CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS
FOR

SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS (2023-SL01)

FOR

CITY OFFICIALS:

PATRICK McNULTY ..... MAYOR

JOE RICCO ..... MAYOR PRO–TEM

EVA JEAN DALTON ..... COUNCIL MEMBER

KEN MEDDERS, JR. ..... COUNCIL MEMBER

KERRY SCHWARTZ ..... COUNCIL MEMBER

RANDY SMITH ..... CITY MANAGER

ANGELIQUE SOTO ..... CITY SECRETARY

KRISTINA BOBURKA ..... SHORELINE DIRECTOR

ERIKA HUGHSTON ..... COASTAL COORDINATOR

ENGINEER:

LJA Engineering, Inc.
TBPE F-1386/TBPLS 10104001
5350 S. STAPLES STREET, SUITE 425
CORPUS CHRISTI, TEXAS 78411
PHONE: 361.991.8550
WWW.LJA.COM

JANUARY 2023

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS
SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS
(2023-SL01)

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I.
NOTICE TO BIDDERS

I.
NOTICE TO BIDDERS

Sealed proposals, addressed to the City of South Padre Island, Texas (Owner) for **SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS (2023-SL01)**. The work consists of demolition, removal, and disposal of existing improvements to allow for construction of proposed improvements to include restrooms, changing rooms, ADA compliant foot wash station, general use rinse station, paver walkway, as well as installation of water, wastewater, and electrical utilities. All work shall be completed in accordance with the construction plans, specifications, and contract documents.

This project is permitted under the rules and regulations of the Texas General Land Office (GLO) Beachfront Construction Certificate & Dune Protection Permit in the City of South Padre Island, GLO ID No.: BDSPI-22-0321. In compliance with the National Oceanic and Atmospheric Administration and the Texas General Land Office, the following information is to be released with this publication: 60% Federal Funding Allocation: $120,000; Minimum 40% Local Funding Allocation: $80,000. These funding percentages and allocations are based on the funding awarded, not on the total project cost. This project is funded in part by a Texas Coastal Management Program grant approved by the Texas Land Commissioner pursuant to National Oceanic and Atmospheric Administration Award No. NA21NOS4190136. This Contract will comply with all applicable clauses described in Appendix II to Part 200 – Contract Provisions for the non-Federal entity Contracts under Federal Awards. This includes all requirements that are set forth in 2 C.F.R. 200.326 and 2 C.F.R. Part 200, Appendix II.

Bids will be received at the office of the City Secretary, located at 4601 Padre Boulevard, South Padre Island, Texas 78597, to include a hard copy bid packet and a digital copy contained in a flash drive, until **2:00 pm** on **February 2, 2023,** and then publicly opened and read. Any bid received after closing time will be returned unopened.

A **Pre-Bid Meeting** is scheduled for **10:00 am** on **January 24, 2023,** at City Hall located at 4601 Padre Boulevard, Texas 78597. The Pre-Bid Meeting will be conducted by the Engineer and the City.

Plans, proposal forms, specifications and contract documents may be procured from the Engineer, LJA Engineering, Inc. (LJA) located at 5350 S. Staples, Suite 425, Corpus Christi, Texas 78411, upon payment of a non-refundable Fifty Dollar **($50.00)** fee. Documents can be obtained by mail upon payment and receipt of an additional/non-refundable Ten Dollar **($10.00)** postage/handling fee. Plans and Specifications will be available to download at no charge on the SPI website or through Sharefile. Please contact the office at 361.991.8550 or via email LJAsouthcc@lja.com to provide all company information in order to access the link.

A bid bond in the amount of 5% of the highest amount bid must accompany each proposal. Failure to provide the bid bond will constitute a non-responsive proposal which will not be considered. Failure to provide required performance and payment bonds for contracts over $25,000.00 will result in forfeiture of the 5% bid bond to the City as liquidated damages.

The City reserves the right to reject any or all bids, to waive irregularities and to accept the lowest bid which, in the City's opinion, seems most advantageous to the City and in the best interest of the public.

CITY OF SOUTH PADRE ISLAND, TEXAS
/s/ Angelique Soto
City Secretary

II.
INSTRUCTIONS TO BIDDERS

II.
INSTRUCTIONS TO BIDDERS

1. GENERAL AND SPECIAL PROVISIONS OF THE AGREEMENT: Bidders shall thoroughly familiarize themselves with Sections IX. and X., especially as they relate to bid preparation, bond submittal, withdrawal, opening and all other aspects related to the Proposal. These Instructions to Bidders are meant as a supplement to these Sections. In the event of a discrepancy, Sections IX. and X. shall prevail.

2. PREPARATION OF BIDS: Bidders will be furnished PROPOSAL forms which will state the description of the proposed work to be performed and a schedule of items for which lump sum bids or unit price bids are asked. All blank places on the PROPOSAL form must be filled in as noted, in ink, with amount extended and totaled and no changes shall be made in the phraseology of the forms or of the items mentioned herein. If the Bidder does not bid on optional items (if shown on the PROPOSAL form) “No Bid” shall be entered in the blank spaces, therefore, PROPOSALS may be rejected if they show any alteration of words or figures, additions not called for, conditional or uncalled for alternate bids, incomplete bids, erasures irregularities of any kind. The PROPOSAL shall be signed in ink by the person or persons authorized to make the bid. If the PROPOSAL is made by an individual, the post office address shall be given. If made by a firm or partnership, the name and post office address of each member of the firm or partnership shall be given. If made by a corporation, its post office address and title of the person signing the PROPOSAL shall be given.

3. EXAMINATION OF PLANS, SPECIFICATIONS AND SITE OF WORK: Before filing a bid, the Bidder shall carefully examine the PROPOSAL, PLANS and SPECIFICATIONS, and form of the CONTRACT to be entered into for the work contemplated. He shall examine the site of work and satisfy himself as to be as to the conditions which will be encountered relating to the character, quality and quantity of the work to be performed and materials to be furnished. He shall satisfy himself as to all subsurface obstacles to be encountered. The filing of a bid by a Bidder shall be presumptive evidence that he has complied with these requirements. Bidders desiring further information or further interpretation of the CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS and PLANS must make request for such information in writing to the Engineer, prior to 48 hours before the bid opening. Answers to all such requests will be given in writing to all Bidders, in addendum form, and all addenda will be bound and made a part of the Contract. No other explanation or interpretation will be considered official or binding. Should a Bidder find discrepancies in, or omissions from the Contract Documents, TECHNICAL SPECIFICATIONS and PLANS, or should he be in doubt as to their meaning, he should at once notify the Engineer in order that a written addendum may be sent to all Bidders. It is the responsibility of the Bidders to know if they have received all such addenda, complete file of which will be maintained in the office of the Engineer.

4. ADDITIONAL INSURED: As delineated in **Paragraph A-20 of the Special Provisions.** The successful bidder shall be required to list the **City of South Padre Island** and **LJA Engineering, Inc. (LJA)** and each of their officers, agents and employees as additional insured on all required and specified in the Contract Documents.

5. INTERPRETATION OF CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS, AND PLANS: Bidder desiring further information, or for further interpretation of the Contract Documents and TECHNICAL SPECIFICATIONS and PLANS must make request for such information in writing to LJA at 5350 S. Staples, Suite 425, Corpus Christi, Texas 78411 prior to (5) working days before the bid opening.

Answers to all such requests will be given in writing to all bidders, in addendum form, and all addendums will be bound and made a part of the Contract. No other explanation or interpretation will be considered official or binding. Should a bidder find discrepancies in, or omissions from the Contract Documents, TECHNICAL SPECIFICATIONS, or PLANS, or should he be in doubt as to their meaning, he should at once notify the Engineer at 5350 S. Staples Street, Suite 425, Corpus Christi, Texas and in order that a written addendum may be sent to all bidders. It is the responsibility of the Bidder to know if they have received all such addenda, complete files of which will be maintained in the office of LJA at 5350 S. Staples Street, Suite 425, Corpus Christi, Texas and in the office designated to receive the PROPOSAL.

6. CONDITIONS OF WORK: Each Bidder is expected to inform himself fully of the construction and labor conditions under which the work will be performed and will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Contract Documents, TECHNICAL SPECIFICATIONS, and PLANS. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of the Contract and to complete the contemplated work for the considerations set forth in his PROPOSAL.

7. PRE-BID CONFERENCE: A pre-bid meeting between the Engineer, prospective bidders, suppliers, etc., will be held to make certain that the scope of the work is fully understood and to answer any questions concerning the work. No addendum will be issued at this meeting, but subsequent thereto, if necessary, to clarify any questions, an addendum will be issued. The **Pre-Bid Meeting** will be held at **10:00 am** on **January 24, 2023**. Interested parties are requested to meet at the time stated above at City Hall located at 4601 Padre Boulevard, South Padre Island, Texas 78597.

8. INSURANCE REQUIRMENTS: Bidders shall note Sections XI-A. Notice to Contractors “A” Insurance Requirements and XI-B. Notice to Contractors “B” Workers Compensation Insurance Requirements.

9. CONTRACTORS QUALIFICATIONS: The Contractor must have at least five (5) projects minimum experience in street reconstruction work of similar size (or larger) and complexity to this project. Contractor shall submit with bid a list indicating the five (5) projects, each to include: Owner, Project Name, Amount of Project, Owner Contact and Project Engineer Contact Information (phone, email, etc.). **The Contractor shall also note to submit with bid all information requested in Item A-21 and Item A-22 of Section X. Special Provisions of the Agreement.**

10. PROJECT SCHEDULE:
The proposed project schedule is as follows:

Tuesday, January 24, 2023	Pre-Bid Meeting (10:00 am)
Thursday, February 2, 2023	Bid Opening (2:00 pm)
Wednesday, February 15, 2023	Contract Award
Wednesday, March 15, 2023	Pre-Construction Meeting & Issue Notice to Proceed
Saturday, March 25, 2023	Begin Construction
Monday, August 21, 2023	Complete Project Construction

III.
PROPOSAL

III.
PROPOSAL

PROPOSAL OF:_____
(COMPANY NAME)

FOR: **SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS (2023-SL01)**

TO: CITY OF SOUTH PADRE ISLAND
4601 PADRE BLVD.
SOUTH PADRE ISLAND, TEXAS 78597

THE UNDERSIGNED, AS BIDDER, DECLARES THAT THE ONLY PERSON OR PARTIES INTERESTED IN THIS PROPOSAL AS PRINCIPALS ARE THOSE NAMED HEREIN; THAT THIS PROPOSAL IS MADE WITHOUT COLLUSION WITH ANY OTHER PERSON, FIRM, CORPORATION; THAT HE HAS CAREFULLY EXAMINED THE PLANS THEREIN REFERRED TO, AND HAS CAREFULLY EXAMINED THE LOCATIONS, CONDITIONS, AND CLASSES OF MATERIALS OF THE PROPOSED WORK, AND AGREES THAT HE WILL PROVIDE ALL THE NECESSARY MACHINERY, TOOLS, APPARATUS, AND OTHER MEANS OF CONSTRUCTION AND WILL DO ALL THE WORK AND FURNISH ALL THE MATERIALS CALLED FOR IN THE CONTRACT AND SPECIFICATIONS IN THE MANNER PRESCRIBED THEREIN AND ACCORDING TO THE REQUIREMENTS OF THE ENGINEER AS THEREIN SET FORTH.

BIDDER FURTHER DECLARES THAT HE HAS EXAMINED THE SITE OF THE WORK AND THAT HE WILL PROVIDE, IF HE IS THE SUCCESSFUL BIDDER, THOSE ITEMS LISTED IN SECTIONS A-21, A-22, AND A-23 OF SECTION VII. SPECIAL PROVISIONS OF THE AGREEMENT. **SEE ITEM NO. 9 CONTRACTORS QUALIFICATIONS, SECTION II. INSTRUCTIONS TO BIDDERS.**

III.
PROPOSAL

BASE BID – SCHEDULE 'A'

I	II	III	IV	V
ITEM	**QTY & UNIT**	**DESCRIPTION**	**UNIT PRICE**	**TOTAL**
I. GENERAL				
A1	1 LS	Mobilization/Demobilization, Complete in Place per Lump Sum.	$_____	$_____
A2	1 LS	Traffic Control, Complete in Place per Lump Sum.	$_____	$_____
A3	1 LS	Storm Water Pollution Prevention Plan, Complete in Place per Lump Sum.	$_____	$_____
A4	0.07 AC	Site Clearing, Grubbing, and Grading, Complete in Place per Acre.	$_____	$_____
A5	1 LS	Allowance for Unanticipated Adjustments, Complete in Place per Lump Sum.	$ 100,000.00	$ 100,000.00
II. SITEWORK				
A6	75 SY	Saw Cut and Remove Existing Asphalt Road and Parking Lot to Accommodate Utilities Installation, Complete in Place per Square Yard.	$_____	$_____
A7	75 SY	Full-Depth Asphalt Pavement Repair, Complete in Place per Square Yard.	$_____	$_____
A8	2 EA	Restrooms per Construction Plans and Specifications, Complete in Place Each.	$_____	$_____
A9	1 LS	Changing Room (Double Unit) per Construction Plans and Specifications, Complete in Place per Lump Sum.	$_____	$_____
A10	1 LS	ADA Foot Bath Station per Construction Plans and Specifications, Complete in Place per Lump Sum.	$_____	$_____
A11	1 LS	Rinse Station per Construction Plans and Specifications, Complete in Place per Lump Sum.	$_____	$_____
A12	50 LF	4" Striping and "NO PARKING" Lettering, Complete in Place per Linear Foot.	$_____	$_____
A13	1 EA	Pavement Handicap Accessible Symbol, Complete in Place per Each.	$_____	$_____
A14	1 EA	Handicap Parking Stall Sign, Complete in Place p er Each.	$_____	$_____

III.
PROPOSAL

BASE BID – SCHEDULE 'A'

I	II	III	IV	V
ITEM	**QTY & UNIT**	**DESCRIPTION**	**UNIT PRICE**	**TOTAL**
II. SITEWORK (CONT'D)				
A15	185 LF	Concrete Header Curb, Complete in Place per Linear Foot.	$_____	$_____
A16	477 SF	Pavers, Complete in Place per Square Foot.	$_____	$_____
III. UTILITIES				
A17	1 EA	Tie In New 4" Wastewater Line to Existing 12" Wastewater Main (10'-12' Depth), Complete in Place per Each.	$_____	$_____
A18	129 LF	4" ASTM D-3034 PVC (SDR 26) Wastewater Line (0'-6' Depth), Complete in Place per Linear Foot.	$_____	$_____
A19	1 EA	4" Wastewater Clean Out (Traffic Rated), Complete in Place per Each.	$_____	$_____
A20	3 EA	4" Wastewater Clean Out, Complete in Place per Each.	$_____	$_____
A21	1 EA	4" SCH 40 45° Bend, Complete in Place per Each.	$_____	$_____
A22	3 EA	4" SCH 40 Wye Bend, Complete in Place per Each.	$_____	$_____
A23	1 EA	Tie In New 2" C-900 PVC Waterline To Existing 2" Waterline, Complete in Place per Each.	$_____	$_____
A24	168 LF	2" C-900 PVC (SDR 21) Waterline, Complete in Place per Linear Foot.	$_____	$_____
A25	3 EA	2" x 2" x 2" Tee, Complete in Place per Each.	$_____	$_____
A26	2 EA	2" 90° Bend, Complete in Place per Each.	$_____	$_____
A27	2 EA	2" 45° Bend, Complete in Place per Each.	$_____	$_____
A28	4 EA	2" Water Valve, Complete in Place per Each.	$_____	$_____
A29	1 LS	Water System Testing And Approval By City Water Department, Complete And In Place Per Lump Sum.	$_____	$_____

III.
PROPOSAL

BASE BID – SCHEDULE 'A'

I	II	III	IV	V
ITEM	**QTY & UNIT**	**DESCRIPTION**	**UNIT PRICE**	**TOTAL**
III. UTILITIES (CONT'D)				
A30	977 LF	Trench Safety Related to 2" C-900 PVC Waterline Improvements (All Depths), Complete In Place Per Linear Foot.	$_____	$_____
A31	129 LF	OSHA Trench Protection For Wastewater Line (All Depths), Complete In Place Per Linear Foot.	$_____	$_____
A32	1 LS	Restrooms Plumbing Improvements per Construction Plans and Specifications, Complete In Place Per Lump Sum.	$_____	$_____
IV. ELECTRICAL				
A33	1 LS	Electrical Improvements per Construction Plans and Specifications, Complete in Place Lump Sum.	$_____	$_____
			TOTAL BASE BID – SCHEDULE 'A' (ITEMS A1-A33):	$_____

BID SUMMARY

BASE BID SCHEDULE 'A' (ITEMS A1 – A33): $_____

The undersigned hereby declares that he has visited the site and has carefully examined the plans, specifications and contract documents relating to the work covered by his bid or bids, that he agrees to do the work, and that no representations made by the City are in any sense a warranty but are mere estimates for the guidance of the Contractor.

III.
PROPOSAL

THE UNDERSIGNED AGREES TO COMPLETE THE WORK FOR **SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS (2023-SL01)** WITHIN **150 CALENDAR DAYS**, FROM THE DATE DESIGNATED BY THE NOTICE TO PROCEED. **(1)** CONTRACTOR **SHALL NOTE** THE SCHEDULE LISTED IN SECTION II. INSTRUCTIONS TO BIDDERS, ITEM NO. 10 AND SPECIFICATION 011100, CONSTRUCTION SEQUENCE ITEMS AND CONSTRUCTION SCHEDULE.

ADDENDUM _____ DATE_____

ADDENDUM _____ DATE_____

ADDENDUM _____ DATE_____

ENCLOSED WITH THE PROPOSAL IS A CASHIER'S CHECK OR BIDDER'S BOND IN THE AMOUNT OF **$**_____ (AT LEAST 5 PERCENT OF THE LARGEST BASE BID SHOWN IN THIS PROPOSAL). UNDERSIGNED AGREES THAT THIS AMOUNT IS THE MEASURE OF LIQUIDATED DAMAGES WHICH OWNER WILL SUSTAIN BY THE FAILURE OF THE UNDERSIGNED TO EXECUTE AND DELIVER THE ABOVE NAMED CONTRACT AND BONDS, AND FURTHER AGREES THAT THIS CHECK OR BIDDER'S BOND SHALL BE COLLECTED AND RETAINED BY OWNER AS LIQUIDATED DAMAGES IN THE EVENT THIS PROPOSAL IS ACCEPTED BY OWNER WITHIN 60 DAYS AFTER THE DATE OF THE OPENING OF BIDS AND THE UNDERSIGNED FAILS TO EXECUTE THE CONTRACT AND THE REQUIRED BONDS WITH OWNER WITH THE CONDITIONS THEREOF, WITHIN TEN (10) DAYS AFTER THE DATE CONTRACT DOCUMENTS ARE RECEIVED BY THE UNDERSIGNED, OTHERWISE SAID CHECK OR BOND SHALL BE RETURNED TO THE UNDERSIGNED IN ACCORDANCE WITH THE PROVISIONS OF THE INVITATION TO BIDDERS.

VERY TRULY YOURS,

BY: _____

TITLE: _____

ADDRESS: _____

_____

(SEAL – IF BID IS BY A CORPORATION)

ATTEST: _____ DATE: _____

IV.
AGREEMENT

IV.
AGREEMENT

THE STATE OF TEXAS §

COUNTY OF CAMERON §

THIS AGREEMENT is entered into this the ___ day of ____, **2023**, by and between the **CITY OF SOUTH PADRE ISLAND,** County of Cameron, State of Texas, acting through its duly authorized City Manager, termed in the Contract Documents as **"CITY"**, and _____, City of _____, County of _____, State of _____, termed in the Contract Documents as **"CONTRACTOR"**, upon these terms, performable in Cameron County, Texas.

IN CONSIDERATION of the payment of **$_____** by the CITY and other obligations of the CITY as set out herein, the CONTRACTOR will construct, and complete certain improvements described as follows:

SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS
(2023-SL01)
SOUTH PADRE ISLAND, TEXAS

ACCORDING TO the attached Plans and Specifications in a good and workmanlike manner for the prices and conditions set out in their attached bid proposal supplying at their expense such materials, services, labor, and insurance as required by the attached Contract Documents, including overseeing the entire job. The Contract Documents include this Agreement, the bid proposal, and instructions, plans and specifications, including all maps, plats, blueprints, and other drawings, the Performance and Payment bonds, addenda, and related documents all of which constitute the contract for this project and are made a part hereof.

The Contractor will commence work within ten (10) calendar days from date they receive written work order and will substantially complete same within **150 calendar days** after the date of said written notice. Should Contractor default, Contractor may be liable for liquidated damages as set forth in the Contract Documents.

CITY WILL pay CONTRACTOR in current funds for performance of the contract in accordance with the Contract Documents as the work progresses. Signed in four (4) parts in South Padre Island, Texas on the date shown above.

ATTEST:

_____
City Secretary

ATTEST: (If Corporation)

_____

NOTE: (If person signing for corporation is not President, attach Authorization to Sign)

CITY OF SOUTH PADRE ISLAND

By:_____
Randy Smith, City Manager

CONTRACTOR

By:_____

Title: _____

_____
(Address)

_____
(City) (State) (Zip)

V.
PERFORMANCE BOND

V.
PERFORMANCE BOND

STATE OF TEXAS §

COUNTY OF CAMERON §

KNOW ALL BY THESE PRESENTS:

That _____, City of _____, County of _____, State of _____, hereinafter called "PRINCIPAL", and _____ _____ a solvent company duly authorized under the laws of the State of Texas to act as surety on bonds for principals, hereinafter called "SURETY", are held and firmly bound unto the CITY OF SOUTH PADRE ISLAND, a municipal corporation of Cameron County, Texas, hereinafter called "CITY", and unto all Subcontractors, workers, laborers, mechanics and suppliers as their interests may appear, all of whom shall have a right to sue upon this bond in the penal sum of _____ *(amount in words)* **($_____)** *(amount in figures)* to be paid in Cameron County, Texas, for the payment of which sum well and truly to be made, We, said PRINCIPAL and SURETY, bind ourselves and our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents:

Conditions of this bond are such that, whereas, PRINCIPAL has entered into a certain written contract with the CITY OF SOUTH PADRE ISLAND, dated this the _____ of _____ , **2023** which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein, for the construction of:

SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS
(2023-SL01)
SOUTH PADRE ISLAND, TEXAS

Now therefore, the condition of this obligation is such, that if said PRINCIPAL shall faithfully perform said Agreement in accordance with the plans, specifications and contract documents, including any changes, extensions, or guarantees, and including all and singular covenants, conditions, and agreements in and by said contract agreed and covenanted by PRINCIPAL to be observed and performed, and according to the true intent and meaning of said Agreement hereto annexed, and if the PRINCIPAL shall repair and/or replace all defects due to faulty materials and/or workmanship that appear within a period of one (1) year from the date of completion and acceptance of improvements by the CITY (OWNER), then this obligation shall be void; otherwise to remain in full force and effect.

SURETY, for value received, stipulates and agrees that no change to the contract time or contract amount, and no alteration or addition to the terms of the contract, or to the work performed thereunder, or to the plans, specifications, drawings, etc., accompanying the same shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract, or to the work to be performed thereunder.

Provided further, that this bond is executed pursuant to Chapter 2253, Texas Government Code, as amended.

Provided further, that if any legal action be filed on this bond, venue shall lie in Cameron County, Texas.

The undersigned agent is hereby designated by the SURETY as the Resident Agent in Cameron County to whom any requisite notices may be delivered and on whom service of process may be had in matters arising out of such suretyship, as provided by Sections 3503.001 to 3503.005, Texas Insurance Code, as amended.

In witness whereof, said PRINCIPAL and SURETY have signed and sealed this instrument in four (4) copies, each one of which shall be deemed an original, this the ___ day of _____, **2023**.

ATTEST

By:_____
Secretary

CONTRACTOR

By:_____

SURETY

By: _____
Attorney-in-fact

Name and address of Resident Agent of Surety in Cameron County, Texas, for delivery of notice and service of process:

Name: _____

Address: _____
(Physical Street Address)

_____
(City) (State) (Zip)

Telephone: _____

Note: Bond shall be issued by a solvent Surety company authorized to do business in Texas and shall meet any other requirements established by law or by (City) OWNER under applicable law.

Note: Surety Agent's Original Power of Attorney must be attached hereto.

Note: Date of Performance Bond must not be prior to date of contract.

VI.
PAYMENT BOND

VI.
PAYMENT BOND

STATE OF TEXAS §

COUNTY OF CAMERON §

KNOW ALL BY THESE PRESENTS:

That _____, City of _____, County of _____, State of _____, hereinafter called "PRINCIPAL", and _____ _____ a solvent company duly authorized under the laws of the State of Texas to act as surety on bonds for principals, hereinafter called "SURETY", are held and firmly bound unto the CITY OF SOUTH PADRE ISLAND, a municipal corporation of Cameron County, Texas, hereinafter called "CITY", and unto all Subcontractors, workers, laborers, mechanics and suppliers as their interests may appear, all of whom shall have a right to sue upon this bond in the penal sum of _____ *(amount in words)* **($_____)** *(amount in figures)* to be paid in Cameron County, Texas, for the payment of which sum well and truly to be made, We, said PRINCIPAL and SURETY, bind ourselves and our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents:

Conditions of this bond are such that, whereas, PRINCIPAL has entered into a certain written contract with the CITY, dated this the _____ day of _____, **2023** which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein, for the construction of:

SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS
(2023-SL01)
SOUTH PADRE ISLAND, TEXAS

Now, therefore, the condition of this obligation is such, that if said PRINCIPAL shall well and truly pay all Subcontractors, workers, laborers, mechanics and suppliers, all monies to them owing by said Principals for subcontracts, work, labor, equipment, supplies and materials done and furnished for the construction of improvements of said Agreement, then this obligation shall be and become null and void; otherwise, to remain in full force and effect.

Surety, for value received, stipulates and agrees that no change to the contract time or contract amount, and no alteration or addition to the terms of the contract, or to the work performed thereunder, or to the plans, specifications, drawings, etc., accompanying the same shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract, or to the work to be performed thereunder.

Provided further, that this bond is executed pursuant to Chapter 2253, Texas Government Code, as amended.

Provided further, that if any legal action be filed on this bond, venue shall lie in Cameron County, Texas.

The undersigned agent is hereby designated by the SURETY as the Resident Agent in Cameron County to whom any requisite notices may be delivered and on whom service of process may be had in matters arising out of such suretyship, as provided by Sections 3503.001 to 3503.005, Texas Insurance Code, as amended.

In witness whereof, said PRINCIPAL and SURETY have signed and sealed this instrument in four (4) copies, each one of which shall be deemed an original, this the _____ day of _____, **2023**.

ATTEST

_____
Secretary

CONTRACTOR

By: _____

SURETY

By: _____
Attorney-in-fact

Name and address of Resident Agent of Surety in Cameron County, Texas, for delivery of notice and service of process:

Name: _____

Address: _____
(Physical Street Address)

_____
(City) (State) (Zip)

Telephone: _____

Note: Bond shall be issued by a solvent Surety company authorized to do business in Texas and shall meet any other requirements established by law or by OWNER under applicable law.
Note: Surety Agent's Original Power of Attorney must be attached hereto.
Note: Date of Payment Bond must not be prior to date of contract.

VII.
SPECIAL PROVISIONS OF THE AGREEMENT

VII.
SPECIAL PROVISIONS OF THE AGREEMENT

A-1 Time and Place of Receiving Proposals/Pre-Bid Meeting

Sealed proposals will be received in conformity with the official advertisement inviting bids for the project. Proposals will be received in the office of the City Secretary, located at 4601 Padre Boulevard, South Padre Island, Texas 78597, until **2:00 p.m.** on **February 2, 2023.** Proposals mailed should be addressed in the following manner:

City of South Padre Island
City Secretary's Office
4601 Padre Boulevard
South Padre Island, Texas 78597

ATTN: BID PROPOSAL – SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS (2023-SL01)

A pre-bid meeting will be held on **January 24, 2023,** beginning at **10:00 a.m.** The pre–bid meeting will convene at City Hall located at 4601 Padre Boulevard, South Padre Island, Texas 78597.

No additional or separate visitations will be conducted by the City.

A-2 Definitions and Abbreviations

Section B-1 of the General Provisions will govern.

A-3 Description of Project:

SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS (2023-SL01). The work consists of demolition, removal, and disposal of existing improvements to allow for construction of proposed improvements to include restrooms, changing rooms, ADA compliant foot wash station, general use rinse station, paver walkway, as well as installation of water, wastewater, and electrical utilities. All work shall be completed in accordance with the construction plans, specifications, and contract documents.

This project is permitted under the rules and regulations of the Texas General Land Office (GLO) Beachfront Construction Certificate & Dune Protection Permit in the City of South Padre Island, GLO ID No.: BDSPI-22-0321. In compliance with the National Oceanic and Atmospheric Administration and the Texas General Land Office, the following information is to be released with this publication: 60% Federal Funding Allocation: $120,000; Minimum 40% Local Funding Allocation: $80,000. These funding percentages and allocations are based on the funding awarded, not on the total project cost. This project is funded in part by a Texas Coastal Management Program grant approved by the Texas Land Commissioner pursuant to National Oceanic and Atmospheric Administration Award No. NA21NOS4190136. This Contract will comply with all applicable clauses described in Appendix II to Part 200 – Contract Provisions for the non-Federal entity Contracts under Federal Awards. This includes all requirements that are set forth in 2 C.F.R. 200.326 and 2 C.F.R. Part 200, Appendix II.

A-4 Method of Award

The bids will be evaluated based on the following priorities subject to the availability of funds.

1. Total Base Bid
2. Experience and Qualifications of Company and onsite Supervisor Personnel.
3. Budget consideration regarding sanitary sewer rehabilitation items and additive items and various combinations.

The City reserves the right to reject any or all bids, to waive irregularities and to accept the bid which, in the City's opinion, is most advantageous to the City and in the best interest of the public.

A-5 Explanation of Proposal and Items to be Submitted with Proposal

See Item 10, Section II. Instructions to Bidders for explanation of the Project Schedule to be considered in preparation of the Proposal.

The following item **are required** to be submitted with the proposal:

1. **5% Bid Bond (Must reference Project Name): Sea Island Circle Beach Access Amenity Improvements (2023-SL01) as identified in the Proposal. (A Cashier's Check, certified check, money order or bank draft from any State or National Bank will also be acceptable.)**

2. A list of successfully completed projects similar to the project proposed by these plans and specifications. The list shall include the project description, construction cost, Owner and Engineer reference contact information.

A-6 Time of Completion/Liquidated Damages

The working time for completion of the Project will be **150 Calendar Days.** The Contractor shall commence work within ten (10) calendar days after receipt of written notice from the Engineer.

For each calendar day that any work remains incomplete after the time specified in the Contract for completion of the work or after such time period as extended pursuant to other provisions of this Contract, **$300.00 (Three Hundred Dollars)** per calendar day will be assessed against the Contractor as liquidated damages. Said liquidated damages are not imposed as a penalty but as an estimate of the damages that the City will sustain from delay in completion of the work, which damages by their nature are not capable of precise proof. The City Manager may withhold and deduct from monies otherwise due the Contractor the amount of liquidated damages due the City.

A-7 Workers Compensation Insurance Coverage

If the Contractor's workers' compensation insurance coverage for its employees working on the Project is terminated or canceled for any reason, and replacement workers' compensation insurance coverage meeting the requirements of this Contract is not in effect on the effective date of cancellation of the workers' compensation insurance coverage to be replaced, then any Contractor employee not covered by the required workers' compensation insurance coverage must not perform any work on the Project.

Furthermore, for each calendar day including and after the effective date of termination or cancellation of the Contractor's workers' compensation insurance coverage for its employees working on the Project until the date replacement workers' compensation insurance coverage, meeting the requirements of this Contract, is in effect for those Contractor employees, liquidated damages will be assessed against and paid by the Contractor at the highest daily rate elsewhere specified in this Contract. Such liquidated damages will accumulate without notice from the Engineer to the Contractor and will be assessed and paid even if the permitted time to complete the Project has not expired.

In accordance with other requirements of this Contract, the Contractor shall not permit subcontractors or others to work on the Project unless all such individuals working on the Project are covered by workers' compensation insurance and unless the required documentation of such coverage has been provided to the Contractor and the Engineer.

A-8 Faxed or Emailed Proposals

Proposals faxed or emailed directly to the City will be considered non-responsive. Proposals must contain original signatures and guaranty and be submitted in accordance with Section B-2 of the General Provisions.

A-9 Acknowledgment of Addenda

The Contractor shall acknowledge receipt of all addenda received in the appropriate space provided in the proposal. Failure to do so will be interpreted as non-receipt. Since addenda can have significant impact on the proposal, failure to acknowledge receipt, and a subsequent interpretation of non-receipt, could have an adverse effect when determining the lowest responsible bidder.

A-10 Cooperation with Public Agencies

The Contractor shall cooperate with all public and private agencies with facilities operating within the limits of the Project. The Contractor shall provide a forty-eight (48) hour notice to any applicable agency when work is anticipated to proceed in the vicinity of any facility by using DIGTESS at 1-800-344-8377, the Lone Star Notification Company at 1-800-669-8344, the Southwestern Bell Locate Group at 1-800-828-5127 and the Verizon Dig Alert at 1-800-483-6279. For the Contractor's convenience, the following telephone numbers are listed.

A/E Project Engineer	Yesenia Singleton, PE 5350 S. Staples, Suite 425 Corpus Christi, TX 78411 Phone: 361.991.8550 Email: ysingleton@lja.com
Police Department	956.761.5454
Public Works Division	956.761.8159
AEP	877.373.4858

A-11 Maintenance of Services

The Contractor shall take all precautions in protecting existing utilities, both above and below ground. The Drawings show as much information as can be reasonably obtained from existing as-built drawings, base maps, utility records, etc. and from as much field work as normally deemed necessary for the construction of this type of project with regard to the location and nature of underground utilities, etc. However, the accuracy and completeness of such information is not guaranteed.

It is the Contractor's sole and complete responsibility to locate such underground features sufficiently in advance of his operations to preclude damaging the existing facilities. If the Contractor encounters utility services along the line of this work, it is his responsibility to maintain the services in continuous operation at his own expense.

In the event of damage to underground utilities, whether shown in the drawings, the Contractor shall make the necessary repairs to place the utilities back in service to construct the work as intended at no increase in the Contract price. All such repairs must conform to the requirements of the company or agency that owns the utilities.

Where existing sewers are encountered and are interfered with (i.e. broken, cut, etc.), flow must be maintained. Sewage or other liquid must be handled by the Contractor either by connection into other sewers or by temporary pumping to a satisfactory outlet, all with the approval of the Engineer and the City.

Sewage or other liquid must not be pumped, bailed, or flumed over the streets or ground surface and Contractor must pay for all fines and remediation that may result if sewage or other liquid contacts the streets or ground surface. It is also the Contractor's responsibility to make all necessary repairs, relocations, and adjustments to the satisfaction of the Engineer at no increase in the Contract price. Materials for repairs, adjustments or relocations of sewer service lines must be provided by the Contractor.

A-12 Area Access and Traffic Control

Sufficient traffic control measures must be used to assure a safe condition and to provide a minimum of inconvenience to motorists. All weather access must be provided to all residents and businesses at all times during construction.
The Contractor must provide temporary driveways and/or roads of approved material during wet weather. The Contractor must maintain a stockpile on the Project site to meet the demands of inclement weather.

The Contractor will be required to schedule his operations so as to cause minimum adverse impact on the accessibility of adjoining properties. This may include, but is not limited to, working driveways in half widths, construction of temporary ramps, etc.

The Contractor shall comply with TxDOT's Manual of Uniform Traffic Control Devices (latest edition).

A-13 Construction Equipment Spillage and Tracking

The Contractor shall keep the adjoining streets free of tracked and/or spilled materials going to or from the construction area. Hand labor and/or mechanical equipment must be used where necessary to keep these roadways clear of job-related materials. Such work must be completed without any increase in the Contract price.

Streets and curb line must be cleaned at the end of the workday or more frequently, if necessary, to prevent material from washing into the storm sewer system. No visible material that could be washed into storm sewer is allowed to remain on the Project site or adjoining streets.

A-14 Excavation and Removals

Excavated areas must be filled with "clean" dirt. "Clean" dirt is defined as dirt that is capable of providing a good growth of grass when applied with seed/sod and fertilizer. The dirt must be free of debris, caliche, asphalt, concrete and any other material that detracts from its appearance or hampers the growth of grass. All existing concrete and asphalt within the limits of the Project must be removed unless otherwise noted.

All necessary removals including but not limited to pipe, driveways, sidewalks, etc., are to be considered subsidiary to the various bid items; therefore, no direct payment will be made to Contractor.

A-15 Disposal/Salvage of Materials

Excess excavated material, broken asphalt, concrete, broken culverts, and other unwanted material becomes the property of the Contractor and must be removed from the site by the Contractor. The cost of all hauling is considered subsidiary; therefore, no direct payment will be made to Contractor.

A-16 Schedule and Sequence of Construction

The Contractor shall submit to the Engineer a work plan based only on working days. This plan must detail the schedule of work and must be submitted to the Engineer at least three (3) working

days prior to the pre-construction meeting. The plan must indicate the schedule of the following work items:

1. Initial Schedule: Submit to the Engineer three (3) days prior to the Pre-Construction Meeting an initial Construction Progress Schedule for review.
2. Items to Include: Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Identify the first workday of each week.
3. Submittal Dates: Indicate submittal dates required for all submittals.
4. Re-Submission: Revise and resubmit as required by the Engineer.
5. Periodic Update: Submit Updated Construction Progress Schedule to show actual progress of each stage by percentage against initial Schedule.

A-17 Construction Staking

The drawings depict lines, slopes, grades, sections, measurements, benchmarks, baselines, etc. that are normally required to construct a project of this nature.

The major control points and benchmarks required for setting up a project will be provided by the Engineer.

The Contractor shall furnish all construction staking.

If, during construction, it is necessary to disturb or destroy a control point or benchmark, the Contractor shall provide the Engineer 48 hours notice so that alternate control points can be established by the Engineer as he deems necessary, at no cost to the Contractor. Control points or benchmarks damaged as a result of the Contractor's negligence will be restored by the Engineer at the expense of the Contractor.

If, for whatever reason, it is necessary to deviate from proposed line and grade to properly execute the work, the Contractor shall obtain approval of the Engineer prior to deviation. If, in the opinion of the Engineer, the required deviation would necessitate a revision to the drawings, the Contractor shall provide supporting measurements as required for the Engineer to revise the drawings.

The Contractor shall tie in or reference all valves and manholes, both existing and proposed, for the purpose of adjusting valves and manholes at the completion of the paving process. Also, the Engineer may require that the Contractor furnish a maximum of two (2) personnel for the purpose of assisting the measuring of the completed work.

A-18 Testing and Certification

The City shall provide material testing. All materials to be used in project construction shall be subject to testing. The preponderance of testing to be performed in this project is directly related to utility construction and a series of laboratory tests normally associated with this type of construction will be required, said tests being performed by an independent testing laboratory using qualified personnel.

The Contractor shall notify the Engineer at least one week prior to the contractor beginning construction. It is assumed that the preponderance of testing required in this project is that testing related directly to street and utility construction. For this reason, the following ratio of testing is established.

RATIO OF TESTING

BACKFILL DENSITY CONTROL

Utility Trench (Outside Roadway).....1 per 200 Linear Feet/Lift (1 per lift min.)

~~Behind Curb and Gutter.....1 per 200 Linear Feet curb and gutter~~
Trench Under Roadways and Driveways.....1 per 200 Linear Feet/Lift (1 per lift min.)

PROCTORS
Base Material .....1 per 3,000 Cubic Yard
Bank Sand Backfill .....1 per each type of material source
Trench Backfill.....1 per each type of material

BASE QUALIFICATION TESTS (Perform Tests Required by TxDOT if TxDOT Spec is Utilized.)
Atterberg Limits and Gradation.....1 per 3,000 Cubic Yard

HOT MIX ASPHALTIC CONCRETE
Lab sampling, lab molding, lab density, stability, maximum theoretical specific gravity and extraction…… ……..1 per project (1 per 500 tons-min)
Cored In-Place Densities/Air Voids, Thickness of Compacted Mix……..Minimum 2 per project 1 per 1,000 Linear Feet of Street

CONCRETE
Compressive Strength Test
Sidewalks, Drives, Concrete Pavement .....1 set (3) per 4,000 Square Foot (1 Set Min.)
~~Poured-In-Place Concrete Box Culvert (Each) .....2 sets per each foundation, each wall, top, or 2 sets for each pour.~~

BANK SAND BACKFILL.....1 Atterberg Limits & 1 – minus #200 sieve analysis from source prior to delivery to site. Two Atterberg Limits and minus #200 sieve from onsite stockpiles when directed by project representative.

SAND BEDDING & INITIAL BACKFILL.....Classification Tests, Sieve Analysis minus #200 sieve prior to delivery to site. Two additional of same tests from stockpile.

The above schedule is a minimum schedule for testing. Failures are not included. In the event of failures, additional tests will be required. If excessive rain occurs on a previously tested section, the Engineer shall have the right to order re-tests as necessary.

All testing in accordance with these requirements shall be performed in accordance with the American Society of Testing Materials (ASTM) latest revision, and/or as elsewhere provided in approved plans and specifications for this project.

All test reports shall be certified by a licensed Professional Engineer (Texas License). The Engineer shall be furnished with a minimum of two (2) copies of the testing reports.

A-19 Surety Bonds
Paragraph two (2) of Section B-3-4 of the General Provisions is changed to read as follows: "No surety will be accepted by the City from any Surety Company who is now in default or delinquent on any bonds or who has an interest in any litigation against the City. All bonds must be

issued by an approved Surety Company authorized to do business in the State of Texas.

If performance and payment bonds are in an amount in excess of ten percent (10%) of the Surety Company's capital and surplus, the Surety Company shall provide certification satisfactory to the City Attorney that the Surety Company has reinsured the portion of the bond amount that exceeds ten percent (10%) of the Surety Company's capital and surplus with reinsurer(s) authorized to do business in the State of Texas. The amount of the bond reinsured by any reinsurer may not exceed ten percent (10%) of the reinsurer's capital and surplus. For purposes of this section, the amount of allowed capital and surplus will be verified through the State Board of Insurance as of the date of the last annual statutory financial statement of the Surety Company or reinsurer authorized and admitted to do business in the State of Texas. The Surety shall designate an agent who is a resident of Cameron County, Texas.

Each bond must be executed by the Contractor and the Surety. For contracts in excess of $100,000 the bond must be executed by a Surety company that is certified by the United States Secretary of the Treasury or must obtain reinsurance for any liability in excess of $100,000 from a reinsurer that is certified by the United States Secretary of the Treasury and that meets all the above requirements. The insurer or reinsurer must be listed in the Federal Register as holding certificates of authority on the date the bond was issued."

A-20 Supplemental Insurance Requirements

For each insurance coverage provided in accordance with Section B-6-11 of the Contract, the Contractor shall obtain an endorsement to the applicable insurance policy, signed by the insurer, stating: In the event of cancellation or material change that reduces or restricts the insurance afforded by this coverage part, each insurer covenants to mail prior written notice of cancellation or material change to:

1. Name: City of South Padre Island / Attn: City Manager
2. Address: 4601 Padre Boulevard, South Padre Island, Texas 78597
3. Number of days advance notice: 30

The Contractor shall provide to the Engineer the signed endorsements, or copies thereof certified by the insurer, within thirty (30) calendar days after the date the Engineer requests that the Contractor sign the Contract documents.

Within thirty (30) calendar days after the date the Engineer requests that the Contractor sign the Contract documents, the Contractor shall provide the Engineer with a certificate of insurance certifying that the Contractor provides worker's compensation insurance coverage for all employees of the Contractor employed on the Project described in the Contract.

For each insurance coverage provided in accordance with Section B-6-11 of the Contract, the Contractor shall obtain an endorsement to the applicable insurance policy, signed by the insurer, stating that the City and LJA Engineering, Inc. are an additional insured under the insurance policy. The City need not be named as additional insured on Worker's Compensation coverage.

For contractual liability insurance coverage obtained in accordance with Section B-6-11 (a) of the Contract, the Contractor shall obtain an endorsement to this coverage stating:

Contractor agrees to indemnify, save harmless and defend the City, its agents, servants, and employees, and each of them against and hold it and them harmless from any and all lawsuits, claims, demands, liabilities, losses and expenses, including court costs and attorneys' fees, for or on account of any injury to any person, or any death at any time resulting from such injury, or any

damage to any property, which may arise or which may be alleged to have arisen out of or in connection with the work covered by this Contract.

The foregoing indemnity shall apply except if such injury, death or damage is caused directly by the negligence or other fault of the City, its agents, servants, or employees or any person indemnified hereunder.

A-21 Considerations for Contract Award and Execution

To allow the City to determine that the bidder is able to perform its obligations under the proposed contract, then prior to award, the City may require a bidder to provide documentation concerning:

1. Whether any liens have been filed against bidder for either failure to pay for services or materials supplied against any of its projects begun within the preceding two (2) years. The bidder shall specify the name and address of the party holding the lien, the amount of the lien, the basis for the lien claim, and the date of the release of the lien. If any such lien has not been released, the bidder shall state why the claim has not been paid; and

Whether there are any outstanding unpaid claims against bidder for services or materials supplied which relate to any of its projects begun within the preceding two (2) years. The bidder shall specify the name and address of the claimant, the amount of the claim, the basis for the claim, and an explanation why the claim has not been paid.

A bidder may also be required to supply construction references and a financial statement, prepared no later than ninety (90) days prior to the City's request, signed and dated by the bidder's owner, president or other authorized party, specifying all current assets and liabilities.

A-22 Contractor's Field Administration Staff

The Contractor shall employ for this Project, as its field administration staff, superintendents and foremen who are careful and competent and acceptable to the City.
The criteria upon which the City makes this determination may include the following:

1. The superintendent must have at least **five (5) years** of experience in the day-to-day field management and oversight of projects of a similar size and complexity to this Project. This experience must include, but is not limited to, scheduling of manpower and materials, structural steel erection, masonry, safety, coordination of subcontractors, and familiarity with the architectural submittal process, federal and state wage rate requirements, and contract close-out procedures.

2. The foreman must have at least **five (5) years** of experience in oversight and management of the work of various subcontractors and crafts. If the scope of the Project is such that a foreman is not required, the Contractor's superintendent shall assume the responsibilities of a foreman.

Documentation concerning these matters will be reviewed by the City. The Contractor's field administration staff, and any subsequent substitutions or replacements thereto, must be approved by the City in writing prior to such superintendent or foreman assuming responsibilities on the Project.

Such written approval of field administration staff is a prerequisite to the City's obligation to execute a contract for this Project. If such approval is not obtained, the award may be rescinded. Further, such written approval is also necessary prior to a change in field administration staff during the term of this Contract. If the Contractor fails to obtain prior written approval of the City concerning any substitutions or replacements in its field administration staff for this Project during the term of the

Contract, such a failure constitutes a basis to annul the Contract pursuant to section B-7-13.

A-23 Amended "Consideration of Contract" Requirements

Under "General Provisions and Requirements for Municipal Construction Contracts" Section B-3-1 Consideration of Contract add the following text: Within five (5) working days following the public opening and reading of the proposals, the three (3) apparent lowest bidders (based on the Base Bid only) must submit to the Engineer the following information:

1. A list of the major components of the work;
2. A list of the products to be incorporated into the Project;
3. A schedule of values which specifies estimates of the cost for each major component of the work;
4. A schedule of anticipated monthly payments for the Project duration.

5. A list of subcontractors that will be working on the Project. This list may contain more than one subcontractor for major components of the work if the Contractor has not completed his evaluation of which subcontractor will perform the work.

The Engineer retains the right to approve all subcontractors that will perform work on the Project. The Contractor shall obtain written approval by the Engineer of all of its subcontractors prior to beginning work on the Project. If the Engineer does not approve all proposed subcontractors, it may rescind the Contract award.

In the event that a subcontractor previously listed and approved is sought to be substituted for or replaced during the term of the Contract, then the Engineer retains the right to approve any substitute or replacement subcontractor prior to its participation in the Project. Such approval will not be given if the replacement of the subcontractor will result in an increase in the Contract price. Failure of the Contractor to comply with this provision constitutes a basis upon which to annul the Contract pursuant to Section B-7-13;

6. A preliminary progress schedule indicating relationships between the major components of the work. The final progress schedule must be submitted to the City at the pre-construction conference;

7. Documentation required pursuant to the Special Provisions A-21 and A-22 concerning Considerations for Contract Award and Execution and the Contractor's Field Administration Staff.
8. Within five (5) days following bid opening, submit in letter form, information identifying type of entity and state, i.e., Texas (or other state) Corporation or Partnership, and name(s) and Title(s) of individual(s) authorized to execute contracts on behalf of said entity.

A-24 Amended Policy on Extra Work and Change Orders

Under "General Provisions and Requirements for Municipal Construction Contracts" B-8-5 Policy on Extra Work and Change Orders the present text is deleted and replaced with the following: Contractor acknowledges that the City has no obligation to pay for any extra work for which a change order has not been signed by the City Manager.

A-25 Amended "Execution of Contract" Requirements

Under "General Provisions and Requirements for Municipal Construction Contracts" B-3-5 Execution of Contract add the following: The award of the Contract may be rescinded at any time prior to the date the City delivers a contract to the Contractor which bears the signature of the City Manager, or his authorized designee. Contractor has no cause of action of any kind, including for breach of contract, against the City, nor is the City obligated to perform under the Contract, until the date the City delivers the signed Contracts to the Contractor.

A-26 Conditions of Work

Each bidder must familiarize himself fully with the conditions relating to the completion of the Project. Failure to do so will not excuse a bidder of his obligation to carry out the provisions of this

Contract. Contractor is reminded to attend the **Pre-Bid Meeting referred to in Special Provision A-1**.

A-27 Precedence of Contract Documents

In case of conflict in the Contract documents, first precedence will be given to addenda issued during the bidding phase of the Project, second precedence will be given to the Special Provisions, third precedence will be given to the construction plans, fourth precedence will be given to the Standard Specifications and the General Provisions will be given last precedence. In the event of a conflict between any of the Standard Specifications with any other referenced specifications, such as the Texas Department of Public Transportation Standard Specifications for Highways, Streets and Bridges, ASTM specifications, etc., the precedence will be given to TxDOT Standard Specifications addenda, Special Provisions and Supplemental Special Provisions (if applicable), construction plans, referenced specifications, Standard Specifications, and General Provisions, in that order.

A-28 Other Submittals

1. Shop Drawing Submittal: The Contractor shall follow the procedure outlined below when processing Shop Drawing submittals:

a. Quantity: Contractor shall submit number required by the City to the Engineer or his designated representative.
b. Submittal Transmittal Forms: Contractor shall use the Submittal Transmittal Form attached at the end of this Section; and sequentially number each transmittal form. Resubmittals must have the original submittal number with an alphabetic suffix. Contractor must identify the Contractor, the Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate, on each submittal form.
c. Contractor's Stamp: Contractor must apply Contractor's stamp, appropriately signed or initialed, which certifies that review, verification of Products required, field dimensions, adjacent construction work, and coordination of information, is all in accordance with the requirements of the Project and Contract documents.
d. Scheduling: Contractor must schedule the submittals to expedite the Project, and deliver to the Engineer for approval, and coordinate the submission of related items.
e. Marking: Contractor must mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
f. Variations: Contractor must identify any proposed variations from the Contract documents and any Product or system limitations which may be detrimental to successful performance of the completed work.
g. Space Requirements: Contractor must provide adequate space for Contractor and Engineer review stamps on all submittal forms.
h. Re-submittals: Contractor must revise and resubmit submittals as required by Engineer and clearly identify all changes made since previous submittal.
i. Distribution: Contractor must distribute copies of reviewed submittals to subcontractors and suppliers and instruct subcontractors and suppliers to promptly report, thru Contractor, any inability to comply with provisions.

2. Samples: The Contractor must submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Engineer's selection.

3. Test and Repair Report: When specified in the Technical Specifications Section, Contractor must submit three (3) copies of all shop test data, and repair report, and all on-site test data within the specified time to the Engineer for approval. Otherwise, the related equipment will not be approved for use on the project.

A-29 Amendment to Section B-8-6: Partial Estimates

General Provisions and Requirements for Municipal Construction Contracts Section B-8-6: Partial Estimates is amended to provide that approximate estimates from which partial payments will be calculated will not include the net invoice value of acceptable, non-perishable materials delivered to the Project work site unless the Contractor provides the Engineer with documents, satisfactory to the Engineer, that show that the material supplier has been paid for the materials delivered to the Project work site.

A-30 OSHA Rules & Regulations

It is the responsibility of the Contractor(s) to adhere to all applicable OSHA rules and regulations while performing any and all City-related projects and or jobs.

A-31 Amended Indemnification & Hold Harmless

Under "General Provisions and Requirements for Municipal Construction Contracts" B-6-19 Indemnification & Hold Harmless, text is deleted in its entirety and the following is substituted in lieu thereof: The Contractor shall hold the City, its officials, employees, attorneys, and agents harmless and shall indemnify the City, its officials, employees, attorneys, and agents from any and all damages, injury or liability whatsoever from an act or omission of the contractor, or any subcontractor, supplier, material man, or their officials, employees, agents, or consultants, or any work done under the contract or in connection therewith by the contractor, or any subcontractor, supplier, material man, or their officials, employees, agents, or consultants.

The contractor shall hold the City, its officials, employees, attorneys, and agents harmless and shall indemnify the City, its officials, employees, attorneys, and agents from any and all damages, injury, or liability whatsoever from a negligent act or omission of the city, its officials, employees, attorneys, and agents that directly or indirectly causes injury to an employee of the contractor, or any subcontractor, supplier or material man.

A-32 Change Orders

Should a change order(s) be required by the engineer, Contractor shall furnish the engineer a complete breakdown as to all prices charged for work of the change order (unit prices, hourly rates, sub-contractor's costs and breakdowns, cost of materials and equipment, wage rates, etc.). This breakdown information shall be submitted by contractor as a basis for the price of the change order.

A-33 As-Built Dimensions and Drawings

1. Contractor shall make appropriate daily measurements of facilities constructed and keep accurate records of location (horizontal and vertical) of all facilities.

2. Upon completion of each facility, the Contractor shall furnish Owner with one set of direct prints, marked with red pencil, to show as-built dimensions and locations of all work constructed. As a minimum, the final drawings shall include the following:
   a. Horizontal and vertical dimensions due to substitutions/field changes.
   b. Changes in equipment and dimensions due to substitutions.
   c. "Nameplate" data on **all** installed equipment.
   d. Deletions, additions, and changes to scope of work.
   e. Any other changes made.

A-34 Disposal of Highly Chlorinated Water

The Contractor shall be responsible for the disposal of water used for testing, disinfection, and line flushing in an approved manner. Contaminants in the water, particularly high levels of chlorine, will be used for disinfection, and may exceed the permissible limits for discharge into wetlands or environmentally sensitive areas. These are regulated by numerous agencies such as TNRCC, EPA, etc. It will be the Contractor's responsibility to comply with the requirements of all regulatory agencies in the disposal of all water used in the project. The methods of disposal shall be submitted to the City for approval.

There shall be no separate pay for disposal of highly chlorinated water. Contractor shall not use the City's sanitary sewer system for disposal of contaminated water.

A-35 Pre-Construction Exploratory Excavations

Prior to any construction whatsoever on the project, Contractor shall excavate and expose all existing pipelines and utilities on the project that cross or run within 6' parallel to, the proposed pipeline construction of the project and Contractor shall survey the exact vertical and horizontal location of each crossing and potentially conflicting pipelines or utilities. The work shall be performed **prior to commencement of construction** and conflicts with proposed construction shall be reported to the Engineer.

Contractor shall then prepare a set of marked plans and submit it to the Engineer for approval indicating the Owner of pipelines and utilities excavated and surveyed, as well as the approximate station thereof, distance to the proposed improvements and elevations of the top of existing pipelines and proposed profile of new improvements if different from that shown on the plans. The Engineer will require 10 working days after receipt in his office of the marked plans to review, analyze and, if necessary, make changes in alignment and/or elevation.

Contractor shall not order materials or perform any construction work on the project until all exploratory excavations have been made in their entirety, the results thereof reported to the Engineer and until Contractor receives Engineer's approval of report.

Exploratory excavations shall not be paid for as a separate item. Any pavement repair associated with exploratory excavations shall be paid for according to the established unit price of pavement repair, however, no cuts may be made in City streets without approval of the City. Contractor shall provide all his own survey work effort (no separate pay) for exploratory excavations.

A-36 Overhead Electrical Wires

Contractor shall comply with all OSHA safety requirements with regard to proximity of construction equipment beneath overhead electrical wires. There are many overhead wires crossing the construction route and along the construction route. Contractor shall use all due diligence, precautions, etc., to ensure that adequate safety is provided for all of his employees and operators of equipment and with regard to ensuring that no damage to existing overhead electrical wires or facilities occurs. Contractor shall coordinate his work with AEP and inform AEP of his construction schedule with regard to said overhead lines. Some overhead lines are shown in the construction plans, while others are not. It shall be the Contractor's sole responsibility to provide for adequate safety with regard to overhead lines whether shown in the plans or not.

A-37 Amended "Maintenance Guaranty"

Under "General Provisions and Requirements for Municipal Construction Contracts", B-8-11 Maintenance Guaranty, add the following: "The Contractor's guarantee is a separate, additional remedy available to benefit the City of South Padre Island. Neither the guarantee nor expiration of the guarantee period will operate to reduce, release, or relinquish any rights or remedies available to the City of South Padre Island for any claims or causes of action against the Contractor or any other individual or entity."

A-38 Mobilization Bid Item

The Mobilization Bid Item shall include mobilization and demobilization and shall not be greater than 8% of the total base bid for each part. 75% of the item will be paid upon mobilization on the job and 25% will be paid upon job completion and demobilization.

A-39 Unanticipated Work Allowance Bid Item

The item included in the Base Bid and Additive Bid items described as "Project Contingency" has been set as noted and shall be included in the Total Base Bid for each bidder. This allowance may be used at the Engineer's discretion should an unanticipated adjustment of existing or planned improvements or heretofore unknown structure or similar situation warrant the use of the allowance funds. Should the use of funds from the allowance become necessary, the Engineer will provide written authorization at a cost negotiated between the City and the Contractor. There is no guarantee that any of these funds will be needed to be used throughout the course of the work.

SUBMITTAL TRANSMITTAL FORM

PROJECT: SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS (2023-SL01)

OWNER: CITY OF SOUTH PADRE ISLAND

ENGINEER: LJA ENGINEERING, INC

CONTRACTOR: _____

SUBMITTAL DATE:_____ **SUBMITTAL NUMBER:**_____

APPLICABLE SPECIFICATION OR DRAWING	**SUBMITTAL**

VII-A.
NOTICE TO CONTRACTORS “A”
INSURANCE REQUIREMENTS

VII-A.

NOTICE TO CONTRACTORS "A" INSURANCE REQUIREMENTS

A Certificate of Insurance indicating proof of coverage in the following amounts is required:

TYPE OF INSURANCE	MINIMUM INSURANCE COVERAGE
30-Day Notice of Cancellation Required on all Certificates	**Bodily Injury/Property Damage Per Occurrence/ Aggregate**
Commercial General Liability Including: 1. Commercial Form 2. Premises - Operations 3. Explosion and Collapse Hazard 4. Underground Hazard 5. Products/ Completed Operations Hazard 6. Contractual Liability 7. Broad Form Property Damage 8. Independent Contractors 9. Personal Injury	$2,000,000 Combined Single Limit
Automobile Liability Owned/Non-Owned or Rented	$1,000,000 Combined Single Limit Rented
Worker's Compensation Employer's Liability	Complies with the Texas Worker's Compensation Act & Paragraph II of this Exhibit. $500,000
Excess Liability	$1,000,000 Combined Single Limit
Professional Pollution Liability/Environmental Impairment Coverage Not limited to sudden & accidental discharge; to include long-term environmental impact for the disposal of contaminants	$2,000,000 Combined Single Limit ☐ Required ☒ Not Required
Builder's Risk	See Section B-6-11 & Supplemental Insurance Requirements ☐ Required ☒ Not Required
Installation Floater	See Section B-6-11 & Supplemental Insurance Requirements ☐ Required ☒ Not Required

The **City of South Padre Island and LJA Engineering, Inc.** must be named as **additional insured** on all coverages except worker's compensation liability coverage.

The **Project Name** must be listed under "description of operations" on each certificate of insurance.

VII-B.
NOTICE TO CONTRACTORS "B"
WORKERS COMPENSATION
INSURANCE REQUIREMENTS

VII-B.
NOTICE TO CONTRACTORS "B"
WORKERS COMPENSATION INSURANCE REQUIREMENTS

TEXAS ADMINISTRATIVE CODE

TITLE 28: INSURANCE
PART 2: TEXAS DEPT. OF INSURANCE, DIVISION OF WORKER'S COMPENSATION
CHAPTER 110: REQUIRED NOTICES OF COVERAGE
SUBCHAPTER B: EMPLOYER NOTICES
RULE§110.110: REPORTING REQUIREMENTS FOR BUILDING OR CONSTRUCTION PROJECTS FOR GOVERNMENTAL ENTITIES

A. The following words and terms, when used in this rule, shall have the following meanings, unless the context clearly indicates otherwise. Terms not defined in this rule shall have the meaning defined in the Texas Labor Code, if so defined.

(1) Certificate of coverage (certificate). A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a workers' compensation coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees (including those subject to a coverage agreement) providing services on a project, for the duration of the project.

(2) Certificate of coverage (certificate). A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a workers' compensation coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees (including those subject to a coverage agreement) providing services on a project, for the duration of the project.

(3) Building or construction. Has the meaning defined in the Texas Labor Code, §406.096(e) (l).

(4) Contractor. A person bidding for or awarded a building or construction project by a governmental entity.

(5) Coverage. Workers' compensation insurance meeting the statutory requirements of the Texas Labor Code, §401.011(44).

(6) Coverage agreement-A written agreement on form TWCC-81, form TWCC-82, form TWCC-83, or form TWCC-84, filed with the Texas Workers' Compensation Commission which establishes a relationship between the parties for purposes of the Texas Workers' Compensation Act, pursuant to the Texas Labor Code, Chapter 406, Subchapters F and G, as one of employer/employee and establishes who will be responsible for providing workers' compensation coverage for persons providing services on the project.

(7) Duration of the project. Includes the time from the beginning of work on the project until the work on the project has been completed and accepted by the governmental entity.

(8) Persons providing services on the project ("subcontractor" in §406.096 of the Act). With the exception of persons excluded under subsections (h) and (i) of this section, includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes but is not limited to independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity furnishing persons to perform services on the project. "Services" includes but is not limited to providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project.

"Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

(9) Project. Includes the provision of all services related to a building or construction contract for a governmental entity.

B. Providing or causing to be provided a certificate of coverage pursuant to this rule is a representation by the insured that all employees of the insured who are providing services on the project are covered by workers' compensation coverage, that the coverage is based on proper reporting of classification codes and payroll amounts, and that all coverage agreements have been filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading certificates of coverage, or failing to provide or maintain required coverage, or failing to report any change that materially affects the provision of coverage may subject the contractor or other person providing services on the project to administrative penalties, criminal penalties, civil penalties, or other civil actions.

C. A governmental entity that enters into a building or construction contract on a project shall:

(1) include in the bid specifications, all the provisions of paragraph (7) of this subsection, using the language required by paragraph (7) of this subsection;

(2) as part of the contract, using the language required by paragraph (7) of this subsection, require the contractor to perform as required in subsection (d) of this section;

(3) obtain from the contractor a certificate of coverage for each person providing services on the project, prior to that person beginning work on the project;

(4) obtain from the contractor a new certificate of coverage showing extension of coverage:

(a) before the end of the current coverage period, if the contractor's current certificate of coverage shows that the coverage period ends during the duration of the project; and

(b) no later than seven days after the expiration of the coverage for each other person providing services on the project whose current certificate shows that the coverage period ends during the duration of the project;

(5) retain certificates of coverage on file for the duration of the project and for three years thereafter;

(6) provide a copy of the certificates of coverage to the commission upon request and to any person entitled to them by law; and

(7) use the language contained in the following Figure 1 for bid specifications and contracts, without any additional words or changes, except those required to accommodate the specific document in which they are contained or to impose stricter standards of documentation: Attached Graphic

D. A contractor shall:

(1) provide coverage for its employees providing services on a project, for the duration of the project based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements;

(2) provide a certificate of coverage showing workers' compensation coverage to the governmental entity prior to beginning work on the project;

(3) provide the governmental entity, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown

on the contractor's current certificate of coverage ends during the duration of the project;

(4) obtain from each person providing services on a project, and provide to the governmental entity:
   (a) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and
   (b) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

(6) notify the governmental entity in writing by certified mail or personal delivery, within ten days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project;

(7) post a notice on each project site informing all persons providing services on the project that they are required to be covered, and stating how a person may verify current coverage and report failure to provide coverage. This notice does not satisfy other posting requirements imposed by the Act or other commission rules. This notice must be printed with a title in at least 30 point bold type and text in at least 19 point normal type, and shall be in both English and Spanish and any other language common to the worker population. The text for the notices shall be the following text provided by the commission on the sample notice, without any additional words or changes: Attached Graphic

(8) contractually require each person with whom it contracts to provide services on a project to:
   (a) provide coverage based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements for all of its employees providing services on the project, for the duration of the project;
   (b) provide a certificate of coverage to the contractor prior to that person beginning work on the project;
   (c) include in all contracts to provide services on the project the language in subsection (e)(3) of this section;
   (d) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
   (e) obtain from each other person with whom it contracts, and provide to the contractor:
      (i) a certificate of coverage, prior to the other person beginning work on the project;
      (ii) prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
   (f) retain all required certificates of coverage on file for the duration of the project and for one year thereafter.
   (g) notify the governmental entity in writing by certified mail or personal delivery, within ten days after the person knew or should have known, of any change that

materially affects the provision of coverage of any person providing services on the project; and

(h) contractually require each other person with whom it contract, to perform as required by subparagraphs (A)-(H) of this paragraph, with the certificate of coverage to be provided to the person for whom they are providing services.

E. A person providing services on a project, other than a contractor, shall:

(1) provide coverage for its employees providing services on a project, for the duration of the project based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements;

(2) provide a certificate of coverage as required by its contract to provide services on the project, prior to beginning work on the project;

(3) have the following language in its contract to provide services on the project: "By signing this contract or providing or causing to be provided a certificate of coverage, the person signing this contract is representing to the governmental entity that all employees of the person signing this contract who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions."

(4) provide the person for whom it is providing services on the project, prior to the end of the coverage period shown on its current certificate of coverage, a new certificate showing extension of coverage, if the coverage period shown on the certificate of coverage ends during the duration of the project;

(5) obtain from each person providing services on a project under contract to it, and provide as required by its contract:

(a) a certificate of coverage, prior to the other person beginning work on the project; and

(b) prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(6) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

(7) notify the governmental entity in writing by certified mail or personal delivery, of any change that materially affects the provision of coverage of any person providing services on the project and send the notice within ten days after the person knew or should have known of the change; and

(8) contractually require each other person with whom it contracts to:

(a) provide coverage based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements for all of its employees providing services on the project, for the duration of the project;

(b) provide a certificate of coverage to it prior to that other person beginning work on the project;

(c) include in all contracts to provide services on the project the language in paragraph (3) of this subsection;

(d) provide, prior to the end of the coverage period, a new certificate of coverage

showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(e) obtain from each other person under contract to it to provide services on the project, and provide as required by its contract:
  (i) a certificate of coverage, prior to the other person beginning work on the project; and
  (ii) prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the contract;

(f) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

(g) notify the governmental entity in writing by certified mail or personal delivery, within ten days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

(h) contractually require each person with whom it contracts, to perform as required by this subparagraph and subparagraphs (A)-(G) of this paragraph, with the certificate of coverage to be provided to the person for whom they are providing services.

If any provision of this rule or its application to any person or circumstance is held invalid, the invalidity does not affect other provisions or applications of this rule that can be given effect without the invalid provision or application, and to this end the provisions of this rule are declared to be severable.

This rule is applicable for building or construction contracts advertised for bid by a governmental entity on or after September 1,1994. This rule is also applicable for those building or construction contracts entered into on or after September 1, 1994, which are not required by law to be advertised for bid.

The coverage requirement in this rule does not apply to motor carriers who are required pursuant to Texas Civil Statutes, Article 6675c, to register with the Texas Department of Transportation and who provide accidental insurance coverage pursuant to Texas Civil Statutes, Article 6675c, §4(j).

The coverage requirement in this rule does not apply to sole proprietors, partners, and corporate officers who meet the requirements of the Act, §406.097(c), and who are explicitly excluded from coverage in accordance with the Act, §406.097(a) (as added by House Bill 1089, 74th Legislature, 1995, §1.20). This subsection applies only to sole proprietors, partners, and corporate executive officers who are excluded from coverage in an insurance policy or certificate of authority to self-insure that is delivered, issued for delivery, or renewed on or after January 1, 1996.

Source Note: *The provisions of this §110.110 adopted to be effective September 1, 1994, TexReg 5715; amended to be effective November 6, 1995, 20 TexReg 8609*

T28S110.110(d)(7)
Required Worker's Compensation Coverage: "The law requires that each person working on this site or providing services related to this construction project must be covered by workers' compensation insurance. This includes persons providing, hauling, or delivering equipment or materials, or providing labor or transportation or other service related to the project, regardless of the identity of their employer or status as an employee".

"Call the Texas Workers' Compensation Commission at 512-440-3789 to receive information on the legal requirement for coverage, to verify whether your employer has provided the required coverage, or to report an employer's failure to provide coverage".

T28S110.110(c)(7)
Workers' Compensation Insurance Coverage:

A. Definitions

Certificate of coverage ("certificate"). A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

Duration of the project. Includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.

Persons providing services on the project ("subcontractor" in §406.096). Includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

B. The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the contractor providing services on the project, for the duration of the project.

C. The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

D. If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

E. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:
(1) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and
(2) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

F. The contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

G. The contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

H. The contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

I. The contractor shall contractually require each person with whom it contracts to provide services on a project, to:
(1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;
(2) provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;
(3) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
(4) obtain from each other person with whom it contracts, and provide to the contractor:
(5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
(6) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and
(7) contractually require each person with whom it contracts, to perform as required by paragraphs (1)-(7), with the certificates of coverage to be provided to the person for whom they are providing services.

J. By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

K. The contractor's failure to comply with any of these provisions is a breach of contract by the contractor which entitles the governmental entity to declare the contract void if the contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

VIII.
GENERAL PROVISIONS OF THE AGREEMENT

VIII.
GENERAL PROVISIONS OF THE AGREEMENT

B-1 DEFINITIONS AND ABBREVIATIONS

B-1-1 Definition of Terms: Wherever the words, forms or phrases defined herein, or pronouns used in their place occur in these specifications, in the contract, in the bonds, in the advertisement or any other documents or instrument herein contemplated, or to which these specifications apply or may apply, the intent and meaning shall be interpreted as follows:

Advertisement: All of the legal publications pertaining to the work contemplated or under contract.

Bidder: Any person, persons, partnership, company, firm, association, corporation, or joint venture acting directly or through a duly authorized representative submitting a proposal for work contemplated.

City: (Also called Owner) The City of South Padre Island, Texas, a municipal corporation, acting by and through (a) its governing body or (b) its City Manager, each of whom is required by Charter to perform specific duties. Responsibility for final enforcement of contracts involving the City of South Padre Island is, by Charter, vested in the City Manager.

City Attorney: The City Attorney of the City of South Padre Island, Texas, or duly authorized assistants or agents.

City Council: The Council of the City of South Padre Island, Texas.

City Engineer: A professional engineer employed as a staff member of the City of South Padre Island, Texas.

City Manager: The Manager of the City of South Padre Island, Texas.

City Secretary: The City Secretary of the City of South Padre Island, Texas, or duly authorized assistants or agents.

Contract: The written agreement covering the performance of the work. The contract includes the advertisement; proposal; specifications, including special provisions; plans or working drawings; any supplemental changes or agreements pertaining to the work or materials therefore, and bonds.

Contract Time: The number of calendar days or working days allowed for completion of the contract, including any authorized time extensions.

Calendar Day: A calendar day is defined as any day shown on the calendar beginning and ending at midnight.

Working Day: A working day is defined as a calendar day, not including Sundays or legal holidays, in which the weather or other conditions affecting the site, not under the control of the Contractor, will in the judgment of the Engineer permit the performance of some substantial unit of work for a substantially continuous period of time of not less than six (6) hours between 7:00 AM and 8:00 PM, or during such other hours of the day as the Contractor does in fact work with the permission of the Engineer as elsewhere provided.

Each calendar day, not including Sundays or legal holidays, in which the Contractor carries on work on some unit of the contract for a period of more than six (6) hours shall be charged as one (1) working day, regardless of the number of hours worked in excess of the (6) hour minimum.

Saturday will not be charged as a working day unless work of any type requiring the presence of the Engineer is in fact carried on for any period of time during the day.

On Sundays and legal holidays on which, by previous written permission of the Engineer as elsewhere provided the Contractor works as much as four hours on some unit of the contract, two working days shall be charged. If, under such permission, work is commenced but proceeds less than four hours, one working day shall be charged. In the determination of the hours above, no deduction shall be made for lunch time taken.

Contractor: The person, persons, partnership, company, firm, association, corporation, or joint venture entering into the contract for the execution of the work, acting directly or through a duly authorized representative.

Engineer: The Consulting Engineer retained by the City of South Padre Island for this project. LJA Engineering, Inc. (LJA).

General Provisions: This Section B of the specifications.

Holidays: The terms regular holidays and legal holidays, for the purposes of charging working days, control of working days and hours, and wages of employees, shall include the following: January 1 (New Year's Day) July 4 (Independence Day) Thanksgiving Days, Memorial Day, Labor Day, and Christmas Day.

Maintenance Guaranty: The approved form of security furnished by the Contractor and his surety as a guarantee that he will maintain the work constructed by him in good condition for the period of time required. This shall be in accordance with the provisions of the specifications and may be made a part of the Performance Bond.

Payment Bond: The approved form of security furnished by the contractor and his surety for the use and benefit of the City as a guarantee for the protection of all claimants supplying labor and/or material in the prosecution of the work provided for in this contract.

Performance Bond: The approved form of security furnished by the contractor and his surety for the use and benefit of the City as a guarantee of good faith on the part of the Contractor to execute the work in strict accordance with the plans, specifications, and terms of the contract, and that the Contractor will maintain the work constructed by him in good condition for the period of one year or such other period of time as may be specially provided.

Plan or Plans: All the drawings pertaining to the contract and made a part thereof, including such supplemental drawings or addenda as the Engineer may issue in order to clarify other drawings or for the purpose of showing changes in the work hereinafter authorized, or for showing details not shown thereon.

Proposal: The written statement or statements duly filed with the City Secretary of the person, persons, partnership, company, firm, association, corporation, or joint venture proposing to do the work contemplated, including the approved form on which the formal bids for the work are to be prepared.

Proposal Guaranty: The bid security designated in the advertisement and proposal to be furnished by each bidder as a guarantee of good faith to enter into a contract with the City and execute the required bonds for the work contemplated after the work is awarded to him.

Special Provisions: The special clauses setting forth conditions or requirements peculiar to the specific project involved, supplementing the standard specifications, and taking precedence over any conditions or requirements of the standard specifications with which they are in conflict.

Specifications: The directions, provisions, and requirements contained herein, together with the special provisions supplemental hereto, pertaining to the method and manner of performing the work or to the qualities or quantities of the material to be furnished under the contract.

Sureties: The corporate bodies which are bound by such bonds as are required with and for the Contractor.

The Work: All work, including the furnishing of labor, materials, tools, equipment, and incidentals, to be performed by the Contractor under the terms of the contract.

B-1-2 Abbreviations: Wherever the abbreviations defined herein occur on the plans, in the specifications, contract, bonds, advertisement, proposal, or in any other document or instrument herein contemplated or to which the specifications apply or may apply, the intent and meaning shall be as follows:

A.A.S.H.T.O.	American Association of State Hwy & Transportation Officials	H.N.G.	Houston Natural Gas Co.
Ac.	Acre	H.S.	Horseshoe
A.C.	Asbestos Cement	In. or "	Inches
A.C.I.	American Concrete Institute	Lb. or #	Pound
A.N.S.I.	American National Standards Institute	L.F.	Linear Foot
Asph.	Asphalt	Lin.	Linear
A.S.T.M.	American Society for Testing Materials	L.S.	Lump Sum
Ave.	Avenue	Max.	Maximum
A.W.P.A.	American Wood Preservers Association	M.H.	Manhole
A.W.S.	American Welding Society	Min.	Minimum
A.W.W.A.	American Water Works Association	Mono.	Monolithic
Blvd.	Boulevard	M.U.T.C.D.	Manual of Uniform Traffic Control Devices
C.F.	Cubic Foot	N.	North
C.I.	Cast Iron	No.	Number
C.L.	Center Line	%	Percent
C.M.P.	Corrugated Metal Pipe	P.L.	Property Line
C.O.	Cleanout	Prop.	Proposed or Property
Conc.	Concrete	P.V.C.	Poly Vinyl Chloride
Cond.	Conduit	R.	Radius
Corr.	Corrugated	R.C.P.	Reinforced Concrete Pipe
C.P. & L.	Central Power & Light Company	Reinf.	Reinforced
Cu.	Cubic	Rem.	Remove
Culv.	Culvert	Rep.	Replace
C.Y.	Cubic Yard	R.R.	Railroad
D.I.	Ductile Iron	R/W or ROW	Right-of-Way
Dia.	Diameter	S.	South
Dr. or Dwy	Drive or Driveway	San.	Sanitary
E.	East	S.F.	Square Foot
Ea.	Each	Sq.	Square
Elev.	Elevation	St.	Street or Storm
Exist.	Existing	Std.	Standard
F.	Fahrenheit	S.Y.	Square yard
F.L.	Flow Line	T.C.	Top of Curb
Ft. or '	Feet	Tel.	Telephone
Gal.	Gallon	V.F.	Vertical Foot
G.L.	Gutter Line	W.	West
G.P.M.	Gallons per Minute	W.U.T.	Western Union Telegraph
		Yd.	Yard
Metrics:			
cm	Centimeter		
gm	Gram	m	Meter
kgm	Kilogram	mgm	Milligram
km	Kilometer	mm	Millimeter

Other abbreviations that may appear shall have the meaning customarily intended in such usage, circumstances, and context.

B-2 PROPOSAL REQUIREMENTS AND CONDITIONS

B-2-1 Proposal Form: The City will furnish bidders with proposal forms which state the general location and description of the contemplated work, and which will contain an itemized list of items of work to be done or materials to be furnished, and upon which bid prices are asked. The proposal form will provide for the amount of proposal guaranty, the contract time, and the acknowledgement of addenda received.

B-2-2 Quantities in Proposal Form: The quantities of the work and materials set forth in the proposal form or on the plans approximately represent the work to be performed and materials to be furnished and are for the purpose of comparing the bids on a uniform basis. Payment will be made by the City to the Contractor only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications, and it is understood that the quantities may be increased or decreased as hereinafter provided without in any way invalidating the bid price.

B-2-3 Examination of Plans, Specifications, and Site of the Work: Bidders are advised that the plans and specifications and other documents on file with the Engineer shall constitute all of the information which the City will furnish. Bidders are required, prior to submitting any proposal, to read the specifications, proposal, contract, and bond forms carefully; to visit the site of the work; to examine carefully local conditions, soil and water conditions to be encountered, improvements to be protected, disposal sites for surplus materials not designated to be salvaged materials, methods of providing ingress or egress to private properties, and methods of handling traffic; to inform themselves, by their independent research, tests, and investigation, of the difficulties to be encountered and judge for themselves of the accessibility of the work and all attending circumstances affecting the cost of doing the work or time required for its completion; and obtain all information required to make an intelligent proposal. No information given by the City or any official thereof, other than that shown on the plans and contained in the specifications, proposal, and other documents, shall be binding upon the City. Bidders shall rely exclusively upon their own estimates, investigations, tests, and other data which are necessary for full and complete information upon which the proposal may be based. It is mutually agreed that submission of a proposal is evidence that the bidder has made the examinations, investigations, and tests required herein.

B-2-4 Forms, Plans and Specifications: Unless otherwise specified in the Notice to Bidders and Special Provisions, forms of proposal, contract and bonds and plans and specifications may be obtained at the offices of the Engineer, LJA Engineering, Inc., 5350 S. Staples Street, Suite 425, Corpus Christi, Texas 78411.

B-2-5 Addenda: Addenda to the plans and specifications, which are formal written notices of additions, deletions, modifications, or explanations of contract documents from the City to prospective bidders in advance of the bid date, may be issued by the Engineer. Such addenda will be mailed immediately to the address designated by prospective bidders taking out plans, specifications, and proposal forms.

B-2-6 Pre-Bid Conference: See Special Provisions for Time and Location of Pre-Bid Conference.

B-2-7 Preparation of Proposal: The bidder shall submit his proposal on the forms furnished by the City. All blank spaces in the forms shall be correctly filled in, and the bidder shall state the prices, written in ink, for which he proposes to do the work contemplated or furnish the material required; the unit prices shall be written both in words and numerals. Such prices shall be written distinctly legible. The unit price shall govern over the amount. If the proposal is submitted by an individual, his name must be signed by him or his duly authorized agent.

If the proposal is submitted by a firm, association, or partnership, the name and address of each member must be given and the proposal signed by a member of the firm, association, or partnership, or person duly authorized. If the proposal is submitted by a company or corporation, the company or corporate name and business address must be given, and the proposal signed by an official or duly authorized agent. Proposals submitted by a joint venture shall list all participants and their addresses. Powers of attorney, authorizing agents, or others to sign proposals, must be properly certified and must be in writing and submitted with the proposal.

B-2-8 Proposal Guaranty: No proposal will be considered unless accompanied by an individual bid security (bond) for the project in the amount of five percent (5%) of the highest amount bid. Such bid security shall be issued by a firm licensed for issuance in the State of Texas. A cashier's check, certified check, money order, or bank draft from any state or national bank will also be acceptable. The security shall be deemed a good faith offer on the part of the bidder to accept a contract, if awarded. In the event the successful bidder declines to accept such award or cannot provide the required bonds and insurance certificates within ten (10) calendar days of the award of the contract, then the amount of the bid security will become the property of the City, not as penalty but as liquidated damages.

The bid securities of the unsuccessful bidders may be released within forty-eight (48) hours of the time bids are received. The bid security of the successful bidder will be released upon execution of the contract documents and submission of the required bonds and certificates.

B-2-9 Filing of Proposal: No proposal will be considered unless it is filed with the City Secretary's office in the City Hall, South Padre Island, Texas, within the time limit for receiving proposals as stated in the advertisement.

Each proposal shall be in a sealed envelope, plainly marked with the word "PROPOSAL" and the name and description of the project as designated in the "ADVERTISEMENT".

B-2-10 Withdrawing Proposals: Proposals filed with the City Secretary cannot be withdrawn or modified prior to the time set for opening proposals. Request for non-consideration of proposals must be made in writing addressed to, and filed with, the City Secretary prior to the time set opening proposals. After other proposals are opened and publicly read, the proposal for which withdrawal is properly requested may be returned unopened.

B-2-11 Cancellation of Bid Opening: The City may, at any time, before any bids are actually opened, cancel the opening of the bids, and return all bids unopened.

B-2-12 Opening Proposals: The proposals filed with the City Secretary will be opened at the time stated in the advertisement and publicly read aloud and shall thereafter remain on file with the City. No contract will be entered into based upon such proposals until after forty-eight (48) hours shall have elapsed. Proposals not accompanied by the required proposal guaranty will not be read.

B-2-13 Irregular Proposals: Proposals will be considered irregular if they show any omissions, failure to properly account for duly issued addenda, alterations of form, additions, conditions not called for, unauthorized alternate bids or irregularities or qualifications of any kind. However, the City reserves the right to waive any irregularities and to make the award in the best interest of the City.

B-2-14 Rejection of Proposals: The City reserves the right to reject any or all proposals, and all proposals submitted are subject to this reservation. Proposals containing any irregularities or showing an unbalanced value of any items may be rejected. Proposals will be rejected for any of the following specific reasons:

(a) Proposal received after the time limit for receiving proposals as stated in the advertisement.
(b) Proposal submitted without the required bid security.
(c) Proposal submitted and not sealed and/or identifiable to a particular project.
(d) Incomplete bid submissions.

B-2-15 Disqualification of Bidders: Bidders may be disqualified, and their proposals not considered for any of the following specific reasons:

(a) Reason for believing collusion exists among the bidders.
(b) Reasonable grounds for believing that any bidder is interested in more than one proposal for the work contemplated.
(c) The bidder being interested in any litigation against the City.
(d) The bidder being in arrears on any existing contract, having defaulted on previous contracts, or being delinquent in the payment of City taxes.
(e) Uncompleted work which, in the judgment of the City, will prevent or hinder the prompt completion of additional work if awarded.
(f) Previous experience investigation reveals poor, incomplete, unacceptable, or inferior work performance and prosecution and lack of fiscal responsibility in paying for services, labor, or products rendered on such previous work.

B-3 AWARD AND EXECUTION OF CONTRACT

B-3-1 Consideration of Contract: After proposals are opened, the proposals will be tabulated for comparison on the basis of the bid prices and quantities shown in the proposal. Until final award of the contract, the City reserves the right to reject any or all proposals or proceed to do the work otherwise in the best interest of the City.

B-3-2 Award of Contract: The City reserves the right to withhold the award of the contract for a reasonable period of time from date of opening proposals, and no award will be made until after investigations are made as to the responsibilities of the low bidder. In the City's considering of an award, the bidder may be requested to submit statements regarding previous experience in performing comparable or similar work, his business or technical organization and equipment to help the City evaluate the bidder's abilities.

The basis for an award will be determined by the lowest responsible bidder (Article 2368a VATS) deemed most advantageous to the City and not necessarily the lowest bidder. In no case will a contract be awarded until at least forty-eight (48) hours shall have elapsed from the time of opening proposals.

B-3-3 Equal Opportunity Employer Provisions: Every Contractor must agree that during the performance of his contract he will:

(a) Treat all applicants and employees without discrimination as to race, color, religion, sex, or national origin.
(b) Identify himself as an equal opportunity employer in all help wanted advertising or requests.

B-3-4 Surety Bonds: With the execution and delivery of the contract, the Contractor shall furnish and file with the City, in the amounts herein required, the following surety bonds:

(a) Performance Bond: A good and sufficient bond in an amount equal to one hundred percent (100%) of the approximate total amount of the contract, as evidenced by the proposal tabulation or otherwise, guaranteeing the full and faithful execution of the work and performance of the contract, and for the protection of the City and all other persons against damage by reason of negligence of the Contractor, or improper execution of the work, or the use of inferior materials. This bond shall provide for the repair and maintenance of all defects due to faulty materials, faulty combinations of materials, and/or faulty workmanship that appear within a period of one year from the date of completion and acceptance of the improvement by the City, or such lesser or greater period as may be designated in the Special Provisions. A Performance Bond will not be required if the contract amount does not exceed $25,000.00.

(b) Payment Bond: A good and sufficient bond in an amount equal to one hundred percent (100%) of the approximate total amount of the contract, as evidenced by the proposal tabulation or otherwise, guaranteeing the full and proper protection of all claimants supplying labor and/or material in the prosecution of the work provided for in said contract and for the use of each such claimant. A Payment Bond will not be required if the contract amount does not exceed $25,000.00.

(c) Other Bonds: Other bonds, if required in the Special Provisions. No surety will be accepted by the City who is now in default or delinquent on any bonds or who is interested in any litigation against the City. All bonds shall be issued by an approved surety company authorized to do business in the State of Texas and acceptable to the City, and the surety shall designate an agent who is a resident of Cameron County, Texas. Each bond shall be executed by the Contractor and the surety.

Should any surety on the contract be determined unsatisfactory at any time by the City, notice will be given the Contractor to that effect, and the Contractor shall immediately provide a new surety satisfactory to the City.

No payment will be made under the contract until the new surety, or sureties as required, has qualified, and been accepted by the City. The contract shall not be operative, nor will any payments be due or paid until approval of the bonds has been made by the City. The City requires that the Power of Attorney submitted with any surety bond (Performance, Payment, etc.) be signed with an original signature and properly dated and sealed.

In the event a facsimile Power of Attorney is used, the City must have on file a sworn statement from an officer of the surety company to the effect that the agent who signs the bond form for the surety is currently in good standing with the surety. It is also required that the facsimile be a true copy of the original Power of Attorney on file among the records of the surety in its home office, not be amended or abridge, still be in full force and effect, and that the City will be notified in the event of cancellation of the particular agent.

B-3-5 Execution of Contract: The person or persons, partnership, company, firm, association, corporation, or joint venture to whom a contract is awarded shall, within ten (10) calendar days after such award and after the Contractor has been requested to execute the documents, sign the required contract, furnish the required insurance certificates, and execute the required bonds. No contract shall be binding on the City until it has been attested by the City Secretary, approved as to form by the City Attorney, executed for the City by the City Manager, and delivered to the Contractor.

B-3-6 Failure to Execute Contract: The failure of the bidder to execute the required bonds, furnish the required insurance certificates, and sign the required contract within ten (10) calendar days after the contract is awarded and the Contractor has been requested to execute the documents shall be considered by the City as an abandonment of his proposal, and the City may annul the award. By reason of the uncertainty of the market prices of materials and labor and its being impracticable and difficult to determine accurately the amount of damages accruing the City by reason of the said bidder's failure to execute said bonds and contract within ten (10) calendar days, the proposal guaranty accompanying the proposal shall be the agreed amount of damages which the City will suffer by reason of such failure on part of the bidder and shall thereupon immediately be forfeited to the City. The filing of a proposal will be considered an acceptance of this provision.

B-4 SCOPE OF WORK

B-4-1 Intent of Plans and Specifications: The intent of the plans and specifications is to prescribe a complete work or improvement which the Contractor undertakes to do in full compliance with the plans, specifications, special provisions, proposal, and contract. The Contractor shall do all work as provided in the plans, specifications, special provisions, proposal, and contract, and shall do such additional extra work as may be considered necessary to complete the work in a satisfactory and acceptable manner. The Contractor shall furnish all labor, tools, material, machinery, equipment, and incidentals necessary for the prosecution of the work.

B-4-2 Subsidiary Work: In the course of furnishing or constructing a complete work or improvement, certain work may be necessary which is subsidiary to the items which are established as pay items. Some such subsidiary work may be shown and specified in detail in the plans and specifications, other work may be less completely shown, and other such work which is entirely necessary for the satisfactory completion of the work as a whole may not be noted on the plans or in the specifications. It shall be the duty of the Contractor to carry out all such subsidiary work as if fully shown, and the cost of such work shall be made subsidiary to the established pay item.

B-4-3 Increased or Decreased Quantities of Work

(a) The City reserves the right to alter the quantities of the work to be performed or to extend or shorten the improvements at any time when and as found necessary, and the Contractor shall perform the work as altered. No allowance will be made for any change in anticipated profits not shall such changes be considered as waiving or invalidating any conditions or provisions of the contract or bonds.

(b) A Major Item as used in this Section shall be construed to be any individual bit item included in the proposal that has a total cost equal to or greater than five percent (5%) of the total contract cost computed on the basis of the proposal quantities and the contract unit prices.

(c) When the quantity of work to be done or of materials to be furnished under any Major Item of the contract is more than one hundred twenty-five (125%) of the quantity of that unit stated in the proposal, then either party, to the contract, upon demand, shall be entitled to revised consideration on that portion of the work above one hundred twenty-five percent (125%) of the quantity stated in the proposal.

(d) When the quantity of work done or materials to be furnished under any Major Item of the contract is less than seventy-five percent (75%) of the quantity of that item stated in the proposal, then either party, to the contract, upon demand, shall be entitled to revised consideration on the work performed.

(e) Any revised consideration is to be determined by special agreement or as is hereinafter provided under "Payment for Extra Work".

B-4-4 Alteration of Plans and Specifications: The City reserves the right to make such changes in the plans and specifications and in the character of the work as may be necessary or desirable to ensure completion in the most satisfactory manner, provided such changes do not materially alter the original plans and specifications or change the general nature of the work as a whole. Such changes shall not be considered as waiving or invalidating any condition or provision of the contract and bonds.

B-4-5 Value Engineering Incentive Procedures: After the award of the contract, the Contractor may develop and submit, to the Engineer, Value Engineering Change Proposals (VECP's) identifying potential reductions in the contract cost by effective changes to the contract plans and specifications. Any VECP submittal shall include the following:

(a) The present contract requirement and description of the proposal change including any modifications to the plans and specifications.
(b) The comparative advantages and disadvantages of both the present requirement and the proposed change.
(c) An analysis of how the proposed change will alter the function, characteristics and/or performance of a component.
(d) A separate detailed cost estimate comparing the cost of the existing requirement and the cost of the proposed change including any costs which might be incurred in testing or evaluation of the proposed change.
(e) A comparative projection of the operational and maintenance costs of the existing requirement and the proposed change.
(f) A projection of the latest date which the VECP can be incorporated into the contract to achieve maximum cost savings. Any effect upon completion time or delivery schedule should also be noted.

The Engineer shall notify the Contractor of the status of the VECP within thirty (30) days of its receipt. Acceptance or rejection of the VECP by the Engineer shall be final. If the VECP is not accepted, written notification will be provided detailing the reasons for rejection. Any VECP may be accepted in whole or in part.

Execution by both parties of a change order to the contract covering the proposed changes shall constitute approval of the VECP and authorization to proceed with the changes. Until such time as the change order is executed, the Contractor shall perform in accordance with the provisions of the existing contract.

The Contractor's share of the savings resulting from approval of the VECP shall be fifty percent (50%) of the net cost savings calculated as follows: Contractor's Share = .50 (existing contract requirement cost – proposed change costs – testing and evaluation costs incurred by the City or Contractor).

This savings will be reflected on the change order approving the VECP and authorizing the change. Deletion of contract work or construction items and changes initiated by the City will not be considered as VECP's. In those instances, the City will realize 100% of the contract reduction or cost savings.

B-4-6 Extra Work: When additional work not shown in the plans and specifications or reasonably inferred as subsidiary work or as normal adaptation to existing conditions is required, the Contractor shall do such work when ordered in writing by the Engineer. Payment for such extra work will be made as hereinafter provided.

B-5 CONTROL OF THE WORK AND MATERIALS

B-5-1 Authority of the Engineer: All work shall be performed under the supervision of the Engineer in a workmanlike manner and to his/her satisfaction. He shall decide all questions which arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rate of progress of the work, sequence of the construction, interpretation of the plans and specifications, acceptable fulfillment of the contract, compensation, mutual rights between Contractors under these specifications and suspension of the work.

He shall determine the amount and quality of the work performed and materials furnished, and his decisions and estimates shall be final. His estimate in such event shall be a condition precedent to the right of the Contractor to receive money due him under the contract.

B-5-2 Authority and Duty of Engineers or Inspectors: The Engineer may appoint Engineers and/or Inspectors as assistants to inspect all work done and material 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. The Engineer or Inspector will not be authorized to revoke, alter, expand, relax, or waive any requirements of the contract documents. The Engineer or Inspector will keep a record of the progress of the work and the manner in which it is being performed and inform the Engineer of same.

He is authorized to call to the attention of the Contractor any deficiency of the work or of materials to conform to the contract documents; however, failure to do so shall not constitute acceptance of said work. The Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether or not the work performed was in accordance with the requirements and intent of the plans and specifications.

The Engineer or Inspector shall in no case act as foreman or supervisor or perform other duties for the Contractor nor interfere with the management of the work by the latter. Any advice which the Engineer or Inspector may give the Contractor shall in no way be construed as binding to the City or release the Contractor from fulfilling all the terms of the contract.

The Engineer or Inspector shall have the authority to reject materials or suspend the work until any questions at issue can be referred to and decided by the Engineer. If the Contractor refuses to suspend operations on verbal order, the Engineer or Inspector shall issue a written order giving the reason for suspending the work. After delivering the order to the person in charge, the Engineer or Inspector shall immediately leave the job site. Work done during the absence of the Engineer or Inspector under these circumstances will not be accepted or paid for.

B-5-3 Conformity with Plans: All work shall conform to the lines, grades, cross-sections, and dimensions shown on the plans. Any deviation from the plans which may be required by the exigencies of construction will be determined by the Engineer and authorized by him in writing.

B-5-4 Existing Structures: The plans show the location of all known surface and subsurface structures. However, the location of many gas mains, water mains, conduits, sewers, etc. is unknown, and the City assumes no responsibility for failure to shown any or all of these structures on the plans or to show them in their exact location.

It is mutually agreed such failure will not be considered sufficient basis for claims for additional compensation for extra work in any manner whatsoever unless the obstruction encountered is such as to necessitate substantial changes in the lines or grades or requires the building of special work for which no provision is made in the plans, and which is not essentially subsidiary to some item of

work for which provision is made. It is assumed that, as elsewhere provided, the Contractor has thoroughly inspected the site, is informed as to the correct location of surface structures, has included the cost of such incidental work in the prices bid, and has considered and allowed for all foreseeable incidental work due to variable subsurface conditions, whether such conditions and such work are fully and properly described on the plans or not. Minor changes and variations of the work specified and shown on the plans shall be expected by the Contractor and allowed for as incidental to the satisfactory completion of a whole and functioning work or improvement.

B-5-5 Coordination of Plans, Specifications, Proposal and Special Provisions: The plans, general provisions, proposal, special provisions, standard specifications, and all supplemental documents are intended to describe a complete work and are essential parts of the contract. A requirement occurring in any of them is binding. In case of discrepancies, figured dimensions shall govern over scale dimensions; plans shall govern over specifications; special provisions shall govern over both general and standard specifications; and plans and quantities shown on the plans shall govern over those shown in the proposal.

The Contractor shall not take advantage of any apparent error or omission in the plans and specifications, and the Engineer shall be permitted to make such corrections or interpretations as may be deemed necessary for the fulfillment of the intent of the plans and specifications. In the event the Contractor discovers an apparent error or discrepancy, he shall immediately call this to the attention of the Engineer.

B-5-6 Cooperation of Contractor: The Contractor will be supplied with three (3) copies of the plans and specifications. The Contractor shall have available on the work site at all times, one copy of said plans and specifications. The Contractor shall give to the work the consistent attention necessary to facilitate the progress thereof, and he shall cooperate with the Engineer, his authorized representatives, and with other contractors in every way possible.

The Contractor shall provide a competent superintendent on the work at all times who is fully authorized as his agent on the work. Such superintendent shall be capable of reading and understanding the plans and specifications and shall receive and fulfill instructions from the Engineer or his authorized representatives.

The Contractor shall provide all facilities to enable the Engineer or Inspector to inspect the workmanship and materials entering into the work. On marine work, the Contractor shall furnish motorboat transportation as required by the Engineer for the purpose of inspecting the work. The superintendent shall keep the Engineer, or his representative informed of the work he is planning to do and the work schedule.

B-5-7 Construction Staking: The Engineer will furnish the Contractor with baseline monumentation and project benchmarks necessary for the proper prosecution and control of the work contracted for under these specifications. Such monuments or markings as the Engineer may establish either for his own use or the Contractor's guidance shall be preserved by the Contractor until authorized by the Engineer to remove same. Unnecessary destruction of monuments shall not be allowed by the Contractor.

B-5-8 Source of Supply of Materials: The materials shall be the best procurable as required by the plans, specifications, and special provisions. The Contractor shall not start delivery of materials until the Engineer has approved the source of supply. Only material conforming to these specifications shall be used, only after written approval has been given by the Engineer, and only so long as the quality of said materials remains equal to the requirements of the specifications.

The Contractor shall furnish approved materials from other sources if for any reason the product from any source at any time before commencement or during the prosecution of the work proves unacceptable. After approval, any material which has become mixed with or coated with dirt or any other foreign substances during its delivery and handling will not be permitted to be used in the work. New material is required unless otherwise specially provided in the plans and specifications.

B-5-8 Source of Supply of Materials: The materials shall be the best procurable as required by the plans, specifications, and special provisions. The Contractor shall not start delivery of materials until the Engineer has approved the source of supply. Only material conforming to these specifications shall be used, only after written approval has been given by the Engineer, and only so long as the quality of said materials remains equal to the requirements of the specifications. The Contractor shall furnish approved materials from other sources if for any reason the product from any source at any time before commencement or during the prosecution of the work proves unacceptable. After approval, any material which has become mixed with or coated with dirt or any other foreign substances during its delivery and handling will not be permitted to be used in the work. New material is required unless otherwise specially provided in the plans and specifications.

B-5-9 Samples and Tests of Materials: Where, in the opinion of the Engineer or as called for in the specifications, tests of material are necessary, such tests will be made at the expense of the Contractor unless otherwise provided. Tests, unless otherwise specified, will be made in accordance with the latest methods of the American Society for Testing Materials.

B-5-10 "Or Equal" Clause: All bids shall be based on the specified products. Where two or more products are specified for an item of work, either one thereof is acceptable and the choice is left to the Contractor.

Where only one product is specified, and where the term "or approved equal “or similar wording is used in connection with specified products, the Contractor may, if he so desires, offer for consideration a substitute product which he judges to be equal in every respect to the required product.

When a specific process is specified as well as a guarantee of the results, the Contractor shall, if in his judgment the process may not produce the required result, offer for approval an alternative process which he would guarantee. All such offers shall be made in writing to the Engineer after award of contract.

The Contractor shall furnish to the Engineer with the first submittal sufficient drawings, specifications, samples, performance data, and other information necessary to assist the Engineer in determining whether the proposed substitution is acceptable. The burden of proof shall be upon the Contractor. No consideration will be given to incomplete submittals. Substitutions must be approved in writing before they may be used.

B-5-11 Removal of Defective and Unauthorized Work: All work which has been rejected or condemned shall be repaired, or if it cannot be repaired satisfactorily, it shall be removed and replaced at the Contractor's expense. Defective materials shall be immediately removed from the site of the work. Work done without line and grade having been given, work done beyond the lines or not in conformity with the grades shown on the plans or as given, save as herein provided, work done without proper inspection, or any extra or unclassified work done without written authority and prior agreement in writing as to prices shall be done at the Contractor's risk and will be considered unauthorized and, at the option of the Engineer, may not be measured and paid for and may be ordered removed at the Contractor's expense.

Upon failure of the Contractor to repair satisfactorily or to remove and replace rejected, unauthorized, or condemned work or materials immediately after receiving notice from the Engineer, the Engineer will, after giving written notice to the Contractor, have the authority to cause defective work to be remedied or removed and replaced or to cause unauthorized work to be removed, and to deduct the cost thereof from any monies due or to become due the Contractor.

B-5-12 Final Inspection: The Engineer will make final inspection of all work included in the contract as soon as practicable after the work is completed and ready for acceptance. If the work is not acceptable to the Engineer at the time of such inspection, he/she will inform the Contractor as to the particular defects to be remedied before final acceptance will be made.

Previous inspection by the Engineer or his/her representatives during the course of the work shall not be interpreted as approval or acceptance of work or materials which on final inspection are found to be defective or note in accordance with the contract and its duly authorized modifications.

B-5-13 Warranty Inspection: Forty-five (45) to sixty (60) days prior to the expiration of the maintenance guaranty period as specified in the contract documents, a warranty inspection will be made. The Contractor may be notified when this examination will be made so that he or his representatives may be present. Within the maintenance guaranty period, the Contractor when ordered by the Engineer, shall repair, replace, or rebuild such portions which are found to be faulty because of materials or workmanship. The Contractor shall begin the remedial work within ten (10) calendar days of written order by the Engineer. In case the Contractor does not start remedial work within the above time limit, or in case of an emergency condition caused by faulty work, the City may take remedial action and charge the cost thereof against the Contractor and/or his surety.

B-6 LEGAL RELATIONS AND PUBLIC RESPONSIBILITY

B-6-1 Laws to be Observed: The Contractor shall at all times observe and comply with all Federal and State Laws and City ordinances and regulations which in any manner affect the conduct of the work and shall observe and comply with all orders, laws, ordinances, and regulations which exist, or which may be enacted later by bodies having jurisdiction or authority for such enactment. No pleas of misunderstanding or ignorance thereof will be considered. The Contractor and his surety shall indemnify and save harmless the City and all its officials, agents, and employees against any claims or liability arising from or based on the violation of any such law, ordinance, regulation, or order, whether by himself or his employees.

B-6-2 Permits and Licenses: The Contractor shall procure all legally required building, plumbing, electrical, TxDOT, TCEQ and other permits and licenses, pay all charges and fees (except City fees), give all notices necessary and incidental to the due and lawful prosecution of the work, and arrange for all building, plumbing, electrical or other inspections as appropriate.

B-6-3 Patented Devices, Materials and Processes: If the Contractor is required or desires to use any design, device, material, or process covered by letters, patent, or copyright, he shall provide for such use by suitable legal agreement with the patentee or owner. It is mutually agreed and understood that, without exception, contract prices shall include all royalties or costs arising from patents, trademarks and copyrights in any way involved in the work. The Contractor and his sureties shall indemnify and save harmless the City 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 in connection with the work agreed to be performed under this contract and shall indemnify the City for any cost, expense, or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

B-6-4 Sanitary Provisions: The Contractor shall establish and enforce among his employees such regulations in regard to cleanliness and disposal of garbage and waste as will tend to prevent the inception and spread of infection or contagious diseases and to prevent effectively the creation of a nuisance about the work or any property either public or private, and such regulations as are required by the Engineer shall be put into immediate force and effect by the Contractor.

The necessary sanitary conveniences for the use of laborers on the work, properly secluded from public observation, shall be constructed, and maintained by the Contractor in such manner and at such points as will be approved by the Engineer, and their use shall be strictly enforced by the Contractor. All sanitary laws and regulations of the State of Texas and the City of South Padre Island shall be strictly complied with.

B-6-5 Public Convenience and Safety: Materials stored about the work shall be so placed and the work shall at all times be so conducted as to cause no greater obstruction to the traveling public than is considered necessary by the Engineer. The Contractor shall, upon direction of the Engineer, make provisions by bridges or otherwise at sidewalks and private driveways for the free passage of pedestrians and vehicles provided that, where bridging is impracticable or unnecessary in the opinion of the Engineer, the Contractor may make arrangements satisfactory to the Engineer for the diversion of traffic and shall, at his own expense, provide all material and perform all work necessary for the construction and maintenance of roadways and bridges. Sidewalks must not be obstructed except by special permission of the Engineer.

The materials excavated and the construction materials or plant used in the construction of the work shall be placed so as not to endanger the work or prevent free access to all fire hydrants, water valves, gas valves, manholes for telephone, telegraph, signal, or electric conduits, sanitary or storm sewers, and fire alarm or police call boxes in the vicinity.

The City reserves the right to remedy any neglect on the part of the Contractor as regards the public convenience and safety which may come to its attention after twenty-four hours notice in writing to the Contractor except in case of emergency when it shall have the right to remedy any neglect without notice, and in either case, the cost of such work done by the City shall be deducted from monies due or to become due the Contractor. The Contractor shall notify the Fire and Police Departments when any street is closed or obstructed.

Where the Contractor is required to construct temporary bridges or make other arrangements for crossings over ditches or streams, his responsibility for accidents shall include the roadway approaches as well as the structures of such crossings.

The Contractor shall mark all detours as directed by the Engineer so that the entire route of the detour is designated, such markings to be by neat and workmanlike signs large enough and so painted and so placed as to be clearly visible.

B-6-6 Privileges of Contractor in Streets and Right-of-Way: For the performance of the contract, the Contractor will be permitted to occupy such portions of streets or other right-of-way, as provided for in the ordinances of the City, as shown on the plans or as permitted by the Engineer. The Contractor's maximum allowable weight for loaded equipment is 54,000 lbs. on City streets.

B-6-7 Traffic Control Devices: Where the Contractor's operations are carried on in or adjacent to any public right-of-way or public place and which, in the opinion of the Engineer, interferes with normal vehicular and pedestrian traffic, the Contractor shall take appropriate measures to protect persons, property and the work. Such measures shall include but not be limited to barricades, lights, signs, fences, flag-person, and watchmen.

Such measures shall be taken to exclude or route pedestrian and vehicular traffic around the work and area of operations. Barricades, lights, signs, and flag-person shall be utilized in accordance with the Standards and Practices of the Texas Department of Transportation.

The Contractor shall be responsible for all damages to persons, property and the work occasioned by his operations and said responsibility shall not cease until the project has been accepted by the City.

B-6-8 Protection and Restoration of Property: Where the work passes over or through private property, the City will provide such right-of-way. The Contractor shall not enter upon private property for any purpose without having previously obtained permission from the owner.

The Contractor shall be responsible for the preservation of and shall use every precaution to prevent damage to all trees, shrubbery, plants, lawns, fences, culverts, bridges, pavements, driveways, sidewalks, etc., to all water, sewer & gas lines; to all conduits, to all overhead pole lines, or appurtenances thereof; and to all other public and private property along or adjacent to the work. The Contractor shall be responsible for all damage or injury to the property of any character resulting from any act, omission, neglect or misconduct in the execution of the work or in consequence of the non-execution thereof on the part of the Contractor, he shall restore or have restored at his own cost and expense such property to a condition similar to equal to that existing before such damage or injury was done by repairing, rebuilding or otherwise restoring as may be directed, or he shall made good such damage from injury in a manner acceptable to the owner or the Engineer. In case of failure on the part of the Contractor to restore such property or to make good such damage or injury, the Engineer may, after forty-eight (48) hours written notice under ordinary circumstances, and without notice when a nuisance or hazardous condition results, proceed to repair, rebuild or otherwise restore such property as may be determined necessary, and the cost thereof will be deducted from any monies due or to become due the Contractor under his contract.

B-6-9 Responsibility for Damage Claims: The Contractor shall not commence work under this contract until he has obtained all insurance required herein and such insurance has been approved by the City. The Contractor shall not allow any subcontractor(s) to commence work until all similar insurance required of the subcontractor(s) has been so obtained.

Within ten (10) calendar days after the date the City requests that the Contractor sign the contract documents, the Contractor shall furnish the City with certificates of insurance evidencing that the Contractor has obtained insurance coverage of the types more particularly described below in parts (a) through (e) of this section. (For self-insured workers' compensation coverage, other documents, specified hereafter, may be substituted for the certificate of insurance just described).

The workers' compensation insurance policy need not list the City as an additional insured. Additionally, all certificates of insurance shall state the name of the project in the "Description of Operations" section of such certificate. These certificates and any subsequent insurance certificates in connection with this particular contract shall be delivered to the offices of the Engineer. The Certificates of Insurance shall state that ten (10) days written notice will be given the City before any policy covered thereby is changed or canceled and shall shown the following minimum coverage in an insurance company acceptable to the City. The City reserves the right to modify minimum limits based upon the nature and scope of the work. The Contractor agrees to comply with the Supplemental Insurance Requirements stated in the "Special Provisions" section of this contract.

(a) General Liability – Including Commercial General Form; Premises - Operations; Explosion & Collapse Hazard; Underground Hazard; Products/Completed Operations Hazard; Contractual Insurance, with an endorsement on the face of the certificate that it includes the "Hold Harmless" in the last paragraph of this provision; Broad Form Property Damage; Independent Contractors; and Personal Injury:
(b) Automobile Liability – Owned, Non-Owner or Rented:
(c) Workers' Compensation and Occupational Diseases – The Contractor shall obtain worker's compensation insurance coverage through a licensed insurance company or through self-insurance obtained in accordance with Texas law. If such coverage is obtained through a licensed insurance company, then the contract for coverage shall be written on a policy and endorsements approved by the Texas State Board of Insurance.
(d) Employer's Liability

B-6-10 Contractor's Claim for Damages: Should the Contractor claim compensation for any alleged damage by reason of the acts or omissions of the City, he shall, within three (3) days after sustaining such alleged damage, make a written statement to the Engineer, setting out in detail the nature of the alleged damage; and on or before the twenty-fifth (25th) day of the month succeeding that in which any such damage is claimed to have been sustained. The Contractor shall file with the Engineer an itemized statement of the details and amount of such alleged damage and, upon request, shall give the Engineer access to all books of accounts, receipts, vouchers, bills of lading and other books or papers containing any evidence as to the amount or such alleged damage. Unless such statements shall be filed as hereinabove required, the Contractor's claim for compensation shall be waived and he shall not be entitled to payment on account of such damage.

B-6-11 Public Utilities and Other Property to be Changed: In case it is necessary to change or move, the property shall not be moved or interfered with until ordered to do so by the Engineer, unless the plans or specifications show that such work is to be done by the Contractor. The right is reserved to the owner of public utilities to enter upon the limits of the contract for the purpose of making such changes or repairs of their property that may be necessary by performance of the contract. The City reserves the right of entering upon the limits of the contract for the purpose of repairing or relaying sewer, gas and water lines and appurtenances, repairing structures, etc., and making other repairs, changes, or extensions to any City property.

B-6-12 Arrangement and Charge for Water Furnished by the City: Where the Contractor desires to use City water in connection with any construction work, he shall make complete and satisfactory arrangements with the City of South Padre Island Public Works Department for so doing. Payment will be at City standard rates.

B-6-13 Use of Fire Hydrants: No person shall open, turn off, interfere with, attach any pipe, or hose to, or connect anything with any fire hydrant, stop valve or stop cock, or tap and water main belonging to the City unless duly authorized to do so by the City of South Padre Island, Public Works Department.

B-6-14 Use of a Section or Portion of the Work: Wherever, in the opinion of the Engineer, any section or portion of the work or any structure is in suitable condition, it may be put into use upon the written order of the Engineer, and such usage shall not be held to be in any way an acceptance of said work or structure or any part thereof or as a waiver of any of the provisions of these specifications or the contract pending final completion and acceptance of the work; all necessary repairs and removals of any section of the work so put into use, due to defective materials or workmanship or to operations of the Contractor, shall be performed by the Contractor at his own cost and expense.

B-6-15 Separate Contracts: The City reserves the right to make essential installation of items not included in the contract prior to acceptance of the project from the Contractor. Within this right, the City may let other contracts or may do such work with its own materials and labor forces. The City, in reserving this right, warrants that it will cooperate with the Contractor's forces and goals.

The Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor or company or by City employees. The Contractor shall cooperate to the end that the City may realize a complete functioning of the project on the date of Final Acceptance.

B-6-16 Contractor's Responsibility for the Work: Until written acceptance by the Engineer, as provided for in these specifications, the work shall be under the charge and care of the Contractor, and he shall take every necessary precaution to prevent injury or damage to the work or any part thereof by action of the elements or from any other cause whatsoever, whether arising from the execution or non-execution of the work. The Contractor will be responsible for damage to streets caused by overweight equipment. The Contractor shall rebuild, repair, restore and make good, at his own cost and expense, all injuries, or damages to any portion of the work occasioned by any of the hereinabove causes.

B-6-17 No Waiver of Legal Right: Inspection by the Engineer, any order, measurement, quantity, or certificate by the Engineer; any order by the City for payment of money; any payment for or acceptance of any work; or any extension of time; or any possession taken by the City shall not operate as a waiver of any provisions of the contract or any power therein reserved to the City of any rights or damages therein provided. Any waiver of any breach of contract shall not be held to be waiver of any other or subsequent breach.

The City reserves the right to correct any error that may be discovered in any estimate that may have been paid and to adjust the same to meet the requirements of the contract and specifications under the 1-Year Warranty.

The City reserves the right to claim and recover by process of law sums as may be sufficient to correct any error or make good any deficiency in the work resulting from such error, dishonesty, or collusion, upon the conclusive proof of collusion or dishonesty by the Contractor or his agents and the Engineer or his assistants, discovered in the work after the final payment has been made.

B-6-18 No Waiver of Legal Right: Inspection by the Engineer, any order, measurement, quantity, or certificate by the Engineer; any order by the City for payment of money; any payment for or acceptance of any work; or any extension of time; or any possession taken by the City shall not operate as a waiver of any provisions of the contract or any power therein reserved to the City of any rights or damages therein provided. Any waiver of any breach of contract shall not be held to be waiver of any other or subsequent breach.

The City reserves the right to correct any error that may be discovered in any estimate that may have been paid and to adjust the same to meet the requirements of the contract and specifications.
The City reserves the right to claim and recover by process of law sums as may be sufficient to correct any error or make good any deficiency in the work resulting from such error, dishonesty, or collusion, upon the conclusive proof of collusion or dishonesty by the Contractor or his agents and the Engineer or his assistants, discovered in the work after the final payment has been made.

B-6-19 Indemnification and Hold Harmless: The Contractor shall hold the City, its officials, employees, attorneys, and agents harmless and shall indemnify the City, its officials, employees, attorneys, and agents or consultants from any and all damages, injury, or liability whatsoever from an act or omission of the Contractor, or any subcontractor, supplier, materialman, or their officials, employees, agents, or consultants, or any work done under the contract or in connection therewith by the Contractor, or any subcontractor, supplier, materialman, or their officials, employees, agents, or consultants, or the operations or activities of the Contractor or any subcontractor, supplier, materialman, or their officials, employees, agents, or consultants.

B-6-20 Tax Exemption Provision: Contracts awarded by the City of South Padre Island qualify for exemption pursuant to the provision of Article 20.04 (H) of the Texas Limited Sales, Excise and Use Tax Act. The Contractor performing this contract may purchase, rent, or lease all materials, supplies, equipment used or consumed in the performance of this contract by issuing to his supplier an exemption certificate in lieu of the tax, said exemption certificate complying with State Comptroller's Ruling #95-0.07. Any such exemption certificate issued by the contractor in lieu of the tax shall be subject to the provisions of the State Comptroller's Ruling #95-0.09 as amended to be effective October 2, 1968.

B-7 PROSECUTION AND PROGRESS

B-7-1 Subletting the Work: The Contractor shall perform with his own organization and with the assistance of workmen under his immediate superintendence, work of a value not less than fifty percent (50%) of the value of all work embraced in the contract exclusive of items not commonly found in contracts for similar work or which require highly specialized knowledge, craftsmanship and/or equipment not ordinarily available in the organizations of Contractors performing work of the character embraced in the contract.

No portion of the work covered by these specifications and contract, except contracts for purchase and delivery of materials, shall be sublet without written permission of the City. If the Contractor sublets any part of the work to be done under his contract, he will not, under any circumstances, be relieved of his responsibility and obligations. All transactions of the Engineer will be with the Contractor. Subcontractors will be considered only in the capacity of employees and/or workmen and shall be subject to the same requirements as to character, competency, wages, and hours. The City will not recognize any subcontractor on the work. The Contractor shall at all times when the work is in operation, be represented either in person or by a qualified superintendent or other designated representative.

B-7-2 Assignment of Contract: The Contractor shall not assign, transfer, convey or otherwise dispose of the contract or his right, title, or interest in or to the same, or any part thereof, without the previous consent of the City Council and concurred in by the sureties.

If the Contractor does without such previous consent assign, transfer, convey or otherwise dispose of the contract or of his rights, title or interest therein, or any part thereof to any persons, partnership, company, firm or corporation, or by bankruptcy, voluntary or involuntary, or by assignment under the insolvency laws of any state, attempt to dispose of the contract or make default in or abandon said contract, then the contract may, at the option of the City, be revoked or annulled, unless the sureties shall successfully complete said contract; and any monies due or to become due under said contract shall be retained by the City as liquidated damages for the reason that it would be impracticable and extremely difficult to fix the actual damages.

B-7-3 Prosecution of the Work: Prior to beginning construction operations, the Contractor shall submit to the Engineer a chart or brief of his work schedule outlining the manner and sequence of prosecution of the work that he intends to follow in order to complete the contract within the allotted time.

Whenever, during the course of the work, this planned sequence and/or method must be revised, such revision shall be submitted in writing to the Engineer. Contractor needs approval by the Engineer prior to revisions being done.

The Contractor shall begin the work to be performed under this contract within the time limit stated in the Agreement and shall conduct the work in such a manner and with sufficient equipment, materials, and labor as is necessary to insure its completion within the time limit.

The sequence of all construction operations shall be at all times as directed by or approved by the Engineer.

Such direction or approval by the Engineer shall not relieve the Contractor from the full responsibility of the complete performance of the contract. Should the prosecution of the work be discontinued by the Contractor, he shall notify the Engineer at least twenty-four (24) hours in advance of resuming operations.

B-7-4 Limitation of Operations: The work shall be so conducted as to create a minimum amount of inconvenience to the public. At any time when, in the judgment of the Engineer, the Contractor has obstructed or closes or is carrying on operations on a greater portion of the street or public way than is necessary for the proper execution of the work, the Engineer may require the Contractor to finish the sections on which work is in progress before operations are started on any additional section.

B-7-5 Character of Workmen and Equipment: Local labor shall be used by the Contractor if available. The Contractor may bring in from outside the City his key employees and superintendent. All other employees, including equipment operators, may be imported only after the local supply is exhausted.

The Contractor shall employ such superintendents, foremen, and workmen as are careful and competent and the Engineer may demand the dismissal of any person or persons employed by the Contractor in, about or on the work who shall misconduct himself or be incompetent or negligent in the proper performance of his or their duties or neglect or refuse to comply with the directions of the Engineer, and such person or persons shall not be employed thereon again without the written consent of the Engineer. All workmen shall have sufficient skill and experience to perform properly the work assigned them. The Contractor shall furnish such equipment as is considered necessary for the prosecution of the work in an acceptable manner and at a satisfactory rate of progress.

All equipment, tools and machinery used for handling materials and executing any part of the work shall be subject to the approval of the Engineer and shall be maintained in a satisfactory working condition. Equipment on any portion of the work shall be such that no injury to the work or adjacent property will result from its use.

B-7-6 Working Hours: Work shall be done only during the regular and commonly accepted and prescribed working hours. No work on any unit of this contract for Water, Sanitary Sewer and Storm Water Improvements shall be performed before 7 am, or after 8 pm, or on Sunday, or on a regular holiday as listed in the definitions. The City will allow the Contractor to work on the weekends if necessary.

Excepted from the preceding shall be the setting of flashers, maintenance of barricades, wetting of concrete curing mats, and such measures as the Contractor must take to protect life and property, as are of an emergency nature and not merely extensions of the regular working day. Attention is directed to the definition for contract time.

B-7-7 Time of Commencement and Completion: The Contractor shall commence the work within the time specified, and the rate of progress shall be such that the whole work will be performed, and the premises cleaned up in accordance with the contract, plans and specifications within the time limit specified in the contract unless an extension of time be made in the manner hereinafter specified.

B-7-8 Extension of Time of Completion: The Contractor shall be entitled to an extension of time as provided herein only when claim for such extension is submitted to the City in writing by the Contractor within seven (7) days from and after the time when any alleged cause of delay shall occur, and then only when such claim is approved by the City. In adjusting the contract time for the completion of the project, unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including but not restricted to inability to obtain supplies and materials, acts of God, or the public enemy, acts of the owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather conditions (weather which is beyond the normal weather recorded and expected for the season or seasons of the year in the records of the National Oceanic and Atmospheric Administration's Climatic Data Center), or delays of subcontractors due to such causes; all provided that actual stoppage of work ensues and no fault of the Contractor is involved.

If the satisfactory execution and completion of the contract should require work and materials in a greater amount, or quantities, than those set forth in the contract, then the contract time shall automatically be increased the same proportion as the cost of the additional work bears to the cost of the original work contracted for. No allowance will be made for delays or suspension of the prosecution of the work due to the fault of the Contractor.

B-7-9 Computation of Contract Time for Completion: For the purpose of computation, the contract time shall begin with the tenth (10th) calendar day after the date of the written authorization by the Engineer to begin work, or such earlier date as work, other than the delivery of materials, is actually commenced. The Engineer shall furnish the Contractor a monthly statement showing the days (calendar or working) charged during the month. If no protest as to the correctness of the statement is filed within seven (7) days by the Contractor, the statement will stand. Contract time shall be charged as described under the definition thereof.

B-7-10 Failure to Complete on Time: The time of completion is the essence of the contract. For each day (calendar or working) that any work shall remain uncompleted after the time specified in the time specified in the proposal and contract, or the increased time granted by the City, or as automatically increased by additional work or materials ordered after the contract is signed, a sum per day will be deducted from the monies due the Contractor, not as a penalty but as liquidated damages. This sum of liquidated damages per day will be as shown in the special provisions, proposal or elsewhere in the contract documents.

The sum of money thus deducted for such delay, or noncompletion is not to be considered as a penalty but shall be deemed, taken, and treated as reasonable liquidated damages since it would be impracticable and extremely difficult to fix the actual damages, with such sums of money to be deducted from Contractor's monies at the time or times such damages begin to occur, thence to the completion of construction.

B-7-11 Suspension by Court Order: The Contractor shall suspend such part or parts of the work ordered by the Court and will not be entitled to additional compensation by virtue of such Court Order. Neither will he be liable to the City in the event and for the time the work is suspended by Court Order.

B-7-12 Temporary Suspension: The Engineer shall have the authority to suspend the work wholly or in part for such period or periods as he may deem necessary due to unsuitable weather conditions as are considered unfavorable for the suitable prosecution of the work. If it should become necessary to stop work for an indefinite period, the Contractor shall store all materials in such manner that they will not obstruct or impede the public unnecessarily or become damaged in any way, and he shall take every precaution to prevent damage or deterioration of the work performed; he shall provide suitable drainage about the work and erect temporary structures where necessary. The Contractor shall not suspend work without written authority from the Engineer and shall proceed with work promptly when notified by the Engineer to resume operations.

B-7-13 Suspension of Work and Annulment of Contract: The work or any portion of the work under contract shall be suspended immediately on written order of the Engineer or the City Manager, a copy of such notice to be served on the Contractor's sureties, or the contract may be annulled by the City for any good cause or causes, among others of which special reference is made to the following:

(a) Failure of the Contractor to start the work within the specified number of calendar days from the date of written notice by the City to begin the work.
(b) Substantial evidence that the progress of the work being made by the Contractor is insufficient to complete the work within the specified time.
(c) Failure of the Contractor to provide sufficient and proper equipment for properly executing the work.
(d) Substantial evidence that the Contractor has abandoned the work.
(e) Substantial evidence that the Contractor has become insolvent or bankrupt, or otherwise financially unable to carry on the work.
(f) Deliberate failure on the part of the Contractor to observe any requirements of these specifications or to comply with any orders given by the Engineer as provided for in these specifications.
(g) Failure of the Contractor to promptly make good any defects in materials or workmanship, or any defects of any nature, the correction of which has been directed in writing by the Engineer.
(h) Substantial evidence of collusion for the purpose of illegally procuring a contract or perpetrating fraud on the City in the construction of the work under contract.

When the work is suspended for any of the causes itemized above or for any other cause or causes, the Contractor shall discontinue the work or such part thereof as the City shall designate, whereupon the sureties may, at their option, assume the contract or that potion thereof which the City has ordered the Contractor to discontinue, and may perform the same, or may, with the written consent of the City, sublet the work or that portion of the work so taken over, provided however that the sureties shall exercise their option, if at all, within two (2) weeks after the written notice to discontinue the work has been served upon the Contractor and upon the sureties or their authorized agents.

The sureties in such event shall assume the Contractor's place in all respects and shall be paid by the City for all work performed by them in accordance with the terms of the contract. All monies remaining due the Contractor at the time of his default shall thereupon become due and payable to the sureties as the work progresses, subject to all the terms of the contract.

In case the sureties do not, within the hereinabove specified time, exercise their right and option to assume the contract or that portion thereof which the City has ordered the Contractor to discontinue, then the City shall have the power to complete by contract or otherwise as it may deem necessary; and the Contractor hereto agrees that the City shall have the right to take possession of and use any of the materials, plant, tools, equipment, supplies and property of every kind provided by the Contractor for the purpose of his work and to procure other tools, equipment and materials for the completion of the same, and to charge to the account of the Contractor the expenses of said contract or labor, materials, tools, equipment and expenses incidental thereto.

The expense so charged shall be deducted by the City out of such monies as may be due or may at any time thereafter become due the Contractor under and by virtue of the contract or any part thereof. The City shall not be required to obtain the lowest bid for the work of completing the contract, but the expenses to be deducted shall be the actual cost of such work. In case such expense is less than the sum which would have been payable under the contract if the same had been completed by the Contractor, then in such case, the City may pay to the Contractor the difference in cost provided that the Contractor shall not be entitled to any claim for damages or for loss of anticipated profits; in case such expense shall exceed the amount which would have been payable under the contract if the same had been completed by the Contractor, then the Contractor and his sureties shall pay the amount of such excess to the City on notice from the City of the excess due.

When any particular part of the work is being carried on by the City by contract or otherwise under the provisions of this section, the Contractor shall continue the remainder of the work in conformity with the terms of the contract, and in such manner as not to hinder or interfere with the performance of workmen employed as above provided by the City.

B-7-14 Termination of Contract: The contract will be considered fulfilled, saved as provided in any maintenance stipulations, bond or by law, when all the work has been completed, the final inspection made by the Engineer, and final acceptance and final payment made by the City.

B-8 MEASUREMENT AND PAYMENT

B-8-1 Measurement of Quantities: The determination of quantities of work acceptably completed under the terms of the contract, or as directed by the Engineer in writing, will be made by the Engineer, based on measurements made by the Engineer. These measurements will be taken according to the US Standard Measurements, used in common practice, and will be the actual length, area, solid contents, numbers, and weight.

It is pointed out that inclusion in the standard construction specifications of paragraphs describing methods of measurement and payment is not intended to imply that separate payments shall be made under each such standard specification. The units for which payment shall be made are those stated in the proposal.

B-8-2 Unit Price: Where in the proposal form a "Unit Price" is set forth, the "Unit Price" shall include the furnishing by the Contractor of all labor, tools, materials, machinery, appliances, plant, and equipment appurtenant to and necessary for construction in every detail and the completion in a first class, workmanlike manner of all the work to be done under these specifications. The "Unit Price" shall also include all permanent protection of overhead, surface, and underground structures, cleaning up, finish, overhead expense, bond, insurance, patent fees, royalties, risk due to the elements, delay, profit, injuries, damages, claims and all other items not specifically mentioned that may be required to construct fully each item of the work complete in place.

B-8-3 Scope of Payment: The Contractor shall receive and accept the compensation, as herein provided, in full payment for furnishing all labor, tools, materials, equipment and incidentals; for performing all work contemplated and embraced under the contract; for all lose or damage arising out of the nature of the work or from the action of the elements; for any unforeseen defects or obstructions which may arise or be encountered during the prosecution of the work and before its final acceptance by the Engineer; for all risks of whatever description connected with the prosecution of the work; for all expense incurred by or in consequence of suspension or discontinuance of such prosecution of the work as herein specified; for any infringement of patents, trademarks or copyrights; and for completing the work in an acceptable manner according to the plans and specifications.

The payment of any current or partial estimate prior to final acceptance of the work by the City shall in no way constitute an acknowledgement of the acceptance of the work nor in any way prejudice or affect the obligation of the Contractor to repair, correct, renew, or replace, at his expense, any defects or imperfections in the construction or in the strength or quality of the materials used in or about the construction of the work under contract and its appurtenances, nor any damage due or attributed to such defects, imperfections or damage shall have been discovered on or before the final inspection and acceptance of the work. The Engineer shall be the sole judge of such defects, imperfections, or damage; and the Contractor shall be liable to the City for failure to correct the same as provided herein.

B-8-4 Payment for Extra Work: Extra work authorized and approved by the Engineer and performed by the Contractor will be paid for in the manner hereinafter described, and the compensation thus provided shall be accepted by the Contractor as payment in full for all labor, material, tools, equipment and incidentals and all superintendents' time and timekeepers' services, all insurance, bond, and all other overhead expenses incurred in the prosecution of the extra work. Payment for extra work will be calculated on one of the following basis subject to, all other conditions of the contract:

(a) By unit prices agreed on in writing by both parties, payment to be for the quantity actually installed as finally measured.
(b) By a lump sum price agreed on in writing by both parties.
(c) By actual field cost of the work plus fifteen percent (15%) as described hereinbelow, agreed on in writing by both parties. In the event extra work is to be performed and paid for under this method, the actual field cost of the work will include the cost of all workmen, foremen, timekeepers, mechanics and laborers, and materials, supplies, trucks, rental or machinery equipment, only for the time actually employed or used on such extra work, plus all power, fuel, lubricants, water and similar operating expenses, and a rateable proportion of premiums on Performance and Payment Bonds, public liability and Workmen's Compensation and all other insurance required by law or ordinance. The Engineer will direct the form in which the accounts or actual field cost will be kept and will specify in writing the methods of doing the work, and the type and kind of machinery and equipment to be used and shall have authority to suspend such extra work if in his judgment it is being conducted in a manner wasteful of materials, equipment, or labor, or is not being prosecuted in an efficient manner. The fifteen percent (15%) of the actual field cost to be paid the Contractor shall cover and compensate him for profit, overhead, general superintendence and field office expense, and all other elements of cost and expense not embraced within the actual field cost as herein specified. The Contractor shall give the Engineer access to all accounts, bills, invoices, and vouchers relating thereto. In the event agreement cannot be reached on method or prices of payment for extra work, the City reserves the right to enter on the job with its own forces or to hire other contractors to perform such extra work.

B-8-5 Extra Work and Change Orders

(a) All change orders require written quotations and must be approved in writing by the Contractor and the City prior to the work being done.
(b) All change orders must be approved by the City Council.
(c) The City Manager has authority to approve some change orders. The City Manager may authorize change orders where undue delays could cause damages, either physical or monetary, to the City, Contractor, or the general public. However, final approval must be granted by the City Council.
(d) The total amount of all change orders to a contract shall not exceed 25% of the original contract price.

Contractors are advised that the City is under no obligation to appropriate change order(s) which have not been prepared and executed as stated herein. The addition of items of work covered by unit prices may be performed without written change orders unless the quantity and cost of such work, in the Engineer's opinion, require such written change orders, in which event the Contractor will be so notified.

B-8-6 Partial Estimates: After the twenty-fifth (25th) day of the month and at the Contractor's request, the Engineer will make an approximate estimate of the value of the work done during the month under the specifications, which approximate estimate may include the full net invoice value of acceptable non-perishable materials delivered to the work (i.e., materials on hand).

The Contractor shall furnish to the Engineer such detailed information as he may request to aid him as a guide in the preparation of partial estimates.

It is understood that the partial estimates from month to month will be approximate only and all partial estimates and payments will be subject to correction in the estimate rendered following the discovery of an error in any previous estimate, and such estimate shall not in any respect be taken as an admission of the City of the amount of work done or of its quality or sufficiency nor as an acceptance of the work or the release of the Contractor of any of his responsibility under the contract.

In determining the partial payment to be made to the Contractor, the City will retain five percent (5%) of the total approximate estimate, unless otherwise stated, and will deduct payments previously made. No partial payment will be made when the said estimate or the estimates of work done since the last previous estimate is less than One Hundred Dollars ($100.00) in amount.

All retainage is due and payable to the Contractor upon successful completion of the project and will be included in the final payment. Payment shall be withheld as elsewhere herein specified.

The City reserves the right to increase the retainage. In contracts in which the total amount bid is Four Hundred Thousand Dollars ($400,000) or more and providing for retainage of greater than five percent (5%) of the total estimate, the amount retained shall be deposited in an interest-bearing account and the interest earned shall be paid to the contractor upon completion of the contract with the final payment, unless withheld as otherwise specified.

B-8-7 Withholding Payment: Payment of estimates may be withheld if the work is not being executed in accordance with the specifications and contract and/or to cover known claims as elsewhere specified.

B-8-8 Final Cleanup: Upon completion of the work and before acceptance and final payment will be made, the Contractor shall clean and remove from the site of the work surplus and discarded materials, temporary structures, and debris of every kind. He shall leave the site of the work in a neat, orderly condition, equal to that which originally existed. Surplus and waste materials removed from the site of the work shall be disposed of at locations satisfactory to the Engineer. Such final cleanup shall in general be considered as subsidiary to the established pay items as a whole.

B-8-9 Final Acceptance: Whenever the improvement provided for by contract shall have been completely performed on the part of the Contractor, the Contractor shall notify the Engineer that the improvement is ready for final inspection. The Engineer will then make such final inspection; and if the work is satisfactory and in accordance with the specifications and contract, he will certify such completion for Final Acceptance.

B-8-10 Final Payment: Whenever the improvement provided for by contract shall have been completely performed on the part of the Contractor as evidenced by the Engineer in the Certificate of Final Inspection and Acceptance, a final estimate showing the value of the work will be prepared by the Engineer as soon as the necessary measurements and computations can be made. All prior estimates upon which payments have been made are subject to necessary corrections or revisions in the final payment.

The amount of this final estimate, less any sums that have been deducted or retained under the provisions of the contract, will be paid the Contractor within thirty (30) days after Final Acceptance provided the Contractor has furnished to the City satisfactory evidence in the form of an affidavit(s) that all sums of money due for any labor, materials, apparatus, fixtures, or machinery furnished for and used in the prosecution of the work have been paid; or that the person or persons to whom the sum may respectively be due have consented to such final payment.

The improvement will not be recommended for Final Acceptance until this payment affidavit has been submitted. The acceptance by the Contractor of the last payment as aforesaid shall operate as and shall be a release to the City from all claims or liabilities under the contract for anything done or furnished or relating to the work under the contract or for any act of neglect of said City relating to or connected with the contract.

B-8-11 Maintenance Guaranty: The Contractor shall maintain and keep in good repair the work herein contracted to be done and performed for a period of one (1) year through one winter cycle from the date of acceptance, or for such lesser or greater period as may be specially provided, shall do all necessary backfilling that may arise on account of sunken conditions in ditches, or otherwise, and shall do and perform all necessary work and repair any defective condition growing out of or arising from the improper joining of the same, or on account of any breaking of the same caused by the said Contractor, in laying or building the same, or on account of any defect arising in any of said parts of said work laid or constructed by said Contractor, or on account of improper excavation or backfilling; it being understood that the purpose of this section is to cover all defective conditions arising by reason of negligence of the Contractor, or by reason of defective materials, work or labor performed by the said Contractor, and in case the said Contractor shall fail to do so, it is agreed that the City may do said work and supply such materials, and charge the same against the said Contractor and sureties on this obligation. This provision shall further, and in addition, be evidence by the provisions of the Performance Bond or such other bond as may be required.

The one-year maintenance guaranty period will commence upon final inspection and completion of roadway improvements in the entire neighborhood vicinity of “clustered” improvements or upon final inspection and completion of singular streets or parking lots.

IX.
TECHNICAL SPECIFICATIONS

SECTION 011100

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. The scope of work for **SEA ISLAND CIRCLE BEACH ACCESS AMENITY IMPROVEMENTS (2023-SL01)** consists of demolition, removal, and disposal of existing improvements to allow for construction of proposed improvements to include restrooms, changing rooms, ADA compliant foot wash station, general use rinse station, paver walkway, as well as installation of water, wastewater, and electrical utilities. All work shall be completed in accordance with the construction plans, specifications, and contract documents.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Sea Island Circle Beach Access Amenity Improvements (2023-SL01)

B. Owner: City of South Padre Island
4601 Padre Blvd
South Padre Island, TX 78597

C. Engineer: LJA Engineering, Inc.
5350 S. Staples St., Ste. 425
Corpus Christi, TX 78411
Contact: Yesenia Singleton, P.E.
T: 3 61-991-8550
ysingleton@lja.com

1.3 TYPE OF CONTRACT

A. Reference Owner for General, Supplementary and Special Conditions, and Proposal, Bonding, Insurance and Contracting Requirements.

1.4 QUALITY ASSURANCE RESPONSIBILITIES TO BE PROVIDED BY CONTRACTOR

A. Keep at the project site, during the period when work is being installed, an Owner approved competent superintendent/working foreman who is qualified to direct technical and logistical aspects of the project.

B. The approved working foreman shall not be removed from the project without prior approval from Owner. If removal is for acceptable cause, Contractor shall submit justification in writing within 48 hours prior to the removal. A new foreman will be onsite prior to removal of existing foreman to ensure work will not cease and continuity of work is maintained.

C. Work is to be installed by skilled workers with a minimum of five (5) years of experience doing work of similar scope and detail. Provide documentation of experience to the Owner.

D. Work is to be done in accordance with contract documents and drawings. Deviation from such will be at the discretion of the Engineer and Owner, and will be authorized in writing.

E. Exercise caution in installing the work so as not to damage adjacent building elements and existing site improvements not in the scope of work. Be responsible to protect the adjacent materials from damage due to work or scaffolding, other materials, and equipment.

F. If adjacent elements are damaged due to Contractor's work process during the execution of the work, the Contractor shall be responsible for repairing or replacing the damaged units at no additional cost to the Owner and to the Engineer and Owner's satisfaction.

G. Material and field testing will be required and shall be provided by the Owner, as specified in Section 014529 Testing Laboratory Services, and will require coordination by the Contractor.

1.5 PROJECT CONDITIONS

A. Survey of Existing Condition
   1. Contractor is to survey the property and document existing conditions prior to commencing work. Contractor is to physically and visually inspect and video document the existing condition of areas such as landscaping, irrigation system, pavement, auxiliary structures not included in the scope of work and other items on the property not included in the scope of work. All significant conditions as determined by the Contractor and Owner are also to be documented in writing. All video and written documentation is to be provided to Owner's Representative prior to commencing work.

B. Existing Underground Utilities
   1. It is the General Contractor's responsibility to locate all underground utilities, including storm sewer system lines, wastewater lines, irrigation lines, etc., prior to mobilization and commencement of Work. Contact all utility providers as required to located underground utilities. Any costs to repair damages if utilities are not properly identified, are the sole responsibility of the Contractor.

1.6 USE OF PREMISES & WORK HOURS

A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings and by the Contract limits.

B. Use of Site: Limit use of premises to the project site and areas indicated by the Owner. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Limits: Confine construction operations to areas designated by the Owner.
   2. Access ways: Keep access ways serving the premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
   3. Owner needs to maintain full use of the facility. Coordinate site access requirements with Owner.
   4. Equipment access to be scheduled with Owner's representative forty-eight (48) hours in advance.

C. Contractor shall limit use of the premises for work to 7:00 AM - 7:00 PM, Monday-Sunday, except as designated by Owner, to allow for the continuous operation of the facilities.

D. Coordinate use of premises under direction of the Owner. This includes on-site storage of materials and equipment. Limited on-site storage is available at the site and is subject to coordination with and authorization by the Owner.

E. Contractor shall assume full responsibility for the protection and safekeeping of products stored on premises, and for their proper use.

1.7 OWNER'S OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Personnel will continuously occupy and access the adjacent buildings and grounds. Perform the Work so as not to interfere with day-to-day operations.
   1. Provide not less than seventy-two (72) hours notice to Owner of activities that will affect Owner's operations.

1.8 WORK RESTRICTIONS

A. Existing Utility Interruptions: Do not interrupt utilities serving the adjacent buildings without written authorization from Owner.

1.9 JOB CONDITIONS

A. Confine operations at site to areas permitted by laws, permits, contract, and the Owner.

B. Access shall be provided for random observation of work in progress.

1.10 PROJECT SCHEDULE

A. Time of completion of the proposed Contract is of importance to the Owner. Costs caused by ill-timed or defective work, or work not conforming to the contract documents, are the responsibility of the Contractor.

1.11 FIELD MEASUREMENTS

A. Verify the accuracy of drawings, dimensions, locations, and site conditions relating to existing or other work. Errors due to failure to verify such information shall be promptly rectified without additional cost to the Owner.

1.12 SITE CLEANUP

A. Execute cleanup to ensure that the buildings, grounds, and adjacent sites are maintained free of waste, debris, and rubbish. Remove waste materials from site on a daily basis.

B. Handle materials in a controlled, responsible manner.

C. Any landscaping, including soft and hard landscape elements, irrigation systems, etc., damaged during construction shall be restored to its original condition at no additional cost to the Owner.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 012000

PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Schedule of Values.
   2. Applications for Payment.

1.2 SCHEDULE OF VALUES

A. General:
   1. Submit a Schedule of Values to Project Engineer at least 20 days prior to submitting first Application for Payment.
   2. Schedule of Values is a required submittal and must be approved prior to review of Applications for Payment.
   3. Upon request of Engineer, furnish additional data to support values given that will substantiate their correctness.
   4. Approved Schedule of Values will be used as basis for reviewing Contractor's Applications for Payment.

B. Form and Content:
   1. Format: Contractor's standard electronic media printout will be considered.
   2. List installed value of component parts of Work in sufficient detail to serve as basis for computing values for progress payments.
   3. Include separate line items for:
      a. Site mobilization.
      b. Insurance.
      c. Contractor's general conditions such as scaffolding, overhead and profit.
      d. Demolition equipment and labor
      e. Disposal Costs
   4. For items on which payment will be requested for stored materials, break down value into:
      a. Cost of materials, delivered and unloaded.
      b. Total installed value.
   5. For each line item that has a value of more than $25,000.00, break down costs to list major products or operations under each item.
   6. Total of costs listed in Schedule shall equal Contract Sum.

C. Review and Resubmittal:
   1. After initial review by Project Engineer, revise and resubmit if required.
   2. Schedule revision: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Preparation:
   1. Format: AIA Document G702 - Application and Certification for Payment, supported by AIA Document G703 - Continuation Sheet. Contractor's standard electronic media printout will be considered.
   2. Prepare required information in typewritten format or on electronic media printout.
   3. Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Project Manager will return incomplete applications without action.
      a. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
      b. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
   4. Use data from reviewed Schedule of Values. Provide dollar value in each column for each line item representing portion of work performed.
   5. List each authorized Change Order as a separate line item, listing Change Order number and dollar value.
   6. Prepare Application for Final Payment as specified in Section 017700.

B. Waivers of Lien:
   1. Along with the each Application for Payment, submit waivers of lien from each Subcontractor or Sub-subcontractor included on the current month's Application for Payment.
   2. Submit partial waivers on each item for amount requested, prior to deduction of retainage.
   3. For completed items, submit full or final waiver.

C. Substantiating Data:
   1. When Project Manager or Engineer requires substantiating information, submit data justifying dollar amounts in question.
   2. Provide one copy of data with cover letter showing Application number and date, and line item number and description.

D. Submittal:
   1. Submit 3 signed and notarized original copies of each Application for Payment to Project Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
      a. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
   2. Payment period: Submit at intervals stipulated in Agreement.

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of Values.
   3. Contractor's Construction Schedule (preliminary if not final).
   4. Schedule of unit prices.
   5. Submittals Schedule (preliminary if not final).
   6. List of Contractor's staff assignments.
   7. List of Contractor's principal consultants.
   8. Copies of building permits.
   9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   10. Initial progress report.
   11. Report of preconstruction conference.
   12. Certificates of insurance and insurance policies.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 012100

ALLOWANCES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.
   1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:
   1. Contingency allowances.

1.2 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Engineer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Engineer from the designated supplier.

1.3 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Engineer for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract

Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

PART 2 PRODUCTS

(NOT USED) PART 3

EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Owner's Contingency = $100,000.00

END OF SECTION

SECTION 012500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Document 002600 "Procurement Substitution Procedures" for requirements for substitution requests prior to award of Contract.
2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

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

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

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

1. Substitution Request Form: Use form acceptable to Architect.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size,

durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

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

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

1.4 QUALITY ASSURANCE

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

1.5 PROCEDURES

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

1.6 SUBSTITUTIONS

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

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

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

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

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

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.

j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013119

PROJECT MEETINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes scheduling and administering progress meetings, and providing minutes of meetings.

1.2 PRECONSTRUCTION MEETING

A. Schedule within ten (10) days after Date of Notice to Proceed and prior to starting the project.

B. Attendance: Contractor, Subcontractors, Engineer, and Owner's representative.

C. Agenda to Include:
1. Safety and first aid procedures.
2. Construction schedule.
3. Relation and coordination of Subcontractors.
4. Designation of responsible personnel.
5. Processing of field decisions and change orders.
6. Submittal of shop drawings, project data, and samples.
7. Procedures for maintaining record documents.
8. Use of premises.
9. Major equipment deliveries and priorities.
10. Security procedures.
11. Housekeeping procedures.
12. Setting progress meeting intervals and schedules.

1.3 PROGRESS MEETINGS

A. Hold regular meetings at intervals agreed upon at Preconstruction Meeting.

B. Attendance: Contractor, Subcontractors as pertinent to agenda, Engineer, and Owner's Representatives.

C. Minimum Agenda (to be developed by Contractor for each meeting):
1. Review work progress since last meeting.
2. Note field observations, problems, and decisions.
3. Identify problems that impede planned progress.
4. Review supplier problems.
5. Develop corrective measures and procedures to regain schedule.
6. Coordinate projected progress with building use needs.
7. Review submittal schedules; expedite as required to maintain schedule.

D. Contractor shall take Meeting Minutes during progress meetings and issue them to Engineer and Owner's Representatives no later than one (1) week after meeting.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Contractor's Construction Schedule.
   2. Submittals Schedule.
   3. Daily Construction Reports.
   4. Field Condition Reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

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

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration.

1.3 SUBMITTALS

A. Submittals Schedule: Submit four copies of schedule. Arrange the following information in a tabular format:
   1. Scheduled date for submittals.
   2. Specification Section number and title.
   3. Submittal category (action or informational).
   4. Name of Subcontractor.
   5. Description of the Work covered.
   6. Scheduled date for final release or approval.

B. Preliminary Network Diagram: Submit four copies, large enough to show entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Submit four copies of initial schedule, large enough to show entire schedule for entire construction period.

D. Daily Construction Reports: Submit four copies at weekly intervals.

E. Field Condition Reports: Submit four copies at time of discovery of differing conditions.

1.4 COORDINATION

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

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from parties involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Must be submitted and approved within two weeks of Notice to Proceed.

B. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
   1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
   2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Timeframe: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
   1. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than sixty days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   2. Schedule shall include Application for Payment dates.
   3. Submittal Review Time: Include review and resubmittal times indicated in Section 01330 - "Submittal Procedures," in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
   4. Startup Time: Include time for startup.

5. Substantial Completion: Indicate completion in advance of date established for substantial completion, and allow time for administrative procedures necessary for certification of substantial completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Work Restrictions: Show the effect of the following items on the schedule:
      a. Coordination with existing construction.
      b. Uninterruptible services.
      c. Use of premises restrictions.
      d. Seasonal variations.
      e. Environmental control.
   3. Work Stages: Indicate important stages of construction for each major portion of the Work.
   4. Milestones: Include milestones indicated in the Contract Documents in schedule including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

D. Contract Modifications: For each proposed contract modification, and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Construction Schedule: Submit a comprehensive, fully developed construction schedule at the Preconstruction Meeting. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of Subcontractors at Project site.
   2. Equipment at Project site.
   3. Material deliveries.
   4. High and low temperatures and general weather conditions.
   5. Accidents.
   6. Stoppages, delays, shortages, and losses.
   7. Orders and requests of authorities having jurisdiction.
   8. Services connected and disconnected.
   9. Equipment or system tests and startups.
   10. Work completed.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report.

Describe the differing conditions and recommendation for changing Contract Documents.

PART 3 EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Distribute schedule one week before each regularly scheduled progress meeting.
   1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
   2. Include a report with updated schedule that indicates every change including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
   3. As the work progresses, indicate actual completion percentage for each activity.

B. Updated Construction Schedule must be submitted with Periodic Pay Applications or Owner has no obligation to approve payments.

C. Distribution: Distribute copies of approved schedule to Engineer and Owner, other parties identified by Contractor with a need-to-know schedule responsibility.

END OF SECTION

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

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

B. See Section 013200 - Construction Progress Documentation for submitting schedules and reports, including Contractor's Construction Schedule.

C. See Section 014500 - Project Quality Controls and Procedures for submitting test and inspection reports and for mock-up requirements.

D. See Section 017700 - Closeout Procedures for submitting close out documents.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Engineer's responsive action.

B. Informational Submittals: Written information that does not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. 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. 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.

B. Submittals Schedule: Comply with requirements in Section 013200 -Construction Progress Documentation for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of hardcopy submittal. Complete electronic (PDF) copies will be accepted; electronic submittals shall one (1) file with all required information in sequence for review. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 14 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. Resubmittal Review: Allow 14 days for review of each resubmittal.

D. Identification: Place a permanent label or title block on each submittal for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
   3. Include the following information on label for processing and recording action taken:
      a. Project name.
      b. Date.
      c. Name and address of Engineer.
      d. Name and address of Contractor.
      e. Name and address of subcontractor.
      f. Name and address of supplier.
      g. Name of manufacturer.
      h. Submittal number or other unique identifier, including revision identifier.
         1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
      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. Other necessary identification.

E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
   1. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

G. Transmittal: Package 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.

H. Resubmittals: Make resubmittals 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 approved by the Engineer.

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 Engineer approved submittals.

PART 2 PRODUCTS

2.1 SUBMITTALS

A. General: Prepare and submit Submittals required by individual Specification Sections.

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 printed 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 written recommendations.
      b. Manufacturer's product specifications.
      c. Manufacturer's installation instructions.
      d. Manufacturer's catalog cuts.
      e. Wiring diagrams showing factory-installed wiring.
      f. Printed performance curves.
      g. Operational range diagrams.
      h. Compliance with specified referenced standards.
      i. Testing by recognized testing agency.
   4. Number of Copies: Electronic (PDF) copies are preferred. If hard copy submittals are required, submit four (4) copies of Product Data, unless otherwise indicated. Engineer will return two (2) copies. Mark-up and retain one returned copy as a Project Record Document.

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. Fabrication and installation drawings.
      c. Roughing-in and setting diagrams.
      d. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
      e. Shopwork manufacturing instructions.
      f. Templates and patterns.
      g. Schedules.
      h. Notation of coordination requirements.
      i. Notation of dimensions established by field measurement.

j. Relationship to adjoining construction clearly indicated.
k. Seal and signature of professional engineer if specified.
l. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

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 24 by 36 inches.

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 appropriate 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.
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 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 three sets of Samples. Engineer will retain two Sample sets; remainder will be returned.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
1. Number of Copies: Electronic (PDF) copies are preferred. If hard copy submittals are required, submit four (4) copies of Product Data, unless otherwise indicated. Engineer will return two (2) copies. Engineer will return three (3) copies.

F. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

G. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

H. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Number of Copies: Electronic (PDF) copies are preferred. If hard copy submittals are required, submit four (4) copies of Product Data, unless otherwise indicated. Engineer will return two (2) copies. Engineer will return three (3) copies.

2.2 DELEGATED DESIGN

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 Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, 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. 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.

C. Submittal Log: maintain a submittal log that lists all submitted items per specification section. Record the dates submitted, the dates returned, and disposition of each item based on the Engineer's review. Submit final log showing all approved materials at substantial completion.

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. The Engineer will review, with reasonable promptness, all submitted documents and samples only for conformance with the design concept of the project and compliance with the information given in the Contract Documents. The Engineer will respond to Requests for Information (RFI's) within five working days from receipt and Submittals within 14 working days from receipt.

C. Submittals returned by the Engineer marked "Reviewed As Noted" shall be revised by the Contractor to verify all noted items are properly addressed and corrected prior to construction. The revised submittal does not need to be resubmitted but shall be retained by the Contractor for their records.

D. Submittals returned by the Engineer marked "Revise and Resubmit" shall be revised by the Contractor by addressing and correcting all noted items. The revised submittal shall be resubmitted to the Engineer for further review.

END OF SECTION

SECTION 013523

PROJECT SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 SAFETY REQUIREMENTS

A. Safety Standards
   1. Safety of persons including workers, building tenants, and innocent bystanders shall be of the highest concern. When work cannot proceed safely because of inclement weather (such as high winds), broken or damaged equipment, or for any other reason, work shall be stopped, left in the safest possible condition, and not resumed until the unsafe conditions have ceased or been corrected. The authoritative standards for all work shall be OSHA, the Environmental Protection Agency, Texas Department of Health and Human Services, or the prevailing Local standards and regulations, whichever is more stringent. Safety requirements mandated under this contract must comply with, but are not limited to, the specific measures noted in this section. The Contractor shall comply with all safety and health requirements of OSHA, EPA, and other Federal, State, or Local authorities, whether or not specifically noted herein.
   2. Prior to commencement of project, the Contractor shall meet with representatives from the Cameron County Parks & Recreation Department to review additional requirements.

B. No Compromise of Independent Contractor Status
   1. Nothing in this section shall be construed to alter or compromise the status of the Contractor as an "Independent Contractor" as defined by the rules and regulations of the Internal Revenue Service or the Texas Workers' Compensation Act of 1989.

C. Safety is Responsibility of Contractor
   1. Nothing in this section shall render the Owner or the Engineer responsible or liable for acts or omissions of the Contractor in complying with the safety provisions of this section of the specifications. Nothing in this section shall render the Owner, or Engineer responsible for inspections, observations, or reports to ensure compliance with these safety provisions, nor shall the Owner or Engineer be responsible for correcting safety violations or deficiencies in the Contractor's operations. Compliance with all safety provisions is the responsibility of the Contractor, and all procedures suggested herein are strictly advisory.

D. Breach of Contract
   1. Failure to comply with these safety regulations and requirements shall, however, constitute breach of this contract by the Contractor. The express intent of this section is to encourage jobsite safety.

E. Safety of Building Occupants and Innocent Bystanders
   1. All work shall be conducted in such a way as to ensure protection for building occupants and innocent passers-by or bystanders. Ground equipment and storage areas shall be protected by fencing if dangerous or harmful equipment is to be employed. Warning signs shall be posted to notify all individuals of the work in progress. Cars and vehicles

of subject individuals shall be protected by timely notification to move vehicles or other practical means.

1.2 DOCUMENTATION

A. OSHA Records
   1. The safety standards to be followed at all times are those established by OSHA for jobsite work practices. OSHA injury records and logs are to be maintained at the jobsite at all times.

B. Accident Records and Logs
   1. A record shall be kept of all accidents or injuries and the Owner and Engineer shall be notified of any injury or accident causing a worker to miss more than one full day of work

C. Emergency Phone Numbers
   1. The Contractor shall provide an emergency phone number where an officer of the company can be reached 24 hours a day in the event of an emergency.

1.3 EMPLOYEE SAFETY TRAINING

A. Contractor Safety Officer
   1. The contractor shall designate his Superintendent, Foreman, or other person who will be on the job full-time as the Contractor Safety Officer. The Safety Officer will be responsible for following accepted safe work standards at all times. He will dismiss from the jobsite any employee improperly dressed or failing consistently to follow safe work practices.

B. Safety Meetings
   1. Prior to commencement of work, a "Toolbox Talk" safety meeting will be held at the jobsite by the Contractor Safety Officer to relate specific jobsite field conditions to be addressed and procedures to be followed. This section of the specifications shall be read aloud to all employees and each employee shall be given a copy to read. After each injury, should such occur, the Contractor shall stop work, conduct a "Toolbox Talk" with all on-site personnel regarding the injury, what happened, how it happened, and what should have been done to prevent the accident or injury.

C. Alcohol and Drugs
   1. No alcohol or drugs shall be permitted on the jobsite or in Contractor vehicles on the premises. Should any Contractor personnel be found to be under the influence of alcohol or any controlled substance including, but not limited to, drugs or inhalants, the employee shall be transported safely from the jobsite by an unimpaired employee or representative of the Contractor and that employee shall not be permitted to work on the project again. "In accordance with Article 7.10 (a) of the Texas Workers' Compensation Act of 1989, "Each employer who has 15 or more employees and who maintains workers' compensation coverage shall adopt a policy designed to eliminate drug abuse and its effects in the workplace.

D. Hazardous and Toxic Material Warning
   1. Employees shall be warned of the presence or use of any and all toxic or hazardous materials as defined by the Environmental Protection Agency. All such materials shall be

strictly handled and disposed of in accordance with Federal, State, and Local Laws and Regulations, whichever is the most stringent. MSDS sheets shall be provided for all chemicals. In addition Resource Reclamation and Recovery Act (RCRA) sheets are to be provided on all chemicals, and the date on such sheets shall not be more than one year old.

1.4 EQUIPMENT SAFETY

A. Unsafe and Broken Equipment
   1. No unsafe or broken equipment is to be permitted on the job. That includes, but is not limited to, such items as broken or bent ladders; uncharged fire extinguishers; electrical tools without grounds on plugs; and nicked, cut, or damaged extension or power tool cords. Should such items become damaged while on the job, they shall be removed from the jobsite.

B. Security of Company Vehicles
   1. All company vehicles shall be parked securely with brakes set, locked, and with all loose tools secured from tampering by minors or children. No unattended Contractor vehicles shall be left on the jobsite at night or weekends. Vehicles left on the jobsite overnight by the Contractor shall be subject to towing by the Owner and the expense of such towing shall be borne by the Contractor.

1.5 BEHAVIOR

A. Work Only in Pairs
   1. Two people should always work together. At no time should only one person be on the job alone.

B. No Horseplay
   1. All work performed on the premises shall be in accordance with the OSHA safety guidelines. No horseplay or athletic activities on premises shall be permitted on breaks or at meal time by Contractor personnel.

1.6 DRESS AND CLOTHING

A. Personal Protective Clothing
   1. All employees shall be properly dressed in proper personal protective clothing. Short pants are not permitted. Where dust, dirt, or fumes are in the vicinity, breathing protection shall be provided to the workers by the Contractor. No workers on the project shall work without shirts.

B. Hazardous Object Handling
   1. While handling sharp objects, or any type of abrasive materials or debris, workers shall wear gloves, safety glasses, and hard-hats.

1.7 CLEAN-UP AND HOUSEKEEPING

A. Clean-Up and Housekeeping
   1. Clean-up and housekeeping are a part of the job. The Contractor shall furnish trash containers and bags to store debris and trash pending removal. The jobsite shall be kept neat and clean at all times. The Contractor shall protect the buildings and grounds from

damage and blowing trash or debris. All wrappers from materials used on the job, fast food cups and bags, banding materials, and items of any other kind shall be bagged and removed immediately.

B. Safe Material Storage
   1. All materials removed or stored pending installation shall be stored safely to prevent the materials from blowing in high winds, falling, or serving as a tripping hazard to workers or bystanders. Safe storage shall include tying bundles and weighting down with heavy objects.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 014500

PROJECT QUALITY CONTROL AND PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. This 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. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with the Contract Document requirements.
   2. Requirements for Contractor to provide quality assurance and quality control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. See Divisions 2 through 16 Sections for specific test and inspection requirements.

1.2 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 product 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 that are 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 industry standards.

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. Using a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter.” It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

I. Experienced: When used with an entity, “experienced” means having successfully completed a minimum of 5 previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 COORDINATE WITH RELATED WORK

A. Coordinate the work of this Section with the work of other trades under this Contract, including but not limited to:
   1. Section 011100 - Summary of Work
   2. Section 013300 - Submittal Procedures
   3. Section 016100 - Substitutions and Product Requirements

1.4 CONFLICTING REQUIREMENTS

A. General: 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 uncertainties and 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 SUBMITTALS

A. Qualification Data: 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.

B. Reports: Prepare and submit certified written reports that 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 reinspecting.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

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

B. 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.

C. 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.

D. 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.

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 is similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of

manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.7 QUALITY CONTROL

A. See Section 014529 – Testing Laboratory Services for additional information.

B. 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 reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

C. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. 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.
   1. 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.
   2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
   3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

D. 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 Section 01330 - "Submittal Procedures".

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

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. Safe Access to the Work (including all trench protection requirements).
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.

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.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections. 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

SECTION 014529

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Testing laboratory services and Contractor responsibilities related to those services.

1.2 REFERENCES

A. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

B. ASTM D 3666 - Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.

C. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

D. ASTM E 329 - Specification for Minimum Requirements for Agencies Engaged the Testing and/or Inspection of Materials Used in Construction.

E. ISO/TEC Guide 25 - General Requirements for the Competence of Calibration and Testing Laboratories.

1.3 SELECTION AND PAYMENT

A. The Owner will select, employ, and pay for services of an independent testing laboratory to perform inspection and testing as required.

B. When required, the Contractor shall employ and pay for services of an independent testing laboratory or laboratories to perform inspection and testing identified in “Products” sections of the individual Specification.

C. Employment of a testing laboratory by the Owner shall not relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

D. The Contractor will have the cost of retesting deducted from the estimate for payment whenever failed work must be removed and replaced and retested.

1.4 QUALIFICATION OF LABORATORY

A. Meet laboratory requirements of ASTM E 329 and applicable requirements of ASTM C 1077, ASTM D 3666, and ASTM D 3740.

B. Meet the ISO/TEC Guide 25 conditions for accreditation by the American Association for Laboratory Accreditation (A2LA) in specific fields of testing required in individual

Specification sections.

C. Where a laboratory subcontracts any part of the testing services, such work shall be placed with a laboratory complying with the requirements of this Section.

1.5 LABORATORY REPORTS

A. The testing laboratory shall provide and distribute copies of laboratory reports to the following: Owner(s), Engineer, and Contractor. Other copies of the reports may be required to be submitted to other parties. The testing laboratory will be informed of any other persons that required laboratory reports.

B. One copy of each laboratory report distributed or emailed to the Contractor shall be kept at the site field office for the duration of the project.

C. Before close of business on the working day following test completion and review, reports which indicate failing test results shall be transmitted immediately via email from the testing laboratory to the Owner, Contractor, and Engineer.

1.6 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume any duties of the Contractor.

D. Laboratory has no authority to stop the Work unless a safety risk is imminent. The laboratory's representative shall immediately inform the Engineer and the Owner of any conflicts with the Contractor or Contractor's construction methods.

1.7 CONTRACTOR RESPONSIBILITIES

A. Provide safe access to the Work and to applicable facilities (e.g. manufacturers, suppliers) for the Owner, Engineer, and testing laboratory personnel.

B. Provide to the testing laboratory a copy of the construction schedule and a copy of each update to the construction schedule.

C. Notify the Engineer and the testing laboratory during normal working hours of the day previous, but not less than 18 hours prior notice, to the expected time for operations requiring inspection and testing services. If the Contractor fails to make timely prior notification, then the Contractor shall not proceed with the operations requiring inspection and testing services.

D. Notify the Engineer 24 hours in advance if the Specification requires the presence of the Engineer for sampling or testing.

E. Request and monitor testing as required to provide timely results and to avoid delay to the

Work. Provide samples to the laboratory in sufficient time to allow the required test to be performed in accordance with specified test methods before the intended use of the material.

F. Cooperate with laboratory personnel in collecting samples on site. Provide incidental labor and facilities for safe access to the Work to be tested; to obtain and handle samples at the site or at source of products to be tested; and to facilitate tests and inspections including storage and curing of test samples.

PART 2 - PRODUCTS – [Not Used]

PART 3 - EXECUTION

3.1 CONDUCTING TESTING

A. Laboratory sampling and testing specified in individual Specification sections shall conform to the latest issues of ASTM standards, TxDOT methods, or other recognized test standards as approved by the Engineer.

B. The requirements of this section shall also apply to those tests for approval of materials, for mix designs, and for quality control of materials as performed by the testing laboratories employed by the Contractor.

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Temporary utilities.
   2. Field offices and sheds.
   3. Temporary controls.
   4. Protection of installed Work.
   5. Security.
   6. Progress cleaning.
   7. Water, erosion, sediment, and dust control.
   8. Removal.

1.2 TEMPORARY ELECTRICITY

A. Contractor shall furnish temporary electricity in the form of portable generators for electrical power throughout the entirety of the project in manner so as not to create a hazard to persons (unless otherwise agreed to in writing and authorized by the Owner).

B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

C. Maintain distribution system and provide routine repairs.

1.3 TEMPORARY LIGHTING

A. Provide temporary lighting as required for construction and security purposes.

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lamps and provide routine repairs.

1.4 TEMPORARY VENTILATION

A. Ventilate enclosed areas to facilitate curing of materials, disperse humidity, and prevent accumulations of dust, fumes, vapors, or gases.

B. Provide temporary fan units as required to maintain clean air for construction.

1.5 TEMPORARY TELEPHONE AND FACSIMILE SERVICES

A. Provide temporary telephone service required during construction. Mobile phone communication will be acceptable substitute for temporary telephone service.

B. Provide Contractor's permanent office facsimile number for forwarding correspondence. Contractor's email address will be acceptable substitute for correspondence communications.

1.6 TEMPORARY WATER

A. Contractor shall furnish temporary water as required throughout the entirety of the project in manner so as not to create a hazard to persons (unless otherwise agreed to in writing and authorized by the Owner).

B. Extend branch piping and provide temporary hoses so that water is available at locations needed for work.

1.7 TEMPORARY SANITARY FACILITIES

A. The contractor is required to provide temporary sanitary facilities as specified herein.

B. Permanent toilets may not be used during construction.

C. Maintain facilities in clean and sanitary condition.

D. Sanitary facilities shall be obscured from public view to the greatest practical extent.

E. The location shall be acceptable to the Owner.

F. These facilities shall consist of properly enclosed self-contained portable units equipped with reservoirs that shall be maintained in proper sanitary condition by chemical treatment and periodic cleaning.

G. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

1.8 FIELD OFFICES AND SHEDS

A. Temporary field offices and storage sheds are optional for this project, as required by the Contractor for construction.

B. Do not unreasonably encumber site or premises with excess materials or equipment.

C. Temporary Structures (Optional):
   1. Portable or mobile buildings, structurally sound, weather tight, with floors raised above ground.
   2. Temperature transmission resistance: Compatible with occupancy and storage requirements.
   3. Provide connections for utility services when required.
   4. Provide steps and landings at entrances.

D. Field Office (Optional):
   1. Size required for Contractor's use and to provide space for project meetings.
   2. Adequate electrical power, lighting, heating, and cooling to maintain human comfort.
   3. Furnishings and equipment:
      a. Table and chairs for ten persons minimum.

b. Facilities for storage of Project Record Documents.
c. Computer with printer, modem, and e-mail service for communication.
d. Digital camera with cable connection for computer.

1.9 BARRIERS

A. Barricades, Warning Signs and Lights:
1. Comply with recognized standards and code requirements for the erection of substantial barricades where needed to prevent accidents.

B. Provide barricades required by governing authorities for public right-of-ways and for public access to existing facilities. Provide barriers to prevent unauthorized entry to construction areas, to allow Owner's use of premises, and to protect existing facilities and adjacent building from construction operations.

C. Contractor shall provide signage and appropriate barricades to prevent any unsafe condition from developing during the course of the contract. Contractor shall properly store and secure materials to prevent unauthorized use.

D. Fencing:
1. Provide temporary fencing for construction operations.
2. Construction: Commercial grade chain link.
3. Height: 6 feet.
4. Locate to protect construction operations, materials, and equipment and prevent unauthorized access to adjacent facilities.
5. Provide vehicular gates and coordinate accessible access point with the Project Manager
6. Maintain access to entries. Do not block or interrupt access to the adjacent buildings or prevent egress from the adjacent buildings.
7. The Contractor shall maintain daily supervision of fencing to ensure compliance with requirements listed above.

E. Protection of Trees, Plants and Building Surfaces:
1. Do not remove roots or branches that interfere with construction. Consult with the Engineer or Owner if any branches need to be cut for installation of scaffolding and shoring
2. Supervise earthwork operations to prevent damage to root zones.
3. The contractor shall be responsible for the protection of existing building surfaces, both interior and exterior, utilities, exterior structures, pavement, sidewalks, trees and plant materials, irrigation systems, and all component parts and equipment.
4. Landscaping around the project shall be preserved in their present condition.
5. Provide temporary orange fencing barriers with studded steel "T" posts to height of 6 feet around individual or groups of trees and plants in the area barricaded for work on this project.
6. Do not permit vehicular traffic, parking, storage of materials, dumping of harmful chemicals or liquids, or standing or continuously running water within root zones.
7. The Contractor shall not deface, ruse, scar, injure, or destroy trees, or shrubs, not remove or cut in any way.

8. No ropes, cables, or guy wire shall be fastened to or attached to any existing tree for anchorage.
9. Any damage to existing elements, systems, components, or areas will be repaired at the responsibility of the contractor with the approval of the owner.
10. Immediately replace trees and plants that are damaged or destroyed due to construction operations with a nursery-grown tree or shrub of the same species and size approved by the Owner.
11. Provide services of qualified Arborist acceptable to the Owner to determine damage.
12. Repair tree damage by qualified tree surgeon.
13. Repairs and replacement not satisfactorily completed will be done by the Owner and deducted from the contractor's contract amount.

1.10 EXTERIOR CLOSURES

A. Provide temporary weather tight closures for exterior openings to provide acceptable interior working conditions, to allow for temporary heating and maintenance of ambient temperatures required in individual specification sections, to protect the Work, and to prevent entry of unauthorized persons.

B. Contractor must monitor weather and plan for proper sequencing of work and protection of openings. Provide temporary watertight closures for exterior openings in special conditions when new roofing and flashing cannot be installed and made waterproof by the end of a work day.

C. Maintain interior ambient temperatures acceptable to the Owner.

D. Work is to be weather tight prior to the onset of inclement weather, and at the end of every workday.

1.11 PROTECTION OF INSTALLED WORK

A. Protect installed work from construction operations; provide special protection when required in individual specification sections.

B. Minimize traffic, storage, and construction activities on waterproofed and roofed surfaces. If traffic, storage, or activity is necessary, obtain recommendations for protection from waterproofing or roofing manufacturer.

C. Prohibit traffic from landscaped areas.

1.12 PROGRESS CLEANING

A. Maintain areas free from waste materials, debris, and rubbish. Maintain site in clean and orderly condition on a daily basis.

B. Provide containers for collection of waste materials, debris, and rubbish; remove and dispose of off site as required by construction activities.

C. Periodically clean interior areas to provide suitable conditions for finish work.

1.13 TEMPORARY CONTROLS

A. Water Control:
   1. Provide water barriers to protect site from soil erosion.

B. Erosion and Sediment Control:
   1. The Contractor will be responsible for preparation of a Storm Water Pollution Prevention Plan (SWP3), and installation, inspection and maintenance of sediment and storm water controls. The SWP3 shall include an Erosion and Sediment Control Plan and Municipal Separate Storm Sewer System (MS4) control measures as required to satisfy all municipal, state and federal requirements.
      a. Plan and execute methods to control surface drainage from cuts, fills, borrow areas, and waste disposal areas. Prevent erosion and sedimentation.
      b. Minimize amount of bare soil exposed at any one time.
      c. Provide temporary measures such as silt fences, dikes, berms, settlement basins, and drainage systems to prevent water flow and sedimentation.
      d. Periodically inspect earthwork to detect erosion and sedimentation; promptly employ corrective measures.

C. Dust Control:
   1. Provide dust control materials and methods to minimize dust from construction operations.
   2. Prevent dust from dispersing into atmosphere.

1.14 REMOVAL

A. Remove temporary utilities, equipment, facilities, and services when construction needs can be met by use of permanent construction or upon completion of Project.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing and permanent facilities used during construction to original or to specified condition.

1.15 TEMPORARY FIRE PROTECTION

A. Review fire prevention and protection needs with the Owner's Safety Office officials and establish procedures to be followed in the event of fire.

B. Instruct personnel in procedures and post warnings and information.

C. Maintain unobstructed access to fire extinguishers, temporary fire protection facilities, stairways and other access routes.

D. Where equipment is used that employs heat, welding or fire, the contractor must have a fire blanket and fire extinguisher in the immediate area that work is being performed. The contractor must also maintain a fire watch in this area of work for a minimum of two hours after work has stopped.

E. Prohibit smoking in hazardous areas.

F. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of ignition.

G. The contractor shall be responsible for initiating, maintaining, and supervising safety precautions and programs associated with the work.

H. It shall be the duty and responsibility of the contractor to comply with all pertinent sections of the OSHA Regulations, and all amendments thereof.

I. The contractor shall do all things necessary and provide all equipment and labor necessary to protect the general public from dangers associated with the contract.

J. Walkways, parking areas, and other areas surrounding the job site will be in use and given priority.

K. The Owner shall not be held responsible for failure of the contractor to perform the job in a safe manner.

1.16 MISCELLANEOUS

A. Contractor Use of Premises:
   1. The Contractor shall limit his use of the premises to the work indicated, so as to allow for owner occupancy.

B. Ongoing Building Operations:
   1. The BISD Food Nutrition Service facility shall remain occupied and in service throughout the completion of the roof repair scope of work. The contractor shall schedule all roof repair scope and roof panel removal and replacement to ensure the facility remains in operation and weather tight at the end of each work day.

C. Contractors are responsible for having visited the site and having determined the general and specific working conditions and limitations, ingress and egress capabilities, any needed measurements, calculations, or special equipment requirements. Failure to do so, for any reason, will not relieve the Contractor from responsibility for successfully performing and completing the work, without additional expense to the Owner.

D. Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project work performance.

E. Work on the building will be only allowed during the scheduled work performance time, reference Section 011100 – Summary of Work. Work during other times shall only be allowed with 96-hour written prior request and written authorization.

F. Keep existing driveways and entrances serving the premises clear and available to the Owner and his employees at all times. Do not use these areas for parking or storage of materials, unless approved in advance by the Owner.

G. Parking: Contractor shall park in designated areas as shown on the drawings.

1. Contractor is to coordinate location of stalls with the Project Manager and Owner. Delivery vehicles will be permitted, but must be unloaded and moved immediately and will not be allowed to remain near the building unless unloading of materials is in progress. Coordinate permissible loading areas with the Project Manager and Owner.
2. Due to limited space, only work trucks will be allowed at the worksite, and these may be limited in number. Contractor shall make every effort to carpool when possible.

H. Security:
1. The contractor assumes all liability for any action which may occur as the result of failing to secure an area.
2. All employees of the contractor, while on the job site, shall maintain appropriate appearance. This shall include proper dress for the job (i.e. shirt and shoes to be worn at all times). This shall also include proper identification. A contractor's employee may be asked to show identification by the Owner's staff at any time.
3. All employees of the contractor shall maintain proper conduct in regard to personal actions and contact with Owners and renters while on property. This shall also include no drug and/or alcohol use and no profane language. Any employee of the contractor engaging in improper conduct will be required to be permanently removed from the job site.
4. The contractor shall not discriminate against any person because of race, sex, age, creed, color, religion, national origin, or disability.

I. Noise Control:
1. Equipment locations and timing or sequence of work operations shall be coordinated so as to not conflict with the Owner's continuing use of the building and adjacent buildings and/or create any interference with scheduled meetings or events. Reference Section 011100 – Summary of Work for additional requirements.

PART 2 PRODUCTS

2.1 SCAFFOLDS AND LIFTS

A. Contractors must meet or exceed all requirements established by Federal/State/Local regulations relating to scaffold safety.

B. Scaffolding must be designed by or under the direct supervision of a registered professional engineer.

C. Provide temporary guys, braces, shoring, falsework supports, and anchors required for existing elements and surfaces.

D. Provide temporary protection for existing surfaces used to support scaffolding and supports.

E. Do not overstress or damage existing surfaces or elements.

F. Provide temporary covered walkways to provide for public access to existing buildings.

G. Provide Emergency Weather Plan. Plan to include items such as wind ratings for scaffolding and disassembly and storage plan during hurricanes or other weather phenomena.

2.2 OVERHEAD WORK

A. The Contractor is to provide and maintain a protected covered area for ingress and egress to the building when performing work above the entrances and emergency exits to the facility. Contractor is responsible for determining limits of barricades and covered pedestrian walkway to ensure the safety of pedestrians. Contractor is to provide adequate pedestrian protection and barricades on the interior of the facility to protect pedestrians from falling objects in the area of construction.

B. No overhead work shall be performed by contractor when, as a result of that work, the potential exists of an object falling and striking a person. Contractor is to monitor wind conditions and provide for safe working conditions and an adequately barricaded area.

C. When lifting and swinging heavy material over roofs, area under roof must be unoccupied and appropriately barricaded. The contractor shall provide tarpaulins, scaffolds, warning signs, etc. that protect pedestrians in the areas surrounding the project. Hard hats shall be worn at all times by contractor personnel.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 015526

TRAFFIC CONTROL AND REGULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for signs, signals, control devices, flares, lights and traffic signals, as well as construction parking control, designated haul routes and bridging of trenches and excavations.

B. Requirement for and qualifications of flagmen.

1.2 UNIT PRICES

A. Unit Prices

1. No separate payment will be made for work performed under this Section. Include cost of such work in Contract unit prices for items listed in bid form requiring traffic control and regulation.

1.3 SUBMITTALS

B. The contractor shall submit for approval by the Owner and prior to the beginning of work a Traffic Control Plan responsive to the Texas Manual on Uniform Traffic Control Devices (TMUTCD) and sealed by a Registered Professional Engineer.

C. For both the traffic control plan and flagmen use, submit schedules of values in accordance with Section 01 33 00 - Submittal Procedures.

D. Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 SIGNS, SIGNALS, AND DEVICES

A. Comply with Texas State Manual on Uniform Traffic Control Devices.

B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

PART 3 - EXECUTION

3.1 PUBLIC ROADS

A. Abide by laws and regulations of governing authorities when using public roads. If the Contractor’s work requires that public roads be temporarily impeded or closed, approvals shall be obtained from governing authorities and permits paid for before starting any work. Coordinate activities with the Owner.

B. Contractor shall always maintain a 10-foot-wide all-weather lane adjacent to work areas which shall be kept free of construction equipment and debris and shall be for the use of emergency vehicles, or as otherwise provided in the traffic control plan.

C. Contractor shall not obstruct the normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the Owner.

D. Contractor shall maintain local driveway access to residential and commercial properties adjacent to work areas at all times.

E. Cleanliness of Surrounding Streets: Keep streets used for entering or leaving the job area free of excavated material, debris, and any foreign material resulting from construction operations.

3.2 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.3 FLARES AND LIGHTS

A. Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.4 HAUL ROUTES

A. Utilize haul routes designated by authorities or shown on the Drawings for construction traffic.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.5 TRAFFIC SIGNS AND SIGNALS

A. Install traffic control devices at approaches to the site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.

C. Relocate traffic signs and signals as Work progresses to maintain effective traffic control.

3.6 BRIDGING TRENCHES AND EXCAVATIONS

A. Whenever necessary, bridge trenches and excavation to permit an unobstructed flow of traffic.

B. Vehicle crossings must be designed by and installed under the supervision of a registered professional engineer.

C. Secure bridging against displacement by using adjustable cleats, angles, bolts or other devices whenever bridge is installed:

1. On an existing bus route;

2. When more than five percent of daily traffic is comprised of commercial or truck traffic;

3. When more than two separate plates are used for the bridge; or

4. When bridge is to be used for more than five consecutive days.

D. Install bridging to operate with minimum noise.

E. Adequately shore the trench or excavation to support bridge and traffic.

F. Extend steel plates used for bridging a minimum of two foot beyond edges of stable trench walls or excavation. Use temporary paving materials (premix) to feather edges of plates to minimize wheel impact on secured bridging.

G. Steel plates shall support H-20 loaded truck or loadings that produces maximum stress.

3.7 REMOVAL

A. Remove equipment and devices when no longer required.

B. Repair damage caused by installation.

C. Remove post settings to a depth of 2 feet.

END OF SECTION

SECTION 015713

TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Description of erosion and sediment control and other control-related practices, which shall be utilized during construction activities.

1.2 UNIT PRICES

A. Payment for this item shall be made on a lump sum basis for the maintenance of the temporary erosion and sediment control and other TPDES requirements. The costs associated with TPDES inspection and reporting shall also be included in this item.

1.3 RESPONSIBILITY

A. It is the contractor's responsibility to acquire a Texas Pollutant Discharge Elimination System (TPDES) Permit as indicated in Section 01 57 23 TPDES Requirements (SWPPP provided by Contractor).

B. All work performed under this section must be as per construction plans and TPDES approved Permit.

PART 2 - PRODUCTS - [Not Used]

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION

A. No clearing and grubbing or rough cutting shall be permitted until erosion and sediment control systems are in place, other than site work specifically directed by the Owner's Representative to allow soil testing and surveying.

B. Equipment and vehicles shall be prohibited by the Contractor from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Damage caused by construction traffic to erosion and sediment control systems shall be repaired immediately by the Contractor.

C. The Contractor shall be responsible for collecting, storing, hauling, and disposing of spoil, silt, and waste materials as specified in this or other Specifications and in compliance with applicable federal, state, and local rules and regulations.

D. Contractor shall conduct all construction operations under this Contract in conformance with the erosion control practices described in the SWPPP, Drawings, and this Specification.

E. The Contractor shall install, maintain, and inspect erosion/sediment control measures and practices as specified in the SWPPP, TPDES Permit, Drawings, and in this or other Specifications.

3.2 TOPSOIL PLACEMENT FOR EROSION AND SEDIMENT CONTROL SYSTEMS

A. When topsoil is specified as a component of another Specification, the Contractor shall conduct erosion control practices described in this Specification during topsoil placement operations.

1. When placing topsoil, maintain erosion and sediment control systems, such as swales, grade stabilization structures, berm, dikes, waterways, and sediment basins.

2. Maintain grades which have been previously established on areas to receive topsoil.

3. After the areas to receive topsoil have been brought to grade, immediately prior to dumping and spreading the topsoil, loosen the sub grade by disking or by scarifying to a depth of at least 2 inches to permit bonding of the topsoil to the subsoil.

4. No sod or seed shall be placed on soil which has been treated with soil sterility until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 SEDIMENT CONTROL MAINTENANCE

A. All erosion, sediment, and water pollution controls will be maintained in good working order. A rain gauge provided by the Contractor shall be located on the project site. Within 24 hours of a rainfall event of 0.5 inches or more as measured by the project rain gauge, the Contractor and the Owner's Representative shall inspect the entire project to determine the condition of the control measures. Sediment shall be removed and devices repaired as soon as practicable but no later than 7 days after the surrounding ground has dried sufficiently to prevent further damage from equipment operations needed for repairs.

B. In the event of continuous rainfall over a 24 hour period, or other circumstances that preclude equipment operation in the area, the Contractor shall install additional backup storm water pollution control devices, as determined by the Owner's Representative, by other appropriate methods. The Contractor shall remove sediment accumulations and deposit the spoils in an area approved by the Owner's Representative as soon as practical and in accordance with the SWPPP. Any corrective action needed for the control measures is to be accomplished in the sequence directed by the Owner's Representative; however, areas adjacent to receiving waters shall generally have priority, followed by devices protecting storm sewer inlets.

3.4 DUST CONTROL

A. Implement dust control methods to control dust creation and movement on construction sites and roads and to prevent airborne sediment from reaching receiving streams or storm water conveyance systems, to reduce on-site and off-site damage, to prevent health hazards, and to improve traffic safety.

B. Control blowing dust by using one or more of the following methods:

1. Mulches bound with chemical binders.

2. Temporary vegetative cover.

3. Spray-on adhesives on mineral soils when not used by traffic.

4. Tillage to roughen surface and bring clods to the surface.

5. Irrigation by water sprinkling.

6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of straw, or similar materials.

C. Implement dust control methods immediately whenever dust can be observed blowing on the project site.

3.5 OFFSITE ROADWAY MAINTENANCE

A. Keep streets clean of construction debris and mud carried by construction vehicles and equipment. If necessary to keep the streets clean, install stabilized construction exits at construction, staging, storage, and disposal areas. A vehicle/equipment wash area (stabilized with coarse aggregate) may be installed adjacent to the stabilized construction exit, as needed. Release wash water into a drainage swale or inlet protected by erosion and sediment control measures. Construction exit and wash areas are shown in the construction plan Details, as Stabilized Construction Exit Detail.

B. In addition to stabilized construction exits, shovel or sweep the pavement to the extent necessary to keep the street clean. Water hosing or sweeping of debris and mud off of the street into adjacent areas is not allowed.

3.6 EQUIPMENT MAINTENANCE AND REPAIR

A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose. Locate such areas so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid as well as solid waste. Clean and inspect maintenance areas daily.

B. On a construction site where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.7 WASTE COLLECTION AND DISPOSAL

A. Contractor shall formulate and implement a plan for the collection and disposal of waste materials on the construction site. In plan, designate locations for trash and waste receptacles and establish a collection schedule. Methods for ultimate disposal of waste shall be specified and carried out in accordance with applicable local, state, and federal health and safety regulations. Make special provisions for the collection and disposal of liquid wastes and toxic or hazardous materials.

B. Keep receptacles and waste collection areas neat and orderly to the extent possible. Waste shall not be allowed to overflow its container or accumulate from day-to-day. Locate trash collection points where they will least likely be affected by concentrated storm water runoff.

3.8 WASHING AREAS

A. Vehicles such as concrete delivery trucks or dump trucks and other construction equipment shall not be washed at locations where the runoff will flow directly into a watercourse or storm water conveyance system. Designate special areas for washing vehicles. Locate these areas where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Beneath wash areas construct a gravel or rock base to minimize mud production.

3.9 STORAGE OF CONSTRUCTION MATERIALS AND CHEMICALS

A. Isolate sites where chemicals, cements, solvents, paints, or other potential water pollutants are stored in areas where they will not cause runoff pollution.

B. Store toxic chemicals and materials, such as pesticides, paints, and acids in accordance with manufacturers' guidelines. Protect groundwater resources from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on any areas where toxic liquids are to be opened and stored.

3.10 DEMOLITION AREAS

A. Demolition activities which create large amounts of dust with significant concentrations of heavy metals or other toxic pollutants shall use dust control techniques to limit transport of airborne pollutants. However, water or slurry used to control dust contaminated with heavy metals or toxic pollutants shall be retained on the site and shall not be allowed to run directly into watercourses or storm water conveyance systems. Methods of ultimate disposal of these materials shall be carried out in accordance with applicable local, state, and federal health and safety regulations.

3.11 SANITARY FACILITIES

A. Provide and maintain sanitary facilities for persons on the job site; comply with the regulations of State and local departments of health.

B. Enforce the use of sanitary facilities by construction personnel at the job site. Such facilities shall be enclosed. Pit-type toilets will not be permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause a nuisance or health problem; have sewer and waste hauled off-site and properly disposed in accordance with local regulations.

C. Located toilets near the Work site and secluded from view insofar as possible. Keep toilets clean and supplied throughout the course of the Work.

3.12 PESTICIDES

A. Use and store pesticides during construction in accordance with manufacturers' guidelines and with local, state, and federal regulations. Avoid overuse of pesticides which could produce contaminated runoff. Take great care to prevent accidental spillage. Never wash pesticide containers in or near flowing streams or storm water conveyance systems.

END OF SECTION

SECTION 015723

TPDES REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section describes the required documentation to be prepared and signed by the Contractor before conducting construction operations, in accordance with the terms and conditions of the Texas Pollutant Discharge Elimination System (TPDES) General Permit Number TXR150000 for discharges of storm water runoff from small construction sites.

B. The Contractor shall be responsible for providing and implementing a Storm Water Pollution Prevention Plan (SWPPP), prepared by and sealed by a licensed professional engineer, for this project.

C. Contractor shall review implementation of the SWPPP in a meeting with the Owner and Engineer prior to start of construction.

1.02 UNIT PRICES

A. Payment for this item shall be made on a lump sum basis and shall cover the preparation and submittal of all required plans, forms, payment of permit fees (if any), cost of implementation and maintenance of the storm water control measures as required throughout the project.

1.03 REFERENCES

A. Part II.E.2. of the Texas Commission on Environmental Quality (TCEQ) General Permit Number TXR150000.

B. Part II.F.3 of TCEQ General Permit Number TXR150000 (notification of MS4 operator)

PART 2 PRODUCTS - As required by Storm Water Pollution Prevention Plan.

PART 3 EXECUTION

3.01 STORM WATER POLLUTION PREVENTION PLAN

A. Prior to start of construction activities, the Contractor shall provide a Storm Water Pollution Prevention Plan, prepared by and sealed by a registered professional engineer, for this project.

B. Contractor shall be responsible for implementation, maintenance, and inspection of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other practices shown on the SWPPP, or as specified by TCEQ or elsewhere in this or other Specifications.

3.02 RETENTION OF RECORDS

A. The Contractor shall keep a copy of the Storm Water Pollution Prevention Plan at the

construction site or at the Contractor's office from the date that it became effective to the date of project completion.

B. At project closeout, the Contractor shall submit to Owner all TPDES forms and certifications, as well as a copy of the SWPPP. Storm water pollution prevention records and data will be retained by Owner for a period of 3 years from the date of project completion.

3.03 NOTICES

The following notices shall be posted from the date that this SWPPP goes into effect until the date of final site stabilization:

A. Regulatory Agency Notices

1. Small Construction Site Notice: The Contractor shall complete and sign the attached Small Construction Site Notice. Copies of the signed notice shall be submitted to TCEQ, the Owner, Engineer, and Owner. Copy of the signed notice shall also be posted at the construction site, as specified.

2. Notice of Intent: The Contractor shall complete and sign a Notice of Intent (NOI) as "Operator" and submit it along with all required fees to the TCEQ, the Owner, Engineer, and other required agencies.

3. TPDES General Permit: A copy of the TCEQ's TPDES storm water general construction permit TXR150000 acknowledgement certificate shall be submitted to Owner, Engineer, and other required agencies and shall be posted at the construction site, as specified.

B. OTHER REQUIRED NOTICES

1. Notice to drivers of equipment and vehicles, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post such notices at every stabilized construction exit area.

2. In an easily visible location on site, post a notice of waste disposal procedures.

3. If applicable, notice of hazardous material handling and emergency procedures shall be posted on site. Keep copies of Material Safety Data Sheets at a location on site that is known to all personnel.

4. Keep a copy of each signed certification at the construction site or at Contractor's office.

END OF SECTION

SECTION 016100

SUBSTITUTIONS AND PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Products.
   2. Transportation and handling.
   3. Storage and protection.
   4. Reuse of existing materials.
   5. Product options.
   6. Substitutions.

1.2 PRODUCTS

A. Provide interchangeable components by the same manufacturer for identical items.

B. Do not reuse materials and equipment removed from existing construction in completed Work, except as specifically permitted by the Contract Documents.

1.3 TRANSPORTATION AND HANDLING

A. Coordinate delivery of Products to prevent conflict with Work and adverse conditions at site.

B. Transport and handle Products in accordance with manufacturer's instructions.

C. Promptly inspect shipments to ensure that Products comply with requirements of Contract Documents, are undamaged, and quantities are correct.

D. Provide equipment and personnel to handle products by methods to prevent damage.

1.4 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturer's instructions with manufacturer's seals and labels intact and legible.

B. Store Products on site unless prior written approval to store off site has been obtained from Owner.

C. Store Products subject to damage by elements in weather tight enclosures. Maintain temperature and humidity within ranges required by manufacturer's instructions.

D. Exterior Storage:
   1. Store fabricated Products above ground; prevent soiling and staining.
   2. Cover products subject to deterioration with impervious sheet coverings; provide ventilation to prevent condensation.

3. Store loose granular materials in well drained area on solid surfaces; prevent mixing with foreign matter.

E. Arrange storage areas to permit access for inspection. Periodically inspect stored products to verify that products are undamaged and in acceptable condition.

F. Coordinate location of stored item on-site with Engineer.

1.5 REUSE OF EXISTING MATERIALS

A. Carefully remove, handle, protect, and store Products.

B. Clean and refinish Products to original or specified condition.

C. Restore operable components to working condition.

D. Arrange and pay for transportation, storage, and handling of Products requiring off site storage, restoration, or renovation.

1.6 PRODUCT OPTIONS

A. Products specified by reference standard only:
   1. Select any Product meeting the specified standard.
   2. Submit Product Data to substantiate compliance of proposed Product with specified requirements.
   3. Products specified by naming two or more acceptable Products: Select any named Product.

B. Products specified by stating that the Contract Documents are based on a Product by a single manufacturer followed by the statement "Equivalent products by the following manufacturers are acceptable”:
   1. Select the specified Product or a Product by a named manufacturer having equivalent or superior characteristics to the specified Product and meeting the requirements of the Contract Documents.
   2. If the specified Product is not selected, submit Product Data to substantiate compliance of proposed Product with specified requirements.
   3. The specified Product establishes the required standard of quality.

C. Products specified by naming one or more Products followed by "or approved substitute" or similar statement:
   1. Submit a Substitution Request Form for Products not listed.
   2. The specified Product establishes the required standard of quality.

D. Products specified by naming one or more Products or manufacturers followed by the statement "Substitutions: Under provisions of Division 1":
   1. Submit a Substitution Request Form for Products not listed.
   2. The specified Product establishes the required standard of quality.

E. Products specified by naming one Product followed by the statement "Substitutions: Not permitted": Substitutions will not be allowed.

F. Products specified by required performance or attributes, without naming a manufacturer or Product:
   1. Select any Product meeting specified requirements.
   2. Submit Product Data to substantiate compliance of proposed Product with specified requirements.

1.7 SUBSTITUTIONS

A. Do not substitute Products unless a Substitution Request Form has been approved by the Engineer.

B. Substitutions during Bidding will not be allowed, unless noted otherwise.

C. Engineer will consider Substitution Requests within 15 days after award of Contract. After initial 15 day period, Substitutions Requests will be considered only due to non-availability of a specified Product.

D. In case of non-availability of a specified Product notify Engineer in writing as soon as non-availability becomes apparent.

E. Submit Substitution Requests using Substitution Request Form provided by Engineer, see Section 01620. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents, including:
   1. Product identification, including name and address of manufacturer.
   2. Product description, performance and test data, and reference standards.
   3. Sample, if requested.
   4. Description of any anticipated effect that acceptance of proposed Substitution will have on Progress Schedule, construction methods, or other items of Work.
   5. Description of any differences between specified product and proposed Substitution.

F. Submit two copies. Engineer will return one copy to Contractor for printing and distribution.

G. A request constitutes a representation that the Contractor:
   1. Has investigated the proposed Product and determined that it meets or exceeds the quality level of the specified Product.
   2. Will provide the same warranty for the Substitution as for the specified Product.
   3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner for design services associated with re-approval by authorities or revisions to Contract Documents to accommodate the Substitution.

H. Substitutions will not be considered if:
   1. They are indicated or implied on Shop Drawings or other submittals without submittal of a Substitution Request Form.
   2. Approval will require substantial revision of Contract Documents without additional compensation to Engineer.

I. Approved substitutions will be incorporated into Contract Documents by Change Order.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 017400

CLEANING

PART 1 GENERAL

1.1 SUMMARY

A. During the course of the Work, maintain premises and adjacent sites free of waste, debris, and rubbish caused by construction operations.

B. At completion of work, or at such other times as directed by the Engineer or Owner, remove waste, debris, rubbish, tools, equipment, machinery, and surplus materials. Clean sight- exposed surfaces; leave work area clean and ready for use.

1.2 SAFETY REQUIREMENTS

A. Standards: Maintain Project in accordance with the following safety and insurance standards:
   1. Occupation Safety and Health Administration (OSHA)

B. Hazards Control:
   1. Store volatile wastes in an approved manner or remove from premises daily.
   2. Prevent accumulation of wastes that create hazardous conditions.
   3. Provide adequate ventilation during use of volatile or noxious substances.

C. Conduct cleaning and disposal operations to comply with federal, state and local antipollution laws.
   1. Rubbish and waste materials shall not be burned or buried on Project site.
   2. Volatile wastes, such as mineral spirits, oil, or paint thinner, shall not be disposed of into storm or sanitary drains.
   3. Wastes shall not be disposed of into streams or waterways.

1.3 SUBMITTALS

A. Product Data:
   1. Manufacturer's recommendations for cleaning specified products.
   2. Proposed cleaning products for products where manufacturer's recommendations are not specified.

PART 2 PRODUCTS

2.1 MATERIALS

A. Select and use cleaning materials and equipment with care to avoid scratching, marring, defacing, staining, or discoloring surfaces cleaned.

B. Use only cleaning materials recommended by manufacturer of surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.1 GENERAL

A. Execute cleaning to ensure that buildings, grounds and public properties are maintained free from accumulations of waste materials and rubbish on a **daily** basis.

B. Wet down materials and rubbish to lay dust and to prevent blowing dust.

C. Clean site and public properties daily, and dispose of waste materials, debris, and rubbish.

D. Provide on-site transportable cart containers for collection of waste, materials, debris, and rubbish as required.

E. Remove waste materials, debris, and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.

F. Handle materials in a controlled manner with as few handlings as possible. Materials shall not be thrown from heights.

G. Maintain equipment on site, while work is in progress, in clean and dust-free condition.

H. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly finished surfaces.

I. Contain all runoff from Work and do not allow construction waste to leach into ground or water.

3.2 FINAL CLEANING

A. Employ experienced workmen for final cleaning.

B. In preparation for Substantial Completion, or occupancy, conduct final inspection of sight- exposed surfaces and of concealed spaces.

C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight- exposed finished surfaces.

D. Repair, patch, and touch up marred surfaces to specified finish and to match adjacent surfaces.

E. Broom clean paved surfaces; rake clean other surfaces on grounds.

F. Clean equipment units if cleaning is required due to construction dust and activities.

G. Maintain cleaning until project, or designated portion thereof, is occupied by Owner.

END OF SECTION

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Closeout procedures.
   2. Final cleaning.
   3. Adjusting.
   4. Project record documents.
   5. Operation and maintenance data.
   6. Warranties.
   7. Replacement parts and maintenance materials.
   8. Demonstration and instructions.

B. Related Sections:
   1. Section 012000 - Payment Procedures
   2. Section 015000 - Temporary Facilities and Controls
   3. Section 017400 - Cleaning

1.2 CLOSEOUT PROCEDURES

A. Final Inspection:
   1. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with the Contract Documents and ready for inspection by the Project Manager and Engineer.
   2. If Project Manager or Engineer performs reinspection due to failure of Work to comply with claims of status of completion made by Contractor, Owner will compensate the Project Manager and Engineer for such additional services and will deduct the amount of such compensation from final payment.

B. Submit final Application for Payment showing original Contract Sum, adjustments, previous payments, retainage withheld from previous payments, and sum remaining due.

C. Closeout Submittals:
   1. Evidence of compliance with requirements of governing authorities.
   2. Construction photographs.
   3. List of subcontractors and suppliers, indicating firm name, area of responsibility or specialty, address, and telephone number.
   4. Certificate of Occupancy.
   5. Project Record Documents.
   6. Operation and Maintenance Data.
   7. Warranties.
   8. Keys and keying schedule.
   9. Replacement parts and maintenance materials.

10. Evidence of payment of Subcontractors and suppliers.
11. Final lien waiver.
12. Certificate of insurance for products and completed operations.
13. Consent of Surety to final payment.

1.3 FINAL CLEANING

A. Execute final cleaning in areas affected by work on this project prior to final inspection.

B. Clean surfaces exposed to view:
   1. Clean glass.
   2. Remove temporary labels, stains and foreign substances.
   3. Polish transparent and glossy surfaces.
   4. Vacuum carpeted surfaces; damp mop hard surface flooring.
   5. Pressure wash all horizontal surfaces with 1000 psi removing dirt and debris
   6. Pressure wash all vertical surfaces with 100 psi removing dirt and debris

C. Clean equipment and fixtures to a sanitary condition.

D. Clean or replace filters of operating equipment.

E. Clean debris from roofs and drainage systems

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.4 FINAL PAYMENT

A. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

B. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. ABP-1, “Contractor’s Affidavit of Bills Paid.”
   5. Contractor’s Affidavit of Release of Liens.
   6. Consent of Surety to Final Payment.
   7. Evidence that claims have been settled.

8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

1.5 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.6 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other Modifications to the Contract.
   5. Reviewed Shop Drawings, Product Data, and Samples.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and Modifications.

E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Location, type and size of work completed.
   2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   3. Field changes of dimension and detail.
   4. Details not on original Contract Drawings.

F. Prior to Substantial Completion transfer marks made during construction to two sets of sepia reproducible transparency prints, and one half size set.

G. Submit documents to Project Manager with final Application for Payment.

1.7 OPERATION AND MAINTENANCE DATA

A. Provide three copies, 8-1/2 x 11 inches text pages, bound in three ring binders with durable plastic covers.

B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Contents:
   1. Directory: List names, addresses, and telephone numbers of Engineer, Subcontractors, and major equipment suppliers.
   2. Operation and maintenance instructions: Arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
   3. Project documents and certificates including:
      a. Shop drawings and product data.
      b. Certificates.
      c. Photocopies of warranties and bonds.

D. Submittal:
   1. Submit one copy of completed volumes in final form 15 days prior to final inspection.
   2. Engineer will notify of any required revisions after final inspection.
   3. Revise content of documents as required prior to final submittal.
   4. Submit revised volumes within 10 days after final inspection.

1.8 WARRANTIES

A. Provide two copies of each warranty.

B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in three ring binder with durable plastic cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.9 REPLACEMENT PARTS AND MAINTENANCE MATERIALS

A. Provide products, manufacturer's recommended primary replacement parts, operations and maintenance manuals and associated materials in quantities specified in individual specification Sections.

B. Deliver to Project site in location as directed; obtain receipt prior to final payment.

1.10 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Utilize Operation and Maintenance Manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed upon times, at equipment location.

E. Prepare and insert additional data in Operation and Maintenance Manuals when need for additional data becomes apparent during instruction.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

ECTION 017836

WARRANTIES

PART 1 GENERAL

1.1 ROOF MATERIAL MANUFACTURER'S COMPONENT APPROVAL LETTER

A. Prior to approval of submittals, the Contractor shall provide a letter from the intended primary roofing material manufacturer on the letterhead of the manufacturer utilizing the text and language on the attached sample entitled "Roofing Material Manufacturer's Letterhead" stipulating that all proposed component materials are approved by the manufacturer for use in its roofing assemblies and making the other representations contained therein. The letter, or an approved equal, must stipulate that the manufacturer will execute a 10 year NDL warranty on the roof system specified.

1.2 ONE YEAR CONTRACTOR'S WARRANTY

A. Upon completion of the job and prior to final payment, the Contractor shall furnish a **one (1) Year** warranty to the Owner on the form provided herein.

1.3 MANUFACTURER'S MATERIAL AND LABOR SYSTEM WARRANTY

A. A **Ten (10) Year** roofing material manufacturer's material and labor **"No Dollar Limit (NDL)"** system warranty will be required on this job. The roofing material manufacturer shall execute the warranty on the form included in these documents.

1.4 SHEET METAL FINISH WARRANTY

A. A **Twenty (10) Year** warranty from the manufacturer of the sheet metal against chipping, flaking, peeling, fading, or corrosion of the finish.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 031000

CONCRETE FORMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete including shoring, bracing and anchorage.

B. Openings for other Work.

C. Release agents and other related form accessories.

D. Form stripping.

1.2 RELATED SECTION

A. Section 032000 - Concrete Reinforcement

B. Section 033000 - Cast-In-Place Concrete

1.3 REFERENCES

A. American Concrete Institute (ACI):

1. 347, Recommended Practice for Concrete Formwork.

1.4 DEFINITIONS

A. Concealed: For Work required under this Section, the term "concealed" will mean "not exposed to view in finished construction."

B. Exposed: For Work required under this Section, the term "exposed" will mean "exposed to view in finished construction."

1.5 QUALITY ASSURANCE

A. Grading Rules. Rules of the following associations apply to materials furnished under this Section:

1. Southern Pine Inspection Bureau (SPIB).
2. Western Wood Products Association (WWPA).

B. Tolerances: Follow ACI 301 (Table 4.3.1).

1.6 DELIVERY, STORAGE AND HANDLING

A. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.7 DESIGN CRITERIA

A. Design, engineering, fabrication, erection, maintenance and removal of formwork shall be responsibility of Contractor.

B. Construct forms following ACI 318, ACI 347, OSHA, state and local requirements.

C. Provide forms with sufficient strength to withstand pressures resulting from concrete placement and vibration.

D. Responsibility for properly bracing and shoring to support subsequent construction loads rests solely with Contractor.

E. Responsibility for removal of forms at any time before concrete has obtained certified specified design strength rests solely with Contractor.

F. The Engineer’s efforts are aimed at designing a project which will be safe after full completion. The Engineer has no expertise in, and takes no responsibility for, construction means and methods or job Site safety during construction which are exclusively Contractor's responsibility. Processing and/or approving submittals made by Contractor which may contain information related to construction methods or safety issues, or participation in meetings where such issues might be discussed must not be construed as voluntary assumption by Engineer of any responsibility for safety procedures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS / PRODUCTS

A. Use forms specified in the general notes of the structural drawings. Provide in largest practical sizes to minimize number of required joints.

2.2 MATERIALS

A. Wood Form Materials:

1. Reference general structural notes in sheet S1.1 for wood grade requirements.

B. Preformed Steel Forms: Minimum 16 gauge (0.06"/1.5mm) matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

C. Form Release Agent: Colorless chemical form coating or mineral oil which will not stain concrete or absorb moisture.

D. Form Ties: Standard coil or snap galvanized adjustable ties with 3/4" diameter plastic cones on exposed surfaces. Provide manufacturer's recessed plugs of gray plastic or concrete to seal tie holes.

E. Nails, Spikes, Lag Bolts, Through Bolts and Anchorages: Sizes required; of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork.

B. Verify that dimensions agree with drawings.

3.2 ERECTION / INSTALLATION / APPLICATION

A. Follow ACI 301 and 347.

B. Provide forms as follows:

1. Concealed Surfaces: Rough or board form finish left by clean, straight formed lumber.
2. Exposed Surfaces (Typical): Hardboard or plywood lined concrete forms.

C. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over-stressing by construction loads.

D. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping.

E. Align joints and make watertight. Keep form joints to minimum.

F. Obtain approval before framing openings in structural members which are not shown.

G. Provide 1" chamfer strips in exposed exterior corners of beams, girders, columns, walls or foundation forms, around tops of all foundation slabs and elsewhere shown.

H. Provide temporary ports or openings in formwork required for cleaning out debris, adjusting reinforcing steel and to facilitate inspection.

I. Coordinate with Work of other Sections which require attachment of components to formwork.

J. Coat forms with non-staining form release agent. No other coating will be permitted unless specifically approved by Architect.

K. Inserts, Embedded Parts and Openings:

1. Provide formed openings required for items to be embedded in or passing through concrete Work.
2. Locate and set in place items which will be cast directly into concrete.
3. Coordinate with Work of other Sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, collars, thimbles, ties, sockets, nailing blocks, other inserts and components of other Work.
4. Obtain required setting information before proceeding.

L. Install accessories following manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.

M. Form Removal:

1. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
2. Loosen forms carefully. Do not wedge pry bars, hammers or tools against exposed concrete surfaces.
3. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

N. Do not construct any masonry walls on concrete floors or walls until concrete has attained its design strength and forms and shoring have been removed.

O. Terminate embedded form ties 1-1/2" from formed face of concrete. Construct ties so that ends and fasteners can be removed without causing spalling of face of concrete.

P. Repair form tie holes as follows:

1. Below Grade Surfaces: Fill tie holes with waterproof bituminous mastic to prevent water infiltration.
2. Above Grade Surfaces - Concealed: Fill tie holes with compatible materials flush with adjacent concrete.
3. Above Grade Surfaces - Exposed: Fill tie holes with compatible materials flush with adjacent concrete. Repairs shall blend in inconspicuously with surrounding surfaces. Follow Section 033000.

Q. Finishes. Follow ACI 301 unless specifically shown otherwise.

3.3 TOLERANCES

A. Formwork: Follow ACI 301.

3.4 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring and bracing to ensure that Work follows formwork design and that supports, fastenings, wedges, ties and items are secure.

3.5 ADJUSTING AND CLEANING

A. Clean forms as erection proceeds to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

END OF SECTION

SECTION 032000

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel, welded wire fabric, tie wires and other related accessories.

B. Work includes reinforcing for interior and exterior cast-in-place concrete and reinforced concrete unit masonry Work.

1.2 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete

B. Section 042200 - Concrete Masonry Units

1.3 REFERENCES

A. American Concrete Institute (ACI):

1. 301, Structural Concrete.
2. 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
3. 318, Building Code Requirements for Reinforced Concrete.

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

1. A82, Cold Drawn Steel Wire for Concrete Reinforcement.
2. A185, Welded Steel Wire Fabric for Concrete Reinforcement.
3. A615, Deformed and Plain Billet Steel Bars for Concrete Reinforcement (including supplementary requirements)

C. Concrete Reinforcing Steel Institute (CRSI):

1. Manual of Practice.
2. 63, Recommended Practice For Placing Reinforcing Bars.
3. 65, Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

1.4 SUBMITTALS

A. Submit:

1. Shop drawings. Provide electronic (PDF) copies of each drawing.

a. Show reinforcing steel and wire fabric sizes, spacings, locations and quantities, bending and cutting schedules and supporting and spacing devices.
b. Indicate visual method of identification of bar strengths following ASTM standard for steel type used.

2. Certified copies of mill test reports of reinforcement materials analysis (upon request).

B. Provide submittals within 30 days after Contract date.

1.5 QUALITY ASSURANCE

A. Maintain 1 copy of each referenced document at Site.

B. Fabrication and Placement Tolerances: Follow ACI 301.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver to Site free of rust and scale, clearly marked as to bar strength.

B. Store reinforcing materials on pallets or other materials off ground. Avoid surface contamination before placement and prevent bending or warping.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Steel: ASTM A615, Grade 60 (60,000 psi yield strength) billet steel bars; unfinished. Provide in sizes shown on plans provide deformed bars typically and plain bars where dowels are shown.

B. Stirrup Steel: #3 reinforcing bars may by ASTM A615 Grade 40.

C. Welded Wire Fabric (WWF): ASTM A185, plain type; unfinished. Provide in sheet form not in rolls. Provide as sized if shown or as follows if not shown:

1. Provide 1 layer of 6 x 6-W2.9 x W2.9 in sidewalk and toppings 4" or less in thickness.

2.2 ACCESSORIES

A. Tie Wire: Minimum 16 gauge (0.06") annealed type.

B. Chairs, Bolsters, Bar Supports and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.

C. Special Chairs, Bolsters, Bar Supports and Spacers Adjacent to Weather Exposed Concrete Surfaces: Stainless steel type; sizes and shapes required.

2.3 FABRICATION

A. Fabrication: Follow CRSI Manual of Practice.

B. Locate reinforcing splices not shown at points of minimum stress.

PART 3 - EXECUTION

3.1 PREPARATION

A. Foundations and Footings:

1. Clean excavations of loose debris and earth. Cut sides of excavations square and remove loose material.
2. Pump out standing water from excavations before placing reinforcement. Remove and replace mud or frozen soil with lean concrete.

B. Clean reinforcement completely before concrete placing. Reinforcement shall be free from loose, flaky rust, mud, oil or other coatings that would destroy or reduce bond with concrete at time concrete is placed. Reinspect reinforcement and clean off any dried cement, mortar or dirt when placement is delayed.

C. Obtain Owner's Engineer's approval of reinforcement installations prior to placement of any concrete.

3.2 ERECTION / INSTALLATION / APPLICATION

A. Position reinforcement following ACI 301, ACI 315 and drawn details.

B. Provide reinforcing steel in concrete footings, foundation walls, thickened slabs, retaining walls and elsewhere shown.

C. Provide reinforcing steel in concrete unit masonry walls, bond beams and elsewhere shown.

D. Provide corner reinforcing steel in footings at corners and at intersections of walls unless shown otherwise:

1. Bar size and spacing shall match wall or footing reinforcing.
2. Return bars minimum of 36 diameters on each end.
3. WELDING OF REINFORCING IS NOT PERMITTED.

E. Provide the following minimum concrete cover requirements for reinforcing steel unless shown otherwise:

1. Concrete Cast Against and Permanently Exposed to Earth: 3".
2. Concrete Exposed to Earth or Weather:

    a. #5 Bars and Smaller: 1-1/2".
    b. Others: 2".

F. Provide minimum splice requirements for reinforcing steel shown or required by ACI 318. Stagger splices so that no more than 1/2 of horizontal reinforcing steel is spliced at any given cross section.

G. Provide a bond breaker such as plastic sleeves at all dowel bars occurring at control and expansion joints.

H. Place, support and secure reinforcement against displacement. Do not deviate from required position.

1. Provide bolsters and chairs required to maintain reinforcing steel at proper elevation in slab.

I. Lap welded wire fabric minimum 6" or 1 full mesh on sides and 1 foot or 2 full meshes on ends and extend to within 2" of slab edges. Chair support welded wire fabric so that welded wire fabric is in upper half of slab while placing slabs on grade unless specifically shown otherwise.

J. Carry welded wire fabric and reinforcing steel through control (contraction) joints but not through construction and expansion joints unless shown otherwise.

1. Grease dowels thoroughly and paper wrap to allow for horizontal movement at expansion joints.
2. Cut alternate wires of welded wire fabric at control joints.

K. Take care to avoid disturbing reinforcement and vapor retarder during placing of concrete. Remove and reinstall disturbed or improperly installed reinforcement when discovered or instructed by Owner's Engineer before continuing concrete placement.

L. Accommodate placement of formed openings.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Interior and exterior plain and reinforced site-placed concrete, vapor retarders, expansion joints, curing compounds and other related accessories.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Masonry Wall Dowels.

1.3 RELATED SECTIONS

A. Section 032000 - Concrete Reinforcement

B. Section 042200 – Concrete Masonry Units

1.4 REFERENCES

A. American Concrete Institute (ACI):

1. 301, Structural Concrete.
2. 302, Guide for Concrete Floor and Slab Construction.
3. 304, Measuring, Mixing, Transporting and Placing Concrete.
4. 305R, Hot Weather Concreting.
5. 308, Curing Concrete.
6. 309, Recommended Practice for Consolidation of Concrete.
7. 318, Building Code Requirements for Reinforced Concrete.

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

1. C31, Making and Curing Concrete Test Specimens in the Field.
2. C33, Concrete Aggregates.
3. C39, Compressive Strength of Cylindrical Concrete Specimens.
4. C94, Ready Mixed Concrete.
5. C143, Test Method for Slump of Portland Cement Concrete.
6. C150, Portland Cement.
7. C171, Sheet Materials for Curing Concrete.
8. C172, Sampling Freshly Mixed Concrete.
9. C231, Air Content of Freshly Mixed Concrete by the Pressure Method.
10. C260, Air Entraining Admixtures for Concrete.
11. C309, Liquid Membrane - Forming Compounds for Curing Concrete.

12. C494, Chemical Admixtures for Concrete.
13. C618, Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

1.5 DEFINITIONS

A. Concealed: For Work required under this Section, the term "concealed" will mean "not exposed to view in finished construction."

B. Exposed: For Work required under this Section, the term "exposed" will mean "exposed to view in finished construction."

1.6 SUBMITTALS

A. Submit: Provide electronic (PDF) copies of all required submittal information.

1. Concrete mix designs. Follow ACI 301. Submit a mix design for each class of concrete required within 30 days after Contract date and prior to placing any concrete.
2. Product data including installation requirements for curing/sealer compounds, mineral and chemical admixtures and joint devices.
3. Concrete delivery tickets.

    a. Submit to Owner's Engineer at Site.
    b. Follow ASTM C94. Also include:

        1) Batch number.
        2) Mix by class of concrete and bag content with maximum aggregate size used
        3) Air content.
        4) Quantities and types of admixtures.
        5) Slump.
        6) Time of loading.

    c. Delivery tickets not showing time of loading will be grounds for rejection of load.

4. Testing laboratory reports.

    a. Submit directly to Owner's Engineer, Contractor and ready-mix supplier.

5. Certification or test results indicating compliance of material or source of material with these specifications (upon request).

1.7 QUALITY ASSURANCE

A. Maintain 1 copy of each referenced document at Site.

B. Acquire cement and aggregate from same source for all Work.

C. Tolerances: Place and finish cast-in-place concrete within tolerance limits specified in ACI 301 and as follows:

1. Formed Surfaces: Follow ACI 301 (Table 4.3.1.)

D. Acceptance of Work: Presence or evidence of nonconforming Work shall be sufficient cause for Owner's Engineer to require entire section of concrete affected be torn out and rebuilt properly at Contractor's expense.

1. Such unacceptable Work includes:

   a. Horizontal or vertical misalignment.
   b. Cracking.
   c. Honeycombing.
   d. Spalling.
   e. Embedded debris.

2. If by tests or on-site observation, Owner's Engineer determines that any of Contract requirements have not been fully met in completion of this Work, he may require additional testing or retesting to determine composition, soundness and actual structural capacity of any concrete.
3. Costs for such testing shall be paid by Contractor if such tests subsequently establish that Work is unacceptable and by Owner if Work is found to be acceptable.
4. Remove and replace all unacceptable Work including related Work which was acceptable but which must be disturbed as a result of replacement if such tests establish that Work is unacceptable with regard to compliance with these specifications.

1.8 DELIVERY, STORAGE AND HANDLING

A. Concrete Delivery: Follow ACI 304 and ASTM C94.

B. Deliver packaged materials in manufacturer's unopened, labeled containers.

C. Store materials to provide protection from weather and damage.

D. Deliver concrete in agitating or revolving type equipment. DO NOT USE NON-AGITATING EQUIPMENT.

E. Discharge concrete at Site within 1-1/2 hours or 300 revolutions, whichever comes first, after water has been added to cement and aggregates or cement batches with aggregates unless a longer time is specifically authorized by Owner's Engineer.

F. Owner's Engineer may require a reduction in this elapsed time during hot weather, when high early strength cement is being used or under other conditions contributing to quick stiffening of concrete.

1.9 PROJECT CONDITIONS

A. Coordinate Work of other trades who will furnish and install items of Work (sleeves, piping, conduit, inserts, etc.) to be cast in concrete. Place no concrete until such items are in place.

B. Place concrete at ambient temperatures between 50°F and 95°F.

C. Follow instructions for special procedures at end of this Section should it be necessary to place concrete in colder or hotter weather.

D. Protect freshly placed concrete from rainfall, water leaks, falling objects, traffic of any kind and other hazards to surfaces. Provide barricades and lights if necessary.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement:

1. ASTM C150 Type II (Moderate).
2. Cement shall be free of false set when tested following ASTM C451.
3. Use same brand, type and source throughout.

B. Aggregates:

1. Fine Aggregate: ASTM C33; natural or manufactured sand, clean, hard and durable, uncoated grains, free from deleterious matter. Average fineness modulus shall be between 2.5 and 3.0.
2. Coarse Aggregate: ACI 301 and ASTM C33.

    a. Interior and Concealed Exterior Applications: Crushed gravel or stone, durable uncoated particles free from deleterious matter.
    b. Exposed Exterior Applications: Crushed dolomite, granite or limestone.
    c. Grading: ASTM C33 No. 57. Exception: Use grade size No. 8 masonry core fill.

C. Admixtures:

1. Mineral Admixtures:

    a. Fly Ash: ASTM C618 Class C or Class F; maximum 25% fly ash may be used as a cement substitute; maximum 6% loss on ignition.
    b. Fly ash source must be approved by Owner's Engineer. Preapproved sources are:

        1) Class C: Boral Manufacturing

2. Chemical Admixtures:

    a. Air Entraining Admixtures: ASTM C260.
    b. Water Reducing Admixtures: ASTM C494 Type A (Water Reducing).

        1) Type E (Water Reducing and Accelerating) may be used during cold weather and Type D (Water Reducing and Retarding) during hot weather with Engineer's prior approval.

2) Type F (Water Reducing - High Range) or Type G (Water Reducing High Range and Retarding) admixtures (superplasticizers) may used be used with Engineer's prior approval.

c. Calcium chloride, thiocyanates, corrosive admixtures or admixtures containing more than 0.05% chloride ions (total) are not permitted.

3. DO NOT USE ANY OTHER ADMIXTURES WITHOUT AEPSC'S PRIOR WRITTEN APPROVAL.

D. Water: Potable; free from objectionable quantities of foreign materials harmful to concrete such as silt, organic matter, acids, alkali, salt and other deleterious substances.

E. Vapor Retarders: Clear or black fungus resistant polyethylene or fabric reinforced plastic film recommended for below grade application; 10 mil thick.

F. Expansion Joint Filler Strips: ASTM D1751 non-extruding and resilient type, asphalt impregnated fiberboard or felt or ASTM D1752 closed cell foam with resiliency recovery of 95% if not compressed more than 50% of original thickness; 3/8" thick for interior and 1/2" thick for exterior unless shown otherwise.

G. Liquid Curing/Sealer Compound (Typical): ASTM C309 Type 1; approved by Asphalt and Vinyl Composition Tile Institute; 30% minimum solids content.

H. Sheet Curing Membranes: ASTM C171; absorptive mats, waterproof paper or polyethylene film.

2.2 CONCRETE MIXES

A. General Requirements:

1. Concrete Mixing: Follow ASTM C94. BATCH MIXING OF CONCRETE ON SITE IS NOT PERMITTED EXCEPT FOR MISCELLANEOUS MIXES.
2. Mixing Procedures: Follow ACI 301.
3. Handling and Weighing: Follow ACI 304.
4. Measure water, air entraining admixtures and water reducing admixtures by weight or volume. Measure all other materials by weight.
5. Provide admixtures for entrainment in concrete Work subject to vehicle abrasion or freeze - thaw cycles either during construction or afterwards. AIR ENTRAINED CEMENT IS NOT ACCEPTABLE.
6. Provide water reducing admixtures in all Classes of concrete Work.
7. No dry-packaged mixtures are allowed.
8. Provide fly ash as supplementary cementitious material in concrete Work. Fly ash content shall not exceed 25% of the cementitious material weight within a concrete batch.
9. Exposed concrete is to meet requirements for potentially destructive exposure.
10. Admixtures are to be added at batch plant.
11. Do not add water to mix on job unless previously approved by Owner's Engineer. Note amount of water added on delivery ticket.
12. Nominal maximum allowable slump of concrete (except for controlled density fill) is 4".
13. Follow Exhibit 033000 for water/cementitious ratio of concrete.

14. Provide minimum 3 day compressive strength of 1800 psi for concrete used for floors.

B. Concrete Properties and Proportions:

1. Provide concrete meeting the following properties and performance specifications

a. Structural Concrete (Class 1)

F'c	4,000 psi (28-day compressive strength)
Portland Cement	ASTM C 150 Type II
Fly Ash	Class C, ASTM C 618 (Maximum of 23% of cementitous material)
Water/Cementitious Material Ratio	0.50 Maximum
Slump	5" (+/- 1") measured from the discharge of the truck, for all concrete unless noted otherwise; 7" (+/- 1") for piers
Coarse Aggregate	1" maximum with gradation requirements prescribed in Table 2 of ASTM C33 Size No. 57.
Air Entrainment	Air entrainment shall not be used for concrete with exposed steel troweled surfaces
Total Air Content	3% Maximum (by volume)
Concrete Temperature	95ºF Maximum

b. CMU Grout Fill (Class 2)

F'c	3,000 psi (28-day compressive strength)
Portland Cement	ASTM C 150 Type II
Fly Ash	Class C, ASTM C 618 (Maximum of 25% of cementitous material)
Slump	8" to 11" measured from the discharge of the truck
Coarse Aggregate	3/8" maximum with gradation requirements prescribed in Table 2 of ASTM C33 Size No. 8

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Site conditions and excavations for earth forms to verify that they are neatly and accurately cut and correctly located.

B. Examine formwork to verify that it is sound and correctly located, that conditions are proper for concrete installation and that excavations are sufficient to permit placement, inspection and removal of forms.

C. Examine reinforcement to verify requirements for concrete cover.

D. Examine areas of Work to be cast to determine that substrates are properly installed, required reinforcement, inserts and embedded items are in place and that correct finish top of cast elevations can be obtained.

1. Verify that conduit and piping is installed below slab. NO UTILITIES ARE TO BE BUILT INTO SLAB OR TOPPING.
2. Verify depths of depressed conditions are correct for specified delayed finishes. Slabs to receive finishes over 1/8" in thickness shall be depressed as required to allow for alignment with adjacent finish materials.
3. Verify base and sub-base slope correctly at floor drains. Slab thickness shall be maintained in sloped areas.

E. Do not start Work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ensure availability of sufficient labor, equipment and materials to place concrete correctly following Project requirements and scheduled casting.

B. Notify Owner's Engineer at least 48 hours in advance of placing any concrete. Place concrete only when Owner's Engineer is present unless this requirement is specifically waived. Excavations must be inspected and approved by soils engineer.

C. Place no concrete before embedded items are in place and before forms, reinforcing and affected Work of other trades have been examined.

1. Coordinate placement of joint devices with erection of formwork and placement of form accessories.

D. Drill holes in previously poured concrete, insert steel dowels and pack solid with non-shrink grout in locations where new concrete is dowelled to existing Work including at bases and pads.

E. Immediately Before Placing Concrete:

1. Clean debris from forms, decks, base slabs, bottoms of forms, etc. to receive concrete.
2. Thoroughly wet base of slabs poured directly on earth, sand, stone, concrete or gravel.
3. Verify sizes and locations of openings required.
4. Secure approval of conditions from Owner's Engineer. Allow a minimum of 1 hour for Owner's Engineer's inspection after installation of reinforcing and before placing concrete.

3.3 ERECTION / INSTALLATION /APPLICATION

A. Follow ACI 301.

B. Place concrete only when Owner's Engineer is present unless this requirement is specifically waived by Owner's Engineer upon notice of scheduled pour.

C. Notify Owner's Engineer not less than 48 hours (excluding holidays and weekends) in advance of placing concrete.

D. Provide concrete of following various classes unless shown otherwise.

1. Class 1: Structural Concrete

2. Class 2: CMU Grout Fill

E. Provide uniform slope at rate shown on structural foundation plans. Exterior walkways shall slope as indicated on Architectural plans.

F. Install vapor retarder under interior and exterior slabs, walks, bases and pads on grade.

1. Lay film directly on slab base just before setting reinforcing and pouring concrete slabs. Provide widest widths practical and oriented to obtain least lineal footage of joint.
2. Lap and seal joints. Lap film a minimum of 6" at joints with top lap placed in direction of spreading of concrete. Seal joints watertight by taping or applying sealant at overlapping edges and ends.
3. Carry film up walls, columns, etc. and secure in place with cement or tape. Fold and cement corners or otherwise make vaporproof.
4. Provide sealed contact with piping and other penetrating items. Cut film carefully around opening for pipes, ducts, conduit, wiring, etc. Tape film to insure maximum barrier effectiveness.
5. Exercise care so that film is not punctured. Seal joints, cuts, punctures, etc. with tape, cement or hot iron.
6. Trim exposed film at floor line after concrete has cured and hardened.
7. Repair vapor retarder damaged during placement of concrete reinforcing.

G. Provide sufficient workmen to allow for placement of concrete and other operations within time limits required in Article 1.07 herein.

H. Keep delivery carts and buggies on runways. Do not allow them to bear on reinforcing or uncured concrete.

I. Deposit concrete within 6 feet of its final location to avoid segregation due to rehandling or flowing. Do not drop concrete freely where reinforcing will cause segregation. Chuting procedure is subject to approval of Owner's Engineer. Maximum allowable drop is 5 feet. SPREADING WITH VIBRATORS IS PROHIBITED.

J. Place concrete quickly and vibrate thoroughly with a vibratory screed or other device approved by Owner's Engineer. Maintain specified position of mesh and reinforcement. Follow ACI 309 for use and type of vibrators.

K. Deposit concrete continuously, or when continuous placement is not possible, provide construction joints at locations approved by Owner's Engineer.

L. Do not deposit partially set concrete, retempered concrete or any concrete failing slump or air content tests.

M. Consolidate concrete by internal vibration to maximum practical density so that it is free from pockets of coarse aggregate and trapped air, fits tightly against subgrades, forms and embedded items and leaves smooth, dense surfaces.

N. Operate vibrators using experienced workers and where possible use same operators throughout Project. DO NOT USE VIBRATORS AGAINST FORMS OR REINFORCEMENT.

O. Finishes: Follow ACI 301 (Chapter 11). Perform finishing using only experienced, skilled workers.

1. Flatwork:

a. Slab finish shall be as noted on structural foundation plans. Reference structural general notes for flatness requirements pertaining to surface finish.
b. Detectable Warning Finish: For exterior handicapped curb cuts (ramp only not on flared sides), textured or imprinted concrete using rollers or aluminum tools to produce 0.9" diameter x 0.2" high (nominal) truncated domes at 2.35" on center following requirements of Americans With Disabilities Act (ADA).

2. Vertical and Miscellaneous Work:

a. Exposed Surfaces: Smooth, Do Not Rub Cement Paste on Exposed Concrete Surfaces.
b. Concealed Surfaces: Rough form finish.

P. Control (Contraction) Joints:

1. General Requirements:

a. Provide joints in walks, pads, slabs and toppings shown or specified.
b. Make joints approximately 1/8" wide and minimum depth of 1/4 slab thickness.
c. Locate as shown or as follows if not shown. Verify final locations with Owner's Engineer before proceeding.

2. Interior Locations:

a. Provide sawed control joints where shown or at maximum 20 feet on center in each direction in slabs and toppings if not shown.
b. Install sawed joints immediately after final finishing to depth of 1/4 slab thickness with Soff-Cut saw.
c. Saw control joints 1/8" wide unless otherwise approved. A construction joint may be located where sawed joint is required.

Q. Curing and Protection: Follow ACI 308.

1. Prevent excessive moisture loss from formed surfaces. Cure formed surfaces by moist-curing or application of curing compound for remainder of curing period if forms are removed before 7 days have elapsed.
2. Provide 1 application of liquid curing/sealer compound immediately after finishing of concrete on interior and exterior concrete slabs.

a. Exception #1: Floors scheduled to receive ceramic tile and quarry tile shall be sheet membrane/water (moist) cured for minimum of 10 days.

1) Begin water curing as soon as concrete has hardened sufficiently to prevent damage from water or cover material.

2) Water curing shall consist of ponding or with sprinkling, spraying or covering with wet burlap, sand or waterproof barrier such as polyethylene or building paper.
3) Maintain 100% coverage continuously over water cured slabs for minimum of 4 days for ponding and for 7 days for spraying and membrane curing.

3.4 FIELD QUALITY CONTROL

A. Test and inspect materials and operations as Work progresses. Failure to detect defective Work shall not prevent rejection when defect is discovered nor shall it obligate Owner for final acceptance.

B. Costs for any retesting resulting from Work found to be in non-compliance shall be paid for by Contractor.

C. Strength: ASTM C31, C39 and C172.

1. Conduct strength tests of all classes of concrete (except miscellaneous mixes).
2. Secure composite samples following ASTM C172. For strength tests, a sample shall be obtained from same batch of concrete on a representative, random basis. A sample consists of six specimens.
3. Mold and cure each sample following ASTM C31.
4. Test 1 specimen at 7 days, test 2 specimens at 28 days and 1 specimen at 56 days following ASTM C39. Results shall be average of strengths of 2 specimens, except that if 1 specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded.
5. Record exact location of Work represented by each sample on test reports.
6. Provide a sample for each amount or fraction thereof of each class of concrete placed each day as follows:

    a. 0-100 Cubic Yards: 1 Sampling of 4 Cylinders.

D. Air Content: ASTM C231.

E. Slump: ASTM C143.

3.5 ADJUSTING AND CLEANING

A. Provide materials, methods and finishes for cleaning, patching and other repairs consistent with similar concrete Work in place, approved by Owner's Engineer before beginning repair Work and performed at Contractor's expense.

B. Repair any slabs which do not meet finish requirements performing all grinding, filling of cracks or patching and leveling procedures as required. Replace slabs which cannot be successfully repaired.

C. Point carefully around piping, conduit and other penetrations on both interior and exterior surfaces.

D. Obtain Owner's Engineer prior approval of any corrective measures for slabs which are dusting or showing other signs of improper curing. These may include additional applications of sealer or hardener, grinding or covering with coating or topping.

E. Remove from interior and exterior exposed surfaces any stain-producing elements such as pyrites, nails, wire, reinforcing steel and form ties immediately prior to final acceptance.

F. Remove stains completely. Use of weak acids or patented cleaners is acceptable but surface is to be completely neutralized after use.

G. Blend in surfaces of exposed repairs inconspicuously with surrounding surfaces.

3.6 PROTECTION

A. Protect newly placed concrete from weather and construction traffic damage.

3.7 SPECIAL PROCEDURES

A. It is Project intent to continue concrete Work required to keep Project on schedule throughout summer and winter.

B. Hot Weather Concreting:

1. Follow ACI 305R.
2. Obtain approval to use a retarder in concrete.
3. Temperature of concrete shall not exceed 95ºF.
4. Cool water and aggregate to lower temperature of concrete.
5. Cool subgrade and forms by sprinklering with water immediately before placing.
6. Schedule trucks to reduce waiting time at Site.
7. Cure immediately after finishing.

C. Replace any concrete injured or destroyed by reason of freezing, hot or cold weather at Contractor's own expense including cost of replacing any Work embedded in concrete.

END OF SECTION

SECTION 033543

POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes polished concrete finishing and scoring.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of product requiring color selection.

1.3 QUALITY ASSURANCE

A. Field Sample Panels: After approval of samples, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 inches minimum, to demonstrate the expected range of finish, color, and appearance variations.

1. Locate panels as indicated or, if not indicated, as directed by Architect.
2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
3. Demolish and remove field sample panels when directed.

PART 2 - PRODUCTS

2.1 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

1. Euclid: Euco Diamond Hard

2. Approved equal (refer to substitution specification)

PART 3 - EXECUTION

3.1 POLISHING

A. Polish: Level 3: High sheen, 800 grit

B. Aggregate Exposure: Class B, fine aggregate (salt & pepper)

C. Apply polished concrete finish system to cured and prepared slabs.

1. Machine grind floor surfaces to receive polished finishes level and smooth.
2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
3. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
4. Control and dispose of waste products produced by grinding and polishing operations.
5. Neutralize and clean polished floor surfaces.

END OF SECTION

SECTION 042200

CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete masonry units, lintels, mortar and other related accessories.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Reinforcing steel.

B. Masonry accessories.

1.3 RELATED SECTIONS

A. Section 032000 - Concrete Reinforcement

B. Section 033000 – Cast-In-Place Concrete

1.4 REFERENCES

A. American Concrete Institute (ACI):

1. 530, Building Code Requirements for Masonry Structures.
2. 530.1, Specifications for Masonry Structures.

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

1. C33, Concrete Aggregates.
2. C90, Load-Bearing Concrete Masonry Units.
3. C140, Methods of Testing Concrete Masonry Units.
4. C150, Portland Cement.
5. C331, Lightweight Aggregates for Concrete Masonry Units.
6. C618, Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

C. Portland Cement Association (PCA): Recommended Practices For Laying Concrete Block.

1.5 DEFINITIONS

A. Concealed: For Work required under this Section, the term "concealed" will mean "not exposed to view in finished construction."

B. Exposed: For Work required under this Section, the term "exposed" will mean "exposed to view in finished construction."

1.6 SUBMITTALS

A. Submit: Provide electronic (PDF) copies of all required submittal information.

1. Provide independent test reports following ASTM C140 for sampling and testing of CMU. Test reports shall be dated within six months of start of project. Test reports shall include net area compressive strength, absorption and density results, average width, height and length of each unit, minimum face shell thickness, average face shell thickness, minimum web thickness, average web thickness, and all other test reporting requirements as noted in ASTM C140.
2. Color samples for precolored units.
3. Masonry unit assembly components such as horizontal wire reinforcement, control joint material and masonry veneer ties.

1.7 QUALITY ASSURANCE

A. Follow ACI 530 and 530.1.

B. Maintain 1 copy of each referenced document at Site.

C. Manufacturer: Current NCMA member.

D. Provide units from single manufacturing source to ensure uniform texture for continuous and visually related areas.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver to Site only units properly cured and following these specifications.

B. Protect masonry units from damage and against moisture and weather, particularly against freezing and thawing. Maintain hollow concrete masonry units in their initial dry state until after they are laid up in wall.

C. Stack masonry units in dry place, off ground on prepared plank platform and in manner to promote circulation of air through and around block. Protect stacked block by shed roof or tarpaulin arranged to allow for circulation of air around and above stacked block.

D. Carefully handle masonry units. Do not build units into Work with chipped edges, spalls or other damage to their appearance which would show in finished wall.

E. Do not store adjacent to materials which can cause staining or discoloration.

1.9 PROJECT CONDITIONS

A. Do not erect masonry when, in Owner's Engineer's opinion, atmospheric conditions or limited facilities prevent proper setting, bonding and curing.

B. Protect tops of masonry walls against weather. Use strong, non-staining waterproof membrane secured with metal masonry wall clamps or properly weighted down. Maintain this protection during construction of walls and after their completion, properly anchored, repaired and replaced until tops of walls are covered by Work of others.

C. Leave necessary openings for passage of pipes, drains, ducts, wires and utility lines. Form chases shown, required or directed. Return and solidly close all openings at completion of Work of other trades. Remove rubbish and sweep out area before closing up any pipe chase, duct space or similar limited access or inaccessible area.

D. Coordinate with other trades and make provisions that will permit installation of their Work in manner to avoid cutting and patching. Build in items furnished by other trades as Work progresses.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150 Type 1.

B. Lime: ASTM C207 Type S.

C. Pozzolans: ASTM C618.

D. Aggregates: ASTM D33 normal weight or ASTM C331 lightweight. Provide either normal, medium or light weight units unless shown otherwise.

E. Mortar: Type S, following ASTM C270 Unit Proportion Requirements using preblended masonry cement.

F. Integral Water Repellent: ASTM E514 Class E.

1. Approved Product: Grace Construction Products' "Dry-Block" admixture.

G. Integral Color: Integral color pigment mixed with cement and aggregates during fabrication to match local licensee's color selection(s).

2.2 CONCRETE BLOCK

A. Hollow Units: ASTM C90 Type I; 1900 psi minimum compressive strength (net).

B. CMU shall be integrally colored with burnished ground facing shell. Color selection shall be by Owner of standard colors

2.3 FABRICATION:

A. Follow ACI and NCMA.

B. Provide the following finishes and colors:

1. Exterior Concrete Block: Manufacturer's ground face (burnished) integrally colored finish.

C. Provide integral water repellent in all exterior concrete block and exterior split face block units.

D. Provide concrete masonry units with modular dimension; standard units 7-5/8" high, 1'-3-5/8" long and 3/8" less nominal widths or thicknesses shown or required, with permissible variation of 1/16".

E. Provide special units for 90° corners, bond beams, bullnosed corners, control joint fillers, etc. shown or required.

F. Cure units minimum 14 days in presence of moist air following ASTM C426.

1. Provide block properly cured to 30% of maximum absorption. Questionable block will be tested and shipment rejected if average moisture content is found to exceed specification limits.
2. Do not build in block with moisture content exceeding specification requirements into Work. Dry block containing excess moisture to acceptable maximum either by further air drying or use of heat before being used.
3. No extension of time for completion will be allowed due to delay cause by failure of Contractor to maintain stored block at acceptable moisture content.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive Work.

B. Inspect materials for defects before starting installation.

C. Reject any chipped or broken block. DO NOT BUILD DAMAGED UNITS INTO WORK.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other sections.

B. Provide temporary bracing during installation of masonry Work. Maintain in place until building structure provides permanent bracing.

3.3 ERECTION / INSTALLATION / APPLICATION

A. Follow ACI and NCMA.

B. See Sections under which materials to be installed are furnished for additional installation requirements.

C. Use thoroughly dry concrete block with sharp, square, unbroken corners and edges and no cracks. DO NOT WET MASONRY UNITS.

D. Take special care in handling and storage of units for exposed block Work. Do not install chipped or marred block where exposed.

E. Lay block in running bond with each course lapping block below by 1/2 block unless shown otherwise.

F. Lay solid block units with full mortar coverage on head and bed joints and hollow block units with face shell bedding on head and bed joints. Mortar hollow block unit web joints in load bearing piers or pilasters, in starting course on footings or solid foundation walls and next to cores grouted solid.

1. Do not shift or tap masonry after mortar has achieved initial set. Remove mortar and replace where adjustments must be made.
2. Buttering corners of joints or excessive furring of mortar joints are not permitted.

G. Build walls and partitions true to dimension, plumb and square, laid to line in level courses, accurately spaced and coordinated with other Work. Keep individual face units "in plane" with walls rising together. Use double lines in multiple-tier walls with each tier plumb and all units "in plane."

H. Lay out Work to avoid fractional pieces. Interlock external corners. Set partitions on structural floor slabs before finish floor is laid unless shown otherwise.

I. Perform required cutting with power equipment which will produce true, straight, clean edges free of chipping and undamaged surfaces. CUTTING WITH HAMMER AND CHISEL WILL NOT BE PERMITTED. Use 100% solid block where webs would be exposed. Minimum length of cut units on exposed Work shall be 1/2 unit.

J. Cut units accurately to fit around pipes, ducts, openings, structural framing, etc. and slush voids full.

K. Take particular care to embed conduits and pipes within block without fracturing exposed shells and to fit units around switch, receptacle and other boxes set in walls. Grind and cut units before building in service where electric conduit, outlets, switch boxes and similar items occur.

L. Fill voids and joints between block and different types of materials with mortar.

M. Make joints approximately 3/8" wide. Line up joints vertically. Remove burrs with burlap or carpet after tooling.

N. Neatly tool interior and exterior joints below grade and in exposed masonry firm to slightly concave profile when mortar is thumbprint hard unless shown otherwise. Cut off flush and brush off surplus as Work progresses. Tool vertically then horizontally. Furnish all masons with joint tools of same diameter. Exception: Strike flush interior concealed joints (such as in chases and plenums) or those covered with directly applied finish materials.

O. Install vertical and horizontal masonry reinforcing where shown. Grout cores solid full length of reinforcing with masonry core grout specified in Section 033000. Maintain position of reinforcing within 1/2" of dimensioned position.

P. Fill voids receiving anchor bolts, wedge anchors, expansion bolts, etc. solid with masonry grout specified under Section 033000.

Q. Provide solid masonry bearing surface under lintels, beams, bearing plates, etc. as shown. Provide the following minimum solid bearing (as applicable) if not shown:

1. Lintels: Solid masonry bearing for full thickness of wall by length of bearing plus 8" by 8" high.
2. Beams: Solid masonry bearing for full thickness of wall by length of bearing plus 1'-4" by 2 feet high.

R. Provide solid masonry for course directly below corbelled masonry walls. Maximum corbel for each course is 1".

S. Provide closure, lintels, bond beams, jamb units, sash, corners headers and other special shapes shown or required. Provide standard manufactured sizes or cut full size block for fractional course heights and lengths. Provide sash blocks or other shapes designed to receive specified control joint filler strips.

T. Provide bullnosed units at exterior corners unless shown otherwise. Field grind to Owner's Engineer's satisfaction all external corners not installed bullnosed.

1. Exception: Provide square cornered blocks at window jambs.

U. Step back unfinished Work for joining with new Work. Toothing will not be permitted unless specifically approved by Owner's Engineer. Remove loose masonry and mortar and clean thoroughly before new Work is started.

V. Build in chases, openings, reinforcement, anchors, access doors, lintels, flashings and other items required. Provide centering required to properly support masonry until mortar attains design strength. Build in sleeves except where shown to be installed in other Sections.

W. Build hollow metal door frames into wall. Plumb and brace. Thoroughly embed frame anchors. Slush frame jambs full with mortar. Allow 1/4" for caulking around frame in exterior walls and 1/8" on interior unless shown otherwise. Rake out joints for caulking.

X. Fill masonry units solid with mortar 2 cores wide at each door jamb and 1 core wide at each window jamb for full height of opening.

Y. Hold block down approximately 2" below roof structural members such as beams, joists and roof deck subject to deflection at non-bearing walls.

Z. Provide control and expansion joints in all block Work. Reference Architectural Contract Drawings for masonry joint locations. Joints spacing shall not exceed 22 ft. on center nor shall a joint be located within two feet of an opening.

AA. Build in control joint filler strips in control joints as masonry is laid up allowing for caulking on each side of wall. Reference architectural for caulking material. Exception: Do not carry horizontal joint reinforcement through control or expansion joints.

BB. Maintain lateral support of intersecting masonry non- load bearing walls with wire mesh ties placed across joint between walls and spaced 1'-4" on center vertically.

CC. Install concealed masonry flashing where shown. Provide clean smooth surfaces set in full mortar bed and cover with full mortar bed. Seal penetrations and joints with mastic.

DD. Build in exposed sheet metal flashing, expansion joints and reglets occurring in masonry. Cut out mortar joint and set flashing or reglet in new mortar bed in existing construction.

EE. Build in bond beams grouting full and carefully position reinforcing where shown. Lap rebars a minimum length of 48 bar diameters. Field modify standard units required to receive required reinforcing where bond beam units are not available in specified finish.

FF. Any masonry Work found deficient in respect to these specifications will require entire wall to be removed and relayed at Contractor's expense.

3.4 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/32".

B. Maximum Variation From Plane of Wall: 1/4" in 10 feet and 1/2" in 20 feet or more.

C. Maximum Variation From Plumb: 1/4" per story non-cumulative; 1/2" in 2 stories or more.

D. Maximum Variation From Level Coursing: 1/8" in 3 feet, 1/4" in 10 feet and 1/2" in 30 feet.

E. Maximum Variation From Joint Thickness: 1/8" in 3 feet.

F. Maximum Variation From Cross Sectional Thickness of Walls: 1/4".

3.5 ADJUSTING AND CLEANING

A. Replace any masonry units which are loose or damaged and repair defective mortar joints. Make these repairs such that evidence of repair is not apparent.

B. Remove surplus mortar, drippings, splatter, etc. from exterior and interior masonry as Work progresses.

C. Clean, point and dry brush all exposed Work at end of each working day. Fill holes from line pins and nails.

D. Point joints to provide a neat uniform appearance. Cut out unrepairable defective joints. Fill solidly with mortar and tool to match adjacent Work. DO NOT CORRECT IMPERFECTIONS WITH SPACKLE.

E. Thoroughly rub out exposed Work to remove any projections. Fill indentations flush with surface.

F. Clean masonry surfaces upon completion from top down with water and fiber brushes to remove stains. ACID CLEANING OF MASONRY IS NOT PERMITTED.

END OF SECTION

SECTION 061000

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product data for engineered wood products, insulating sheathing, underlayment, metal framing anchors, and construction adhesives.

B. Provide electronic (PDF) copies of all required submittal information.

PART 2 - PART 2 PRODUCTS

2.1 LUMBER, GENERAL

A. Furnish grade stamped lumber that is dressed S4S and complies with PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.

1. Provide seasoned lumber with 19 percent moisture content at time of dressing and shipment, for sizes 2 inches or less in thickness.
2. For exposed lumber, apply grade stamps to ends or back of each piece or omit grade stamps entirely and issue certificate of grade compliance.

2.2 DIMENSION LUMBER

A. Provide lumber of the following product classification in grade and species indicated:

B.

1. Plates	Southern Yellow Pine	No. 2	SPIB
2. Posts	Southern Yellow Pine	No. 2	SPIB
3. Rafters/Headers	Southern Yellow Pine	No. 2	SPIB

2.3 LUMBER FOR MISCELLANEOUS USES

A. Unless otherwise indicated, provide "No. 2" grade light-framing-size lumber of any species for support of other construction, including rooftop equipment and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members.

2.4 FASTENERS

A. Of size and type indicated that comply with the following requirements. Where rough carpentry is exposed to weather, in ground contact, or in areas of high relative humidity, provide AISI Type 316 stainless steel fasteners.

1. Nails, Wire and Brads: FS FF-N-105
2. Power Driven Fasteners: National Evaluation Report NER-272.
3. Wood Screws: ANSI B18.6.1.
4. Lag Bolts: ANSI B18.2.1.
5. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

2.5 METAL FRAMING ANCHORS

A. Provide metal framing anchors of type, size, metal, and finish indicated that comply with requirements specified including the following:

1. Current Evaluation/Research Reports: Provide products for which model code evaluation/research reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with the building code in effect for this project.
2. Allowable Design Loads: As published by manufacturer and determined from empirical data or by rational engineering analysis and verified through comprehensive testing by a qualified independent testing laboratory.
3. All connectors shall be 316 stainless steel material.

B. Use stainless steel fasteners for all rough carpentry.

2.6 LUMBER AND PLYWOOD TREATMENT

A. Preservative pressure treat lumber and plywood with water-borne preservatives to comply with AWPA C2 and C9, respectively, and with requirements indicated below. Mark each treated item with the AWPB or SPIB Quality Mark Requirements.

B. Pressure-treat above-ground items with water-borne preservatives to a minimum retention of 0.25 pcf. For interior uses, after treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:

1. Wood, cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.

C. Pressure-treat wood members in contact with the ground or fresh water with water-borne preservatives to a minimum retention of 0.40 pcf.

D. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install rough carpentry work to comply with the International Building Code, 2009 edition, and the National Design Standard, and the following:

1. Recommendations of engineered wood products manufacturer.
2. Recommendations of manufacturer of sheathing, underlayment and other products not covered in above publications.

B. Set rough carpentry to required levels and lines, with members plumb and true and cut to fit.

C. Securely attach carpentry work to substrates and supporting members using fasteners of size that will not penetrate members where opposite side will be exposed to view to receive finish materials.

D. Install fasteners without splitting wood; fasten panel products to allow for expansion at joints unless otherwise indicated.

E. Provide wood framing members of size and spacing indicated; do not splice structural members between supports. Fire stop concealed spaces with wood blocking not less than 2 inches thick, if not blocked by other framing members.

F. Contact Architect / Engineer for framing inspection prior to installing interior gypsum board, roofing paper or exterior vapor barrier.

G. Fasten construction panel products as follows:

1. Sheathing:

a. Nail to framing. Reference structural drawings for nailing schedule.

END OF SECTION

SECTION 067300

COMPOSITE DECKING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Composite Decking

1.2 RELATED SECTIONS

A. Section 061100 – Rough Carpentry

1.3 REFERENCES

A. ASTM D-7032-04: Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails), ASTM International.
B. ASTM D-7031-04: Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products, ASTM International
C. ASTM E-84-01: Test Method for Surface Burning Characteristics of Building Materials, ASTM International.
D. ASTM D 570: Water Absorption of Plastics
E. ASTM D 1761: Mechanical Fasteners in Wood
F. ASTM D -1413-99: Test method for Wood Preservatives by Laboratory Soil-block Cultures
G. ASTM C177: Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

1.4 DESIGN/PERFORMANCE REQUIREMENTS

A. Structural Performance:
    1. Deck: Uniform Live Load – 100 pounds per square foot.
    2. Tread of Stairs: Concentrated Load: 100 pounds per square foot and 1/8” max deflection with a concentrated load of 300 pounds on area of 4 sq. in.
B. Fire-Test Response Characteristics per ASTM E-84.

1.5 SUBMITTALS

A. Product Data Indicate sizes, profiles, surface style, and performance characteristics
B. Product data for stainless steel deck screws with self-gapping hardware for edge-of-deck concealed fastening system.
C. Samples: For each product specified, one sample representing actual product color, size, and finish.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products on a flat and level surface. Adjust support blocks accordingly
B. Support bundles on supplied dunnage.

C. When stacking bundles, supports should start approximately 8” from each end and be spaced approximately 2ft on center. Supports should line up vertically/perpendicular to the decking product.
D. Do not stack decking more than 14 bundles.
E. Keep material covered using the provided bundle cover until time of installation.

1.7 WARRANTY

A. Provide manufactures warranty against rot, decay, splitting, checking, splintering, fungal damage, and termite damage for a period of 25 years for a residential installation and 10 years for a commercial installation. In addition provide Fade and Stain Warranty against food staining and fading beyond 5 Delta E (CIE units) for a period of 25 years for a residential installation and 10 years for a commercial installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Contract Documents are based on products supplied by the Trex Company, Inc., 160 Exeter Dr., Winchester, VA 22603.

2.2 COMPOSITE DECKING

A. Wood-Plastic Composite Lumber
   1. Material Description: Composite Decking consisting of recycled Linear Low Density Polyethylene (LLDPE) and recycled wood. The product is extruded into shapes and sizes as follows:
      a. Trex Transcend Decking Boards; 2x6 nominal.
      b. Lengths – 12, 16, and 20 feet
      c. Color – To be specified by Owner from Trex’ standard list of colors.

   2. Physical and Mechanical Properties as follows:

Test	Test Method	Value	
Flame spread	ASTM E 84	60(Transcend) / 85(Enhance)	
Thermal Expansion	ASTM D 1037	1.9 x 10-5 inch/inch/degreeF	
Moisture Absorption	ASTM D 1037	< 1%	
Screw Withdrawal	ASTM D1761	558 lbs/in	
Fungus Resistance	ASTM D1413	Rating - no decay	
Termite Resistance	AWPAE1-72	Rating = 9.6	
		Ultimate (Typical)Values *	**Design Values**
Compression Parallel	ASTM D198	1588 psi	540 psi
Compression Perpendicular	ASTM D143	1437 psi	540 psi
Bending Strength	ASTM D198	3280 psi	500 psi
Shear Strength	ASTM D143	1761 psi	360 psi
Modulus of Elasticity	ASTM D4761	412,000psi	200,000 psi
Modulus of Rupture	ASTM D4761	3280 psi	500 psi

* Ultimate strength values are not meant for design analysis. Design values are for temperatures up to 130F (54C)

2.2 ACCESSORIES

A. Fasteners:
    1. Trex Universal Hideaway Hidden Fasteners – stainless steel

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install according to manufacturer's installation guidelines.
B. Cut, drill, and rout using carbide tipped blades
C. Do not use composite wood material for structural applications

3.2 CLEANING

A. Following cleaning recommendations as specified in manufacturer's installation guide.

END OF SECTION

SECTION 074113

STANDING SEAM ROOF PANELS

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. Standing-seam aluminum metal roof panels, including underlayment, trim and accessories

2. RELATED SECTIONS

a) Section 07 92 00 - Joint Sealants

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meetings:

1. Schedule meeting to discuss roof project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements before start of work onsite.

2. Required attendees: Contractor, metal deck & roof installer, and any other subcontractors who have equipment penetrating the roof or Work that requires roof access or traffic.

1.3 SUBMITTALS

A. Product Data: Manufacturer literature indicating product specifications, installation instructions, and standard construction details for specified products.

B. Shop Drawings: To be prepared by metal roof system manufacturer.

1. Submit roof plan showing panel layout, profiles, components, accessories, finish colors, gutters and downspouts as applicable.

a) Indicate layout of roofing panels and roof panel sizes, including custom fabricated roofing panels if indicated, indicate each trim condition.

b) Include details of each condition of installation, including the locations and types of fasteners, sealants and accessories. Indicate locations, gauges, shapes, and methods of attachment of all panels, accessories and trim.

c) Indicate products/materials required for construction activities of this section not supplied by manufacturer of products of this section.

d) Indicate locations of field applied sealant.

e) Indicate locations of field worked conditions.

2. Roof Panel Attachment:

a) Indicate attachment method compliant with TDI Product Evaluation Index RC-223

b) Roof plan indication roof clip spacing pattern at field, corner, perimeters and where panels are to be fixed from thermal movement.

C. Samples:

1. Two samples each for roof panel clip, bearing plate and clip fastener.

2. Submit color samples for Architect's selection.

3. Submit sample warranties:

a) Manufacturer Finish Warranty

b) Manufacturer Weathertightness Warranty complying with this Specification

c) Installer Warranty

D. Certificates:

1. Submit roof panel manufacturer's certification that fasteners, clips, backup plates, closures, roof panels and finishes meet the specification requirements.

2. Submit roof panel manufacturer’s certification that installer meets requirements to install roof system and is qualified to obtain required warranties.

E. Delegated Design Submittals: Submit engineering calculations indicating wind uplift pressure calculations according to local building code for project location with tested assembly RC-223 as found on TDI Product Evaluation Index.

F. Test and Evaluation Reports - Certified test results that indicate roof system meets or exceeds design and performance criteria. Testing to include:

1. ASTM E1592 - Manufacturers test data, signed and sealed by a registered professional engineer, substantiating that roof system will meet the allowable wind pressures using an appropriate Factor of Safety in accordance with AISI S-100.

2. ANSI-SPRI ES1 – Manufacturers test data, signed and sealed by a registered professional engineer substantiating that the roof edge metal will mee the allowable wind pressures per test standard referenced.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Manual indicating requirements and recommendations, to maintain the roof system in good working condition.

B. Warranty Documentation: Submit final warranties required in this section.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications: Installer ("roofer") to perform the work of this section shall have no fewer than 5 years of successful experience with the installation of metal roof systems similar to those required for this project. The installer shall be qualified by the roof panel manufacturer for installation of manufacturer- warranted systems.

B. Field Measurements: Prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units, where final dimensions cannot be established prior to fabrication.

C. Mock-Ups: Install a 3 panels wide, quality control area of metal roofing, for review by the Architect. The Architect shall approve the quality of installation for the roof, prior to installing additional metal panels.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements: Deliver panels to jobsite properly packaged to provide protection against transportation damage. Panels too long to ship shall be site formed onto the roof by manufacturer’s factory personnel using manufacturer’s factory roll formingequipment.

B. Storage and Handling Requirements:

1. Exercise care in unloading, storing and erecting panels to prevent bending, warping, twisting, and surface damage.

1.7 WARRANTIES

A. Manufacturer Warranties:

1. Panel Coating: Furnish manufacturer's 40-year warranty panel coating warranty covering cracking, checking, and peeling, and 25 year warranty covering fade and chalk.

2. Metal Roof Weathertightness Warranty:

a) Manufacturer’s Single Source Weather tightness Warranty

(1) Warranty term: 20 years commencing on date of substantial completion.

(2) Warranty must cover: structural failure including rupturing , cracking, or puncturing. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

(3) Warranty: Installer to provide warranty agreeing to repair or replace metal roof panels, trim, or accessories that fails due to poor workmanship or faulty installation.

3. Warranty term: 2 years commencing on date of substantial completion.

PART 2 - PRODUCTS

2.1 ROOF PANEL SYSTEM MANUFACTURES

A. Drexel Metals Inc. (888) 321-9630; DMC 200S, .040” aluminum TDI Product Evaluation RC-223

1. comply with specified TDI requirements in appearance, assembly, and performance.

B. Product Options

1. Factory-formed panel, width of 16 inches. Panels shall be symmetrical in design and shall be mechanically seamed with a field operated electric seaming machine approved by the manufacturer.

2. Minimum seam height 2 inches. Integral seam, double lock and snap together type panels are not acceptable

a) Minimum thickness of .040”.

3. Finish: ALUMINUM SUBSTRATE

4. Roof panel system must allow individual roof panel removal and replacement from any point on the roof without damage to adjacent roof panel(s).

5. Roof panel system must be approved by manufacturer to be installed on slopes as low as 1/4":12.

6. Panels must be furnished and installed in continuous lengths from ridge to eave with no overlaps. Panels too long to ship will be manufactured on site using manufacturer’s employees and equipment.

7. Manufacturer weathertightness warranty meeting requirements of this Section.

2.2 PERFORMANCE/DESIGN CRITERIA

A. Thermal Movement: Metal Roofing system, including flashing, shall accommodate unlimited thermal movement without buckling or excess stress on the structure.

B. Roof panel and trim attachments will be designed to satisfy the requirements of the roof design (shown in shop drawings).

C. Maximum wind uplift capacity of roof system shall be determined using ASTM E 1592 test results, with an appropriate Factor of Safety in accordance with AISI S-100, and ANSI-SPRI ES1 for edge metal.

D. Panel system shall be designed in accordance with the local building code and ASCE7 for project location with respect to appropriate Exposure category, Importance Factor and Factor of Safety in accordance with AISI S-100.

E. Tested and listed by Underwriters Laboratories to comply with UL 580 for wind uplift Class PER STRUCTURAL DWGS.

2.3 ACCESSORIES

A. Panel Clip Screw – STAINLESS STEEL #10-13x1” PHW screw required in wind uplift rating requirements and design specification for application, with corrosion-resistant coating, in length necessary to penetrate substrate minimum 3/4 inch., as supplied by roof panel manufacturer.

B. Roof Panel Clip:

1. Intermittent Clip: 22 gauge 3”x2-1/8” STAINLESS steel DMC200S, one-piece fixed clip, designed to allow roof panel thermal movement and not contact roof panel cap, as supplied by roof panel manufacturer, meeting wind uplift requirements and design criteria of this section.

C. Trim and flashing will be of the same gauge and different finish as selected by architect, unless approved otherwise by the metal roof system manufacturer. Provide products and installation that match tested assembly that meets project requirements per ANSI-SPRI ES1.

D. Gutters and downspouts will be fabricated from same metal and finish TO BE SELECTED BY ARCHITECT FROM MANUFACTURER’S FULL RANGE.

E. Underlayment: ASTM D 226 Type II Underlayment installed with minimum 4" side laps and 6" end laps and fastened using 12-gauge 1-1/4" ring shank nails and 32-gauge 1-5/8" tin caps spaced 6" on center in the laps and two staggered rows 12" on center in the field.

F. Concealed supports, angles, plates, accessories and brackets: gauge and finish as recommended, and furnished by manufacturer.

G. Accessory Screw: Size and screw type as provided by panel manufacturer for each use, with prefinished head in color to match panels where exposed to view.

H. Rivets: full stainless steel or aluminum, including mandrel, in size to match application.

I. Field Sealant:

1. Exposed Sealant: Color coordinated urethane or polymer sealant as supplied by panel manufacturer.

2. Non-exposed Sealant: Non-curing, non-skinning, butyl tape or tube sealant as supplied by manufacturer.

J. Sealant Tape: non-drying, 100 percent solids, high grade butyl tape, as supplied by panel manufacturer, in sizes to match application.

K. Pipe Penetration Flashings: 20 year warranted flexible boot type, with stainless steel compression ring.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Must be certified and qualified by Manufacturer.

3.2 EXAMINATION

A. Verification of Conditions

1. Ensure surfaces are ready for panel application.

2. Inspect and ensure surfaces are free from objectionable warp, wave, and buckle before proceeding with installation of pre-formed metal roofing.

3. Ensure substrate is ready to receive metal roofing. Report items for correction and do not proceed with metal roof panel system installation until resolved.

3.3 PREPARATION

A. Install substrate boards, hat channels, purlins, or furring channels in accordance with manufacturer’s recommendations.

B. Coordinate Work, with installation of other associated Work, to ensure quality application.

C. Coordinate Work with installation of associated metal flashings and building walls.

D. Coordinate Work to minimize foot traffic and construction activity on installed finished surfaces.

E. Coordinate location of pipe penetrations to allow centering of pipe in panel.

3.4 INSTALLATION

A. Comply with and install roofing and flashings in accordance with all details shown on manufacturer’s approved shop drawings and manufacturer's product data, instructions, and installation manuals, within specified erection tolerances.

B. Install field panels in continuous lengths, without endlaps

C. Do not install panels damaged by shipment or handling.

D. Install intermittent clips with bearing plates, if required, and continuous clips, if required, according to the engineered design pattern in the field, perimeter, and corner areas of the roof.

E. Fix panels at location depicted on reviewed shop drawing(s).

F. Allow for required panel clearance at penetrations for thermal movement.

G. Install concealed supports, angles and brackets as furnished by manufacturer to form complete assemblies.

H. Remove roof panel and flashing protective film prior to extended exposure to sunlight, heat, and other weather elements.

I. Field-apply sealant tape and gun-grade sealant according to reviewed shop drawings and manufacturer’s requirements for airtight, watertight installation.

J. Ensure sealant beads and tapes are applied prior to sheet metal installation to achieve a concealed bead. Neatly trim exposed portions of sealant without damaging roof panel or flashing finish.

K. Align pipe penetrations to occur at center of roof panel. Report and have corrected improperly- placed penetrations before proceeding with panel installation. Remove and replace roof panels which have improperly-placed penetration flashings.

3.5 CLEANING

A. Clean exposed surfaces of work promptly after completion of installation.

B. Clean mud, dirt, and construction-related debris from panels before panels are scratched or marred.

3.6 PROTECTION

A. Protect Work as required to ensure roofing will be without damage at time of final completion.

B. Do not allow excessive foot traffic over finished surfaces.

C. Do not track mud, dirt, or construction-related debris onto panel surfaces.

D. Replace damaged Work before final completion.

END OF SECTION

SECTION 076200

SHEET METAL FLASHING AND TRIM (FORMED METAL)

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.

B. Reference wind loads and tested roof assembly for items in this section.

1.2 SUMMARY

A. Section Includes:

1. Formed Products:
    a. Formed roof drainage sheet metal fabrications.
    b. Formed low-slope roof sheet metal fabrications.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Design Wind Loads: Tested per ANSI SPRI ES to resist the uplift pressures as follows which were calculated per IBC 2018 requirements for ultimate design wind speed:

1. Refer to structural drawings

C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

1. Compliance with all Performance Requirements listed above.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.

9. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

D. Qualification Data: For qualified fabricator.

E. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Skilled Workmen - All sheet metal work shall be fabricated and installed by fully trained, qualified sheet metal mechanics properly skilled to perform the Work in accordance with the standards set forth in these specifications. Substandard Work will be rejected.

D. Accepted Flashing Details - In the event field conditions make installation of a flashing detail in accordance with SMACNA or NRCA Details impractical, the Contractor shall submit a shop drawing design to the Owner for approval to fit the particular conditions present.

E. Reference Standards: Except as modified by the Drawings and Specifications, the following documents, or applicable portions thereof, govern the work:

1. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual -Sixth Edition."
2. American Society for Testing and Materials (ASTM).
3. National Roofing Contractors Association (NRCA), “Roofing and Waterproofing Manual”, 5th edition,
4. Sheet Metal Welding Code.
5. ANSI SPRI ES1

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Prefinished Aluminum Sheet Metal - Conforming to ASTM B202-92a (UNS Alloy Designation

A93003-H14 or A933004-H34), minimum thickness required to meet or exceed tested assembly required by Performance Requirements. Exposed aluminum sheet metal shall have a high-performance organic finish, thermo-cured and containing not less than 70 percent polyvinylidene fluoride resin by weight, complying with AAMA 2604. Color: As selected by Architect from manufacturer's full range.

C. Stainless Steel Sheet Metal: ASTM A 240/A 240M, Type 304; No. 2B finish; gauge required to meet or exceed tested assembly required by Performance Requirements .

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
   1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
   2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
   3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
      b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
      c. Henry Company; Blueskin PE200 HT.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
      b. Blind Fasteners: Stainless-steel rivets suitable for metal being fastened.
      c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
   2. Fasteners for prefinished Aluminum Sheet: Series 300 stainless steel.
   3. Fasteners for stainless steel sheet: Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, non-corrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
   1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   2. Obtain field measurements for accurate fit before shop fabrication.
   3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.

E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

K. No Dissimilar Metals - In no case, shall dissimilar metals come into contact with each other, nor shall a flashing be constructed in such a way as to permit water from running off one type metal onto another where chemical reaction or corrosion may occur.

L. Do not use graphite pencils to mark metal surfaces.

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Hanger Style: Match existing.
   2. Fabricate from the following materials:
      a. Prefinished Aluminum
      b. Prefinished Stainless Steel

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations,

dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart, unless called to be continuous in drawings. Anchor each cleat with two fasteners, unless noted otherwise. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for

installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Downspouts: Join sections with 1-1/2-inch telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system indicated.

3.5 FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 085250
PRE-HUNG EXTERIOR DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Pre-hung exterior doors.

B. Related Sections include the following:

1. Division 6 Section "Flexible Flashing" at door openings.
2. Division 8 Section "Door Hardware"

1.2 SUBMITTALS

A. Product Data: Provide test data to confirm compliance with Code dictated wind pressures (ASTM E330) including installation details and tested hardware. All glazing (including sidelites) to meet Code dictated impact rating standards (ASTME1996).

1. Include door hardware
2. Basis of design TDI product evaluation report DR637 and drawing TX4114

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; frame, casing stops, hinges; and other pertinent data.

C. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain all material through one source from a single manufacturer.

B. Provide product listed on TDI product evaluation report DR637 drawing TX4479 to comply with design wind pressures, ensure door hardware matches evaluated assembly.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of manufacturer's written instructions.

B. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, and wet work is complete.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by Manufacturer, Installer, and Contrac- tor, in which manufacturer agrees to repair or replace doors that are defective in materials or work- manship, and have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch

1. Warranty shall also include installation and finishing that may be required due to repair or re- placement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Com- pletion: One year.

PART 2 - PRODUCTS

2.1 PRE-HUNG DOORS

A. Basis of Design Product: The design for doors is based on Plastpro Opaque Fiberglass Doors, (non-impact rated).

B. Pre-hung Doors:

2. Type: Flush Face (**NO RELIEF PANELS**)

a. Style: **Modern Series, South Beach Door**

b. Material: .075" thick fiberglass sheet with composite rails and foam core.

c. Insulation: Polyurethane, 1.9 pcf density.

d. Finish: To be selected by Architect from manufacturer's full range.

e. Size: 1-3/4" thick x width and height as shown on the Door Schedule.

f. Hinges: See Section 087100, Door Hardware.

h. Drip Strip: See Section 087100, Door Hardware.

i. Lockset: See Section 087100, Door Hardware.

j. Door Stop: See Section 087100, Door Hardware

k. Frame:

1) Jamb: Finger jointed wood.

2) Interior Casing: See Section 062000, Finish Carpentry.

l. Threshold: ADA accessible threshold shall be provided at all locations - See Section 087100, Door Hardware.

m. Fully weatherstripped on all 4 edges. Door shoe shall be in contact with threshold.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install doors to comply with manufacturer's written instructions and TDI product evaluation report DR637 and drawing TX4114.

B. Install Flexible Flashing at head and jambs in the sequence recommended by the manufacturer and in strict accordance with manufacturers written instructions.

C. Thresholds shall be fully supported for their entire width and length. Set threshold in solid bed of caulking.

3.3 ADJUSTING AND PROTECTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Replace doors that are damaged or do not comply with requirements. Doors may be repaired or re- finished if work complies with requirements and shows no evidence of repair.

END OF SECTION

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work under this section comprises of furnishing and installing hardware specified herein and noted on drawings for a complete and operational system. Any door shown on the drawing and not specifically referenced in the hardware sets shall be provided with identical hardware as specified on other similar openings and shall be included in the finish hardware suppliers bid. All fire rated door shall be provided with fire rated hardware as required by local code Authority as part of the hardware supplier's base bid. The hardware supplier shall verify all cylinder types specified for locking devices supplied as part of the door system with the door manufacturer and/or door supplies.

B. The General Contractor and/or Hardware Supplier shall notify the Architect in writing of any discrepancies (five (5) days prior to bid date) that could and/or would result in hardware being supplied that is non functional, hardware specified and/or hardware that has not been specified that will result in any code violations and any door that is not covered in this specification. Failure of the General Contractor and/or Hardware Supplier to address any such issue shall be considered acceptance of the hardware specified and all discrepancies shall be corrected at the general contractors and/or hardware supplier's expense and considered a part of their base bid. Change orders shall not be issued if deemed by the Architect and/or Owner to fall under and/or be covered as a part of the supplier's base bid, due to failure to comply with this instruction notification.

C. Items include but are not limited to the following:

1. Hinges - Pivots
2. Locksets and Cylinders
3. Closers
4. Thresholds, Seals and Door Bottoms
5. Silencers
6. Miscellaneous Trim and Accessories

1.2 **RELATED DOCUMENTS**, drawings and general provisions of contract, including General and Supplementary Conditions, and Division 1 Specification sections, apply to this section.

1.3 **RELATED WORK** specified elsewhere that should be examined for its effect upon this section:

A. Section 085250 – Pre-hung Exterior Doors
B. Sections within 099013 - Exterior Painting

1. 4 **REFERENCES SPECIFIED** in this section subject to compliance as directed:

A. NFPA-80-1995 - Standard for Fire Doors and Windows
B. NFPA-101-1994 - Life Safety Code
C. ADA - The Americans with Disabilities Act - Title III - Public Accommodations
D. ANSI-A 117.1 - American National Standards Institute - Accessible and Usable Buildings and Facilities
E. ANSI-A 156.5 - American National Standards institute -Auxiliary Locks and Associated Products

F. UFAS - Uniform Federal Accessibility Standards
G. UL - Underwriter's Laboratories
H. WHI - Warnock Hersey International, Testing Services
I. State and Local Codes including Authority Having Jurisdiction
J. U.B.C.7-2-97 and UL10C
K. IBC2003/2006 – International Building Code
L. NFPA-70 – National Electrical Code

1.5 SUBMITTALS

A. HARDWARE SCHEDULES submit copies of schedule in accordance with Division 1, General Requirements. Schedule to be in vertical format, listing each door opening, including: handing of opening, all hardware scheduled for opening or otherwise required to allow for proper function of door opening as intended, and finish of hardware. At doors with door closers or door controls include degree of door opening. Supply the schedule of all Finish Hardware within two (2) weeks from date purchase order is received by the hardware supplier.
B. Submit manufacturer's cut/catalog sheets on all hardware items and any required special mounting instructions with the hardware schedule.
C. Certification of Compliance:
   1. Submit test data to confirm compliance with wind pressures shown on Structural Drawings. Hardware, door, and frame must be tested as an entire assembly.
D. Submit any samples necessary as required by the Architect.
E. Templates for finish hardware items to be sent to related door and frame suppliers within three (3) working days of receipt of approved hardware schedule.
F. Doors and Frames used in positive pressure opening assemblies shall meet U.B.C. 7-2-97 and UL10C in areas where this specification includes Seals for smoke door.

1.6 QUALITY ASSURANCE

A. Hardware supplier to be a qualified, Factory Authorized, direct distributor of the products to be furnished. In addition, the supplier to have in their regular employment an AHC or AHC /CDC and/or a person of equivalent experience (minimum fifteen (15) years in the industry) who will be made available at reasonable times to consult with the Architect/Contractor and/or Owner regarding any matters affecting the finish hardware on this project.
B. All hardware used in labeled fire or smoke rated openings to be listed for those types of openings and bear the identifying label or mark indicating UL. (Underwriter's Laboratories) approved for fire. Exit devices in non-labeled openings to be listed for panic.

1.7 DELIVERY, HANDLING AND PACKAGING

A. Furnish all hardware with each unit clearly marked and numbered in accordance with the hardware schedule. Include door and item number for each.
B. Pack each item of hardware completes with all necessary parts and fasteners.
C. Properly wrap and cushion each item to prevent scratches and dents during delivery and storage.

1.8 SEQUENCING AND SCHEDULING

A. Any part of the finish hardware required by the frame or door manufacturers or other suppliers that is needed in order to produce doors or frames is to be sent to those suppliers in a timely manner, so as not to interrupt job progress.

1.9 WARRANTY

A. All finish hardware shall be supplied with a Two- (2) year warranty against defects in materials and workmanship, commencing with substantial completion of the project except as follows:
   1. All Closers are to have a ten- (10) year written warranty.
   2. All Exit Devices are to have a three- (3) year written warranty.
   3. All Locksets are to have a two- (2) year written warranty.
   4. All Continuous are to have a ten- (10) year written warranty.

PART 2 – PRODUCTS

2.1 FASTENERS

A. Furnish with finish hardware all necessary screws, bolts and other fasteners of suitable size and type to anchor the hardware in position for a long life under hard use.
B. All closers shall be through-bolted.
C. All fasteners to be stainless steel.

2.2 HINGES

A. All hinges to be stainless steel of one manufacturer as hereafter listed for continuity and consideration of warranties. Provide one of the following manufacturers McKinney, Ives, Bommer, Select Products, Markar or Stanley.
B. Unless otherwise specified provide five-knuckle, heavy-duty, button tip, full mortise template type hinges with non-rising loose pins. Provide non-removable pins for out swinging doors at secured areas or as called for in this specification (Refer to 3.02 Hardware Sets).
C. Provide exterior and interior out-swinging door hinges manufactured from stainless steel with non-removable pins or security studs as called for in 3.02 Hardware Sets.
D. Furnish three (3) hinges up to 90 inches high and one (1) additional hinge for every 30 inches or fraction thereof.
E. Provide size 4" x 4" for all 1 doors up to and including 36 inches wide.
F. Where required to clear the trim and/or to permit the doors to swing 180 degrees furnish hinges of sufficient throw.
G. Provide heavy weight hinges on all doors over 36 inches in width.
H. At labeled door's steel or stainless steel, bearing-type hinges shall be provided. For all doors equipped with closers provide bearing-type hinges.
I. Finishes for exterior and interior five knuckle hinges shall be stainless steel (US32D/630).

2.3 LOCK AND LOCK TRIM

A. All of the locksets, latch sets, and trim to be of one manufacturer as hereafter listed for continuity of design and consideration of warranty. Locksets specified should be equal to Schlage "F" series with the Latitude lever and interchangeable full size cores.
B. Provide metal wrought box strike boxes and curved lip strikes with proper lip length to protect trim of the frame, but not to project more than 1/8 inch beyond frame trim or the inactive leaf of a pair of doors.
C. Mechanical Locks shall meet ANSI Operational Grade 1, Series 4000 as specified.
   1. Hand of lock is to be field reversible or non-handed.
   2. All lever trim is to be through-bolted through the door.
   3. Provide a ¾" (14-042) minimum latch throw at all pairs of hollow metal and/or wood doors.

2.4 CYLINDERS AND KEYING

A. Provide locks and exit devices on interior doors requiring cylinders with Schlage Classic keyway cylinders and locks and exit devices on exterior doors requiring cylinders that comply with performance requirements of ANSI A156.5. All keys shall be of nickel silver material only. **All locks are to be keyed as directed by Owner and the Architect.** The hardware supplier shall meet with the General Contractor, the Architect and Owner at the project site to determine all permanent keying requirements. The hardware supplier shall provide five- (5) silver nickel key blanks manufactured by Kustom Key Inc. with Owners custom stamping information for Owners use. A bitting list, key schedule and One (1) standalone remote Knox Box (and mounting pole) if required by the local Fire Marshal shall also be provided by the supplier. The contractor shall as required by the local Fire Marshal and Owner mount the Knox Box as instructed.

B Furnish all locks, cylinders and Exit devices with temporary keyed construction master keyed cylinders for the duration of construction if requested by Owner. Provide ten (10) construction keys total. The general contractor shall within thirty (30) days of the installation of permanent cylinders return all construction cylinders to the hardware supplier for full credit.

C. Cylinders shall be factory keyed and factory maintained as directed by Owner and the Architect. Provide three- (3) keys per cylinder and six- (6) master keys per masterused.

D. Factory stamp all keys “Do not duplicate” and with key symbol as directed by Owner. Visual key control on the permanent cylinders and keys shall be provided and consist of factory stamping of all cylinders and keys with the key symbol.

2.5 SURFACE MOUNTED DOOR CLOSERS

A. All closers for this project shall be the products of a single manufacturer for continuity of design and consideration of warranty. All door closers shall be mounted as to achieve the maximum degree of opening (trim permitting).

B. All closers to be heavy duty, surface-mounted, fully hydraulic, rack and pinion-action with high strength cast iron or aluminum cylinder to provide control throughout the entire door opening cycle.

C. Size all closers in accordance with the manufacturer’s recommendations at the factory.

D. All closers to have adjustable spring power sizes 1 or 2 through 4 or 6 and separate tamper resistant, brass, non-critical regulating screw valves for closing speed, latching speed and back-check control as a standard feature unless specified otherwise.

E. All closer covers to be rectangular, full cover type of non-ferrous, non-corrosive material painted to match closer. Provide closer covers only if provided as a standard part of the door closer package.

F. Closers shall have heavy-duty arms. All closer arms shall be of sufficient length to accommodate the reveal depth and to insure proper installation. The hardware supplier shall provide any and all required brackets, spacers or filler plates as required by the manufacture for a proper and functional installation as part of their base bid.

G. Supply appropriate arm assembly for each closer so that closer body and arm are mounted on non-public side of door opening and on the interior side of exterior openings, except where required otherwise in the hardware sets.
   1. All parallel arm mounted closers to be factory indexed to insure proper installation.
   2. Furnish heavy-duty cold forged parallel arms for all parallel arm mounted closers.

H. Provide closers with special application and heavy-duty arms as specified in the hardware sets or as otherwise called for to insure a proper operating, long lasting opening. Drop plates and any additional brackets required for the proper installation of the door closer shall be included in the hardware supplier’s base bid.

I. Finish: Aluminum or stainless steel.
J. Provide and install all surface mounted door closers with **sex bolts** as provided by the manufacturer.
K. Closers shall be LCN 4041 (exterior) and 1261 (interior) series as specified and/or products considered equal by Owner and manufactured by LCN.

2.6 LOCK AND LATCH GUARDS

A. Provide deadlock latchguard to cover door frame strike by Ives. Finish shall be stainless steel.

2.7 THRESHOLDS AND SEALS

A. Provide manufacturer standard threshold and weatherstripping.
B. Provide thresholds with stainless steel tapcon anchors. Supply all necessary anchoring devices for weather strip and sound seal.
C. Seals shall comply with the requirements of the Wood Door Manufacturer's certification requirements.

2.8 FINISHES

A. Finishes for all hardware are as required in this specification and the hardware sets.
B. Special care shall be taken to make the finish of all various manufactured items uniform.

2.9 DOOR SILENCERS

A. Provide door silencers at all openings without gasket. Provide two- (2) each at each pair of doors and three- (3) or four- (4) each for each single door (coordinate with the frame manufacturer).

2.10 PROPRIETARY PRODUCTS

A. References to specific products are used to establish quality standards of utility and performance. Unless otherwise approved provide only the specified product.
B. All other materials, not specifically described, but required for a complete and proper finish hardware installation, are to be selected by the Contractor, subject to the approval of the Architect and Owner.
C. Architect and Owner reserve the right to approve all the substitutions proposed for this specification. All requests for substitution to be made prior to bid in accordance with Division 1, General Requirements, and are to be in writing, hand delivered to the Architect. Two (2) copies of the manufacturer's brochures and a physical sample of each item in the appropriate design and finish shall accompany requests for substitution.

PART 3 - EXECUTION

3.1 INSTALLATION AND SERVICE ITEMS OF FINISH HARDWARE

A. All finish hardware shall be installed by an experienced finish hardware installer with at least ten (10) years experience after a pre-installation meeting between the contractor, hardware Manufacturers representative, the hardware supplier, the hollow metal supplier and the wood door supplier. The finish hardware installer shall be responsible for the proper installation and function of all doors and hardware.
B. The hardware supplier's office and/or warehouse shall be located within a four hundred (400) mile radius of the project site as to better service the general contractor and Owner during the course of this project.

C. Check hardware against the reviewed hardware schedule upon delivery. Store the hardware in a dry and secure location to protect against loss and damage.

D. Install finish hardware in accordance with approved hardware schedule and manufacturers' printed instructions. Pre-fit hardware before finish is applied to door; remove and reinstall after finish is complete and dry. Install and adjust hardware so that parts operate smoothly, close tightly, and do not rattle.

E. Mortise and cutting to be done neatly, and evidence of cutting to be concealed in the finished work. Protect all Finish hardware from scratching or other damage.

F. The hardware supplier, general contractor, hardware installer, representatives of the lock, exit device and closer manufacturers shall after three- (3) months of Owners acceptance of the facility perform an onsite survey of the finish hardware. Any item of finish hardware found to be defective or out of adjustment shall be replaced or adjusted for the proper function and operation of the door assembly at the contractor's, supplier's and/or installer's expense. The hardware supplier shall provide a written report of any and all affected items to the Architect and Owner (No Exceptions). The scheduled inspection date
for the onsite inspection and adjustment of finish hardware shall be provided to the Architect as a part of the general contractor and hardware supplies close-out documentation for this project.

G.

3.2 HARDWARE SETS

EXTERIOR

Hardware Group No. 1.03
(Entrance) For use on door(s):
101, 102

Provide each SGL door with the following:

Quantity		Description	Model Number	Mfr
3	EA	HINGE	5PB1 - 4 x 4 NRP	IVE
1	EA	PASSAGE LEVER SET	F10 LAT-GSN W/ GREYSON TRIM	SCH
1	EA	CLOSER	4041 XP SCUSH (mount on interior)	LCN
1	EA	INDICATOR DEAD BOLT	B571626	SCH
1	EA	DOUBLE CYLINDER DEADBOLT	B762P	SCH
1	SET	WEATHERSTRIP	BY DOOR MFR.	
1	EA	DOOR SWEEP	200NSS	NGP
1	EA	THRESHOLD	BY DOOR MFR.	
1	EA	DRIP CAP	16A	NGP
1	EA	LATCH GUARD	LG7	IVE

END OF SECTION

SECTION 099113

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Paint

B. Anti-graffitti coatings

1.2 SUMMARY

A. This section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.
   1. Surface preparation, priming, and finish coats specified in this section are in addition to shop-priming and surface treatment specified under other sections.

B. Paint exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.
   1. Painting includes field-painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

1.3 SUBMITTALS

A. General: Submit the following according to conditions of the contract and division 1 specification sections.

B. Product data for each paint system specified, including block fillers and primers.
   1. Provide the manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
   2. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the project that have resulted in a construction record of successful in-service performance.

B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

C. Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until required sheen, color, and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.

1.5 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50°F (10°C) and 90°F (32°C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45°F (7°C) and 95°F (35°C).

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5°F (3°C) above the dew paint; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to the following:

1. Benjamin Moore and Co. (Moore).
2. PPG Industries, Pittsburgh Paints (PPG).
3. Pratt and Lambert (P & L).
4. Sherwin Williams S-W
5. CSL SiCoat Anti-Graffitti Coating

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

1. Proprietary Names: Use of manufacturer’s proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the

exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.

B. Colors: Provide color selections made by the Architect from the manufacturer's full range of standard colors. **For bidding purposes, contractors should assume 100% dark colors.**

2.3 PRIMERS

A. Provide the manufacturer's recommended factory-formulated primers that are compatible with the substrate and finish coats indicated.

2.4 UNDERCOAT MATERIALS

A. Provide the manufacturer's recommended factory-formulated undercoat materials that are compatible with the substrate and finish coats indicated.

2.5 EXTERIOR FINISH PAINT MATERIAL

A. Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated.

2.6 CLEAR SEALER FOR CONCRETE FLOORING

A. Refer to Specification Section 033500

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected.
2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or are, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and re-prime. Notify Architect in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
2. Cementitious Materials: Prepare concrete masonry block, surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

    a. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
    b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

    a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    b. Prime, stain, or seal wood to be painted immediately upon deliver. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
    c. Back prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
    d. Seal tops, bottoms, and cutouts of un-primed wood doors with a heavy coat of vanish or sealer immediately upon delivery.

4. Ferrous Metals: Clean un-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with non petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture to uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Provide finish coats that are compatible with primers used.
3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

3.4 EXTERIOR PAINT APPLICATION SCHEDULE

A. Provide the following paint systems for the various substrates indicated.

B. Painted Wood:

1. One coat of acrylic latex primer: as recommended by manufacturer

2. Semi-gloss: Two coats of acrylic; as recommended by manufacturer.

C. Painted Ferrous Metal (Unprimed)

1. One coat of acrylic latex primer: DTM Acrylic Primer/Finish; Series B66.
2. Semi-gloss: Two coats of acrylic; Metalatex Semi-Gloss; Series B42.

D. Painted Ferrous Metals, Factory Primed:

1. Touch up primer: DTM Acrylic Primer/Finish; Series B66
2. Semi-Gloss: Two coats of acrylic; Metalatex Semi-Gloss; Series B42

E. Painted Ferrous Metals, Galvanized:

1. One coat of acrylic primer; DTM Acrylic Semi-Gloss Coating, Series B66
2. Semi-Gloss: Two coats of acrylic; Metalatex Semi-Gloss, Series B42

F. Painted Aluminum, Unprimed:

1. One coat acrylic primer; DTM Wash Primer, Series B71
2. Semi-Gloss: Tow coats of acrylic; Metalatex Semi-Gloss, Series B42.

G. Painted Aluminum, Factory Primed

1. Semi-Gloss: Two coats of acrylic latex; DTM Acrylic Semi-Gloss, Series B66

H. Paint E-Pav - Pavement Marking Paint:

1. Yellow: One coat, with reflective particles
2. White: One coat, with reflective particles

I. Cement Masonry Units

1. One coat acrylic latex block filler; Heavy Duty Block Filler B42W46.
2. One coat Enamel undercoat; ProMar 200 Alkyd Enamel Undercoater B49W200.
3. Two coats alkyd enamel, Eg-Shel; ProMar 200 Alkyd Eg-Shel Enamel B33W200.
4. Minimum total dry film thickness 15.6 mil.

3.5 ACCESSORY MATERIALS

A. Patching material: Latex filler

B. Fastener Head Cover Material: Latex Filler

END OF SECTION 099113

SECTION 101400

SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Panel signs.

1.2 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: Texas Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for signs.

   1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
   2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.

C. Samples: For each sign type and for each color and texture required.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions in TAS Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 PANEL SIGNS

A. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product equal to the following:
   1. Mohawk Sign Systems, Inc. , Series 200A Sand Carved

B. Panel Signs: **Provide a total of two (2) signs: per attached floor plans – at exterior door of each restroom**. Provide smooth sign panel surfaces constructed to remain flat under installed

conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:

1. Panel Dimensions: 6"x8"
2. Material: Melamine Plastic
3. Thickness: 1/8 inch thick
4. Edge Condition: Square
5. Corner Condition: Square
6. Border: None
7. Text Height:
   a. Room Number Text Height: 2"
   b. Room Name Text Height: 5/8"
8. Text Style: Helvetica
9. Symbol (Pictogram) size @ Restrooms: 4" tall
10. Mounting:
    a. Silastic Adhesive with Vinyl foam tape to hold sign in place until the silastic has fully cured.
11. Colors: As selected by Architect from manufacturers full range.
12. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with contrasting colors.

C. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
   1. Raised-Copy Thickness: Not less than 1/32 inch (0.8 mm).

2.2 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

1. Contractor shall meet with design team and Owner prior to installation of any given wing to confirm the final locations of each sign

2. Provide the Owners recommended adhesive for all masonry substrates and double sided tape at the interior drywall locations

3. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
4. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

END OF SECTION

SECTION 102800

TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Public-use washroom accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule:

1. Locations Identified using room designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. Bobrick Washroom Equipment, Inc.

B. Liquid-Soap Dispenser:

1. Basis-of-Design Product: Bobrick – B-26117
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 40- fl. oz. (1.2-L)
5. Dimensions: 3-3/4” W x 13-1/8” H x 6” D
6. Materials: Satin Stainless steel container. Body is one piece, seamless construction.
7. Lockset: Tumbler type.
8. Refill Indicator: Unbreakable clear acrylic refill- indicator window.

C. Grab Bar Standard at HC Accessible Toilet Stalls:

1. Basis-of-Design Product: Bobrick: B-6806x36 **(**at rear of toilet)
2. Bobrick: B-6806x42 **(**at side of toilet)
3. Mounting: Flanges with concealed fasteners.
4. Material: Stainless steel, 0.05 inch (1.3 mm) thick.

5. Finish: Smooth, No. 4, satin finish. Outside Diameter: 1-1/2 inches (38 mm).
6. Configuration: As indicated on Drawings Straight.

D. Toilet Tissue (Roll) Dispenser:

1. Basis-of-Design Product: Bobrick B-69997.
2. Description: Double-roll dispenser with stainless steel shroud.
3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for 6 inch diameter tissue rolls.

E. Waste Receptacle:

1. Basis-of-Design Product: Bobrick: B-9279
2. Description: Wall mouinted Waste Receptacle with open top
3. Material: Satin Stainless Steel
4. Dimensions: 6” x 13-3/8" x 23-3/4"H

F. Wall Hooks:

1. Basis-of-Design Product: Bobrick: B-9542
2. Description: Coat Hook
3. Material: Satin Stainless Steel

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using stainless steel fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

END OF SECTION

SECTION 220010

SUMMARY OF PLUMBING WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 22 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, and is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.

B. Contract Documents were prepared for the Project by:
LJA Engineering, Inc.
5350 S. Staples St., Suite 425
Corpus Christi, Texas 78411
Phone Number: (361) 991-8550

C. Scope of Work: Refer to drawings for a detailed Scope of Work.

1. Provide all materials and labor associated with new fully-operational plumbing systems for the project "Sea Island Circle Beach Access Amenity Improvements (2023-SL01)", including but not limited to the following:

a. Plumbing fixtures and appliances such as water closets, lavatories, faucets, drinking fountains, domestic water heaters, floor drains, valves, fittings, hardware and specialties.
b. Potable water distribution piping and service connections to site utilities.
c. Sanitary wastewater and vent piping and service line connections to site utilities.
d. Painting: See Division 9 specifications. Paint all exposed piping, insulation, hangers, accessories in interior exposed areas. Paint exterior pipe supports. Coordinate paint type, color and scope of work with Architect.

1.3 ALLOWANCES

A. See Division 0 Specifications.

1.4 COORDINATION

A. All plumbing work shall be done under sub-contract to a General Contractor. Plumbing Contractor shall coordinate all work through General Contractor, who is ultimately responsible for the entire project.

B. Prior to bidding, Plumbing Contractor shall coordinate all work in Division-22 for integration with civil work, mechanical work, electrical work, irrigation work and general construction. A detailed list of inclusion and exclusions shall be provided to General Contractors at least three days prior to the end of the period set aside to request clarifications so that coordination of any missing items may be addressed and clarified by Architect/Engineer as needed.

1. Coordinate water line diameter, tap size, meter size and backflow preventer size with Engineer. While meter size may be smaller, water line diameter, tap, backflow preventer sizes shall match or be larger than the connection sizes shown on Plumbing drawings. If the distance from the water mains is too large, upsize line, valve sizes to minimize pressure drops. Coordinate details with Engineer.

C. All electrical work required for operation of plumbing systems shall be coordinated through the General Contractor prior to bidding to ensure that all starters, disconnects, conduit and wiring are provided as part of the project. All components needed for a full operational installation of systems shall be provided.

D. All Building Automation Systems (BAS) required for operation of plumbing systems shall be coordinated through the General Contractor prior to bidding, to ensure that all equipment, materials, valves, sensors, devices and labor are provided as part of the project. All components needed for a full operational installation of systems shall be provided.

E. Plumbing Contractor shall coordinate and supervise installation of all controls systems, and coordinate with electrical contractors and equipment suppliers as needed. All components needed for a full operational installation of systems shall be provided.

F. Contractor shall coordinate with other divisions for power and control of plumbing systems. It is not the intent of this specification to dictate who will conduct work, only to state the requirements of conducting the work.

G. Cooperate fully with other contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

H. Coordinate with Div. 1 for work sequence and optimization of construction schedule.

I. Coordinate with Div. 21 for Fire Suppression System.

J. Coordinate with Div. 23 for Mechanical System.

K. Coordinate with Div. 26 electrical contractor for providing power to plumbing equipment, and for Fire Alarm Systems interface with plumbing systems.

L. Issue written notification of the following tasks and allow five (5) days for Engineer to respond and schedule an inspection as required. Failure to issue written notification may result in work having to be redone to allow for proper inspection. It is contractor's responsibility to make sure Engineer receives notification.

1. Upon completion of underground piping installation and prior to testing or covering up.
2. Upon completion of all water piping installation and prior to insulation and/or testing.
3. Upon completion of ductwork and prior to testing and insulating.
4. Above ceiling inspections prior to ceiling tile installation.
5. When ready to request manufacturer's start-up of each piece of equipment.
6. When ready for Substantial Completion Inspection.
7. When ready for Final Inspection.

M. General

1. The Contractor shall execute all work hereinafter specified or indicated on accompanying Drawings. Contractor shall provide all equipment necessary and usually furnished in connection with such work and systems whether or not mentioned specifically herein or on the Drawings.
2. The Contractor shall be responsible for fitting his material and apparatus into the building and shall carefully lay out his work at the site to conform to the structural conditions, to avoid all obstructions, to conform to the details of the installation and thereby to provide an integrated satisfactory operating installation.
3. The Mechanical, Electrical, Plumbing, and associated Drawings are necessarily diagrammatic by their nature, and are not intended to show every connection in detail or every pipe or conduit in its exact location. These details are subject to the requirements of standards referenced elsewhere in these specifications, and structural and architectural conditions. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be organized and laid out so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless specifically noted to be exposed. All exposed work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.
4. When the mechanical, electrical and plumbing drawings do not give exact details as to the elevation of pipe, conduit and ducts, the Contractor shall physically arrange the systems to fit in the space available at the elevations intended with proper grades for the functioning of the system involved. Piping, exposed conduit and the duct systems are generally intended to be installed true and square to the building construction, and located as high as possible against the structure in a neat and workmanlike manner. The Drawings do not show all required offsets, control lines, pilot lines and other location details. Work shall be concealed in all finished areas.

1.5 WORK SEQUENCE

A. Locate Utilities:

1. Coordinate with power, water, sewer, telephone, communications, and other utilities as well as designated Owner's personnel to locate all utilities prior to digging in any area.
2. Obtain any approvals required from utilities to relocate utilities.
3. Cost of relocating or bypassing utilities indicated on drawings shall be included in Base Bid.

B. Coordinate with Division 1 requirements to optimize construction schedule.

C. Provide equipment and material submittals, coordination drawings and shop drawings as required by specifications.

D. Submit detailed plumbing Schedule of Values with Submittals. Plumbing Submittals will not be accepted without a detailed Schedule of Values.

E. Sequence construction in coordination with work by other disciplines.

1.6 CONTRACTOR USE OF PREMISES

A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Driveways and Entrances: Keep driveways and entrances to construction site clear and available to other Contractors, Owner, and A/E personnel at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the following:

1. Temporary fencing around construction areas.
2. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
3. Temporary fencing around equipment while site work is in progress.

1.7 SUBMITTALS

A. Manufacturer's standard dimensioned drawings, performance and product data shall be edited to delete reference to equipment, features, or information which is not applicable to the equipment being supplied for this project. Including Bill or List of Materials.

B. Provide submittals at the same time in one or multiple bound volumes. Include originals from manufacturer. All submittals shall be in native pdf and searchable format. Faxes and copies of faxes are not acceptable.

C. Submittals shall be submitted electronically. Please organize the files as noted below (Native PDF format & searchable format). Files would need to be properly identified (cover letter, stamped, etc.) from the general contractor.

D. Individual submittals shall not be reviewed until a complete package is received.

E. Allow two weeks for initial review by Engineer, from the day it is received.

F. Contractor shall have one week to respond to our submittal/re-submittal review comments.

G. Allow one week for review of resubmittals by Engineer, from the day it is received.

H. All submittal review comments shall be forwarded by Engineer to Architect, who will then distribute as per Division 1.Provide detailed coordination drawings showing how plumbing system components will be installed in coordination with work by others. Engineer's drawing files will be made available to Contractor for producing coordination and as-built drawings upon request.

1.8 SCHEDULE OF VALUES -Special Requirements

A. Plumbing Contractor shall submit a Schedule of Values reflecting the total value of Plumbing Work in the Contract, and broken down into the following items as a minimum, with a line-item for Materials/Equipment and another for Labor:

1. Plumbing fixtures and equipment
2. Plumbing materials
3. Plumbing labor
4. Allowances.
5. Miscellaneous
6. Administrative and project management.

B. Schedule of Values shall be included with bound submittals. Submittals without a Schedule of Values shall not be reviewed.

1.9 EQUIPMENT MANUFACTURERS

A. Plumbing design is based on equipment and materials scheduled and specified. These are used as the basis for performance characteristics, quality, and physical dimensions/weight.

B. Equipment and materials by other APPROVED manufacturers may be provided by Contractor. In doing so, Contractor assumes responsibility for the performance, quality, and physical dimensions of the proposed units.

C. Any costs associated with modifications to the design due to submittal of equipment and/or materials other than those used as the basis of design are the Contractor's responsibility. This includes any design time, production of drawings, and time delays.

D. Where use of equipment and/or materials other than those used as the basis of design impact other disciplines, Contractor shall assume responsibility for all costs associated with any APPROVED modifications. This may include resizing of electrical circuits, modifying openings in the structure, relocating floor drains, etc.

1.10 OPERATIONS AND MAINTENANCE MANUALS & TRAINING

A. Submit Operations and Maintenance Manuals two weeks prior to Substantial Completion Inspection. Engineer will not conduct a Substantial Completion Inspection without having reviewed Operations and Maintenance Manuals.

B. Use Operations and Maintenance Manuals as a guide for conducting training of Owner's personnel.

PART 2 - PRODUCTS

(Not Used) PART 3 -

EXECUTION (Not Used)

END OF SECTION

SECTION 220517

SLEEVES AND SLEEVE SEALS 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. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 STACK-SLEEVE FITTINGS

A. Manufacturers:

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Manufacturers:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Manufacturers:

1. Presealed Systems.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."

3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade: Cast-iron wall sleeves

2. Exterior Concrete Walls below Grade: Cast-iron wall sleeves with sleeve-seal system.
   a. Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system

3. Concrete Slabs-on-Grade: Cast-iron wall sleeves with sleeve-seal system.
   a. Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade: Galvanized-steel-pipe sleeves

5. Interior Partitions: Galvanized-steel-pipe sleeves

END OF SECTION

SECTION 220518

ESCUTCHEONS 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. Escutcheons.
2. Floor plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

D. Split-Casting Brass Type: With polished, chrome-plated and rough-brass finish and with concealed hinge and setscrew.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Insulated Piping: One-piece, stamped-steel type.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast- brass type with polished, chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough- brass finish.
f. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.
2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION

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. CPVC ball valves.

B. Related Sections:
   1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
   2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated, include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:
   1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
   2. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces, grooves, and weld ends.
   3. Set angle, gate, and globe valves closed to prevent rattling.
   4. Set ball and plug valves open to minimize exposure of functional surfaces.
   5. Set butterfly valves closed or slightly open.
   6. Block check valves in either closed or open position.

B. Use the following precautions during storage:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve-End Connections:
   1. Solder Joint: With sockets according to ASME B16.18.
   2. Threaded: With threads according to ASME B1.20.1.

E. Valve Bypass and Drain Connections: MSS SP-45.

2.2 CPVC BALL VALVES

A. CPVC Union Ball Valves:

1. Manufacturers:
   a. American Valve.
   b. IPEX.
   c. Or approved equal.

2. Description:
3. Standard: MSS SP-122.
4. Pressure Rating and Temperature: 125 psig at 73 deg F.
5. Body Material: CPVC.
6. Body Design: Union type.
7. End Connections for Valves NPS 2 and Smaller: Detachable, **socket**.
8. Ball: CPVC; full port.
9. Seals: PTFE or EPDM-rubber O-rings.
10. Handle: Tee shaped.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.3 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.

3.4 DOMESTIC COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. CPVC Pipe NPS 2 and Smaller: Union ball valve.

END OF SECTION

SECTION 220529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

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 stands.
6. Equipment supports.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 220516 "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
3. Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, 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.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.

4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:
1. Manufacturers:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.
c. Flex-Strut Inc.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut Corporation; Tyco International, Ltd.
g. Wesanco, Inc.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Hot-dipped galvanized.
8. Plastic Coating: PVC.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.

6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Plastic.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 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.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.9 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

G. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

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. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. 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.

N. 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.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting." Section 099123 "Interior Painting." Section 099600 "High-Performance Coatings."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.nt

F. Use stainless-steel pipe hangers and attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper 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. 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 Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
3. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
4. 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.
5. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
6. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. 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.

L. 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.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I- beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I- beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.
13. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. 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.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

R. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 220553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

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. Equipment labels.
   2. Warning signs and labels.
   3. Pipe labels.
   4. Stencils.
   5. Valve tags.
   6. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:
   1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
   3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
   4. Fasteners: Stainless-steel rivets or self-tapping screws.
   5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:
   1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
   2. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
   3. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
   4. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
   5. Fasteners: Stainless-steel rivets or self-tapping screws.
   6. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

D. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

E. Fasteners: Stainless-steel rivets or self-tapping screws.

F. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

G. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
   1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
   2. Lettering Size: At least 1/2 inch.

2.4 STENCILS

A. Stencils for Piping:
   1. Lettering Size: Size letters according to ASME A13.1 for piping.
   2. Stencil Paint: Exterior, gloss, alkyd enamel in colors complying with recommendations in ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.
   3. Identification Paint: Exterior, alkyd enamel in colors according to ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
   1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   2. Fasteners: Brass beaded chain.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or

space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting." and Section 099600 "High-Performance Coatings."

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.

2. Stencil Paint: Use for pipe marking.

C. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
1. Valve-Tag Size and Shape:
   a. Cold Water: 1-1/2 inches, round.
   b. Hot Water: 1-1/2 inches, round.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 220719

PLUMBING PIPING 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 insulating the following plumbing piping services:
   1. Domestic cold-water piping.
   2. Domestic hot-water piping.
   3. Domestic recirculating hot-water piping.
   4. Domestic chilled-water piping for drinking fountains.
   5. Storm water piping.
   6. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail 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.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:
   1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

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 Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
   1. Products:
      a. Armaflex
      b. K-Flex

G. Mineral-Fiber, Preformed Pipe Insulation:
   1. Products:
      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.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
   1. Products:
      a. Insulco, Division of MFS, Inc.; Triple I.
      b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.

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:
    a. Foster Products Corporation, H. B. Fuller Company
    b. Aeroflex
    c. Armacell
    d. K-Flex

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive 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."

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products:
    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, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products:
    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, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive 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."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
   1. Products:
      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.
      f. Vimasco Corporation; 749.
   2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
   3. Service Temperature Range: Minus 20 to plus 180 deg F.
   4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
   5. Color: White.

2.5 SEALANTS

A. Joint Sealants:
   1. Materials shall be compatible with insulation materials, jackets, and substrates.
   2. Permanently flexible, elastomeric sealant.
   3. Service Temperature Range: Minus 100 to plus 300 deg F.
   4. Color: White or gray.
   5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   6. Sealants 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."

B. FSK and Metal Jacket Flashing Sealants:
   1. Products:
      a. Childers Products, Division of ITW; CP-76-8.
      b. Foster Products Corporation, H. B. Fuller Company; 95-44.
      c. Marathon Industries, Inc.; 405.
      d. Mon-Eco Industries, Inc.; 44-05.
      e. Vimasco Corporation; 750.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.
   3. Fire- and water-resistant, flexible, elastomeric sealant.
   4. Service Temperature Range: Minus 40 to plus 250 deg F.
   5. Color: Aluminum.
   6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   7. Sealants 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."

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
   1. Products:
      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, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants 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."

2.6 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.

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.

2.8 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. Metal Jacket:

   1. Products:
      a. Childers Products, Division of ITW; Metal Jacketing Systems.
      b. PABCO Metals Corporation; Surefit.
      c. RPR Products, Inc.; Insul-Mate.

   2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
      a. Sheet and roll stock ready for shop or field sizing.
      b. Finish and thickness are indicated in field-applied jacket schedules.
      c. Moisture Barrier for Indoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper
      d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
      e. Factory-Fabricated Fitting Covers:

         1) Same material, finish, and thickness as jacket.
         2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.

3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

C. Underground Direct-Buried Jacket: 125-mil-thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

2.10 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products:
   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:
   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.

2.11 SECUREMENTS

A. Bands:

1. Products:

a. Childers Products; Bands.
b. PABCO Metals Corporation; Bands.
c. RPR Products, Inc.; Bands.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 316; 0.015 inch thick, 3/4 inch wide.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

C. Wire: 0.080-inch nickel-copper alloy.

1. Manufacturers:
a. C & F Wire.
b. Childers Products.
c. PABCO Metals Corporation.
d. RPR Products, Inc.

2.12 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:
1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:
1. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
1. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

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.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

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 4 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

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. Cleanouts.

3.4 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 Section 078413 "Penetration Firestopping" for 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 Section 078413 "Penetration Firestopping."

3.5 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. 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.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

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.

3.7 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe 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.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch-thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. 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.

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.

3.9 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
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, two locations of welded strainers, three locations of threaded valves, and three 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 EQUIPMENT INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.

B. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.

C. Domestic hot-water storage tank insulation shall be the following, of thickness to provide an R-value of 13: Mineral-fiber pipe and tank.

3.12 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.

3.13 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water Piping embedded in walls:
1. All Pipe Sizes: Insulation shall be the following:
a. Flexible Elastomeric: 1 inch thick, with two coats of protective coating recommended by the insulation manufacturer.

B. Domestic Hot and Recirculated Hot Water:
   1. Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick, with two coats of protective coating recommended by the insulation manufacturer.

C. Condensate and Equipment Drain Water below 60 Deg F:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Flexible Elastomeric: 3/4 inch thick, with two coats of protective coating recommended by the insulation manufacturer.

D. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Flexible Elastomeric: 1 inch thick.

E. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Flexible Elastomeric: 1 inch thick.

F. Hot Service Drains:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.

G. Hot Service Vents:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.

H. Rainwater conductors, and roof drain bodies:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Flexible Elastomeric: 1 inch thick, with two coats of protective coating recommended by the insulation manufacturer.

I. Vapor barrier on all piping, except on hot water piping.

J. Insulation shall be painted where exposed to view. Coordinate with Architect.

3.14 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Domestic Water Piping:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Flexible Elastomeric: 1 inch thick.
      b. Vapor barrier.

3.15 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. Piping, Exposed:
   1. Aluminum, Smooth: 0.020 inch thick.

3.16 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION

SECTION 221116

DOMESTIC 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. Under-building-slab and aboveground domestic water pipes, and fittings inside buildings.
   2. Encasement for piping.

B. Related Requirements:
   1. Section 221113 "Facility Water Distribution Piping" for water-service piping and water meters outside the building from source to the point where water-service piping enters the building.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

1.5 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
   1. Notify Architect no fewer than two days in advance of proposed interruption of water service.
   2. Do not interrupt water service without Architect's 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.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

2.2 CPVC PIPING

A. CPVC Pipe: ASTM F 441/F 441M, **Schedule 40**.

1. Rigid Vinyl Compounds: **ASTM D 1784**.

B. CPVC Piping System: ASTM D 2846/D 2846M, SDR 11, pipe and socket fittings.

C. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:
1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

F. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.

2.4 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105/A21.5.

B. Form: tube.

2.5 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.
1. Manufacturers:

a. Cascade Waterworks Manufacturing.
b. Dresser, Inc.; Dresser Piping Specialties.
c. Ford Meter Box Company, Inc. (The).
d. JCM Industries.
e. Romac Industries, Inc.
f. Smith-Blair, Inc; a Sensus company.
g. Viking Johnson; c/o Mueller Co.

D. Plastic-to-Metal Transition Fittings:
1. Description:

a. **CPVC** one-piece fitting with manufacturer's Schedule 40 equivalent dimensions.
b. One end with threaded brass insert and one solvent-cement-socket **or threaded** end.

E. Plastic-to-Metal Transition Unions:
1. Description:

a. CPVC four-part union.
b. Brass threaded end.
c. Solvent-cement-joint plastic end.
d. Rubber O-ring.
e. Union nut.

2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
1. Manufacturers:

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. EPCO Sales, Inc.
d. Hart Industries International, Inc.
e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
f. Zurn Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1079.
3. Pressure Rating: 150 psig.

4. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:
1. Manufacturers:

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. EPCO Sales, Inc.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Standard: ASSE 1079.
3. Factory-fabricated, bolted, companion-flange assembly.
4. Pressure Rating: 150 psig.
5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:
1. Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.
2. Nonconducting materials for field assembly of companion flanges.
3. Pressure Rating: 150 psig.
4. Gasket: Neoprene or phenolic.
5. Bolt Sleeves: Phenolic or polyethylene.
6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:
1. Manufacturers:

a. Perfection Corporation; a subsidiary of American Meter Company.
b. Precision Plumbing Products, Inc.
c. Victaulic Company.
2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F 1545.
4. Pressure Rating and Temperature: 300 psig at 225 deg F.
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

2.7 FLEXIBLE CONNECTORS

A. Manufacturers:
1. Flex-Hose Co., Inc.
2. Flex Pression, Ltd.
3. Flex-Weld, Inc.
4. Hyspan Precision Products, Inc.
5. Metraflex, Inc.
6. Universal Metal Hose; a Hyspan company

B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
   1. Working-Pressure Rating: Minimum **200 psig**
   2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
   3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 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 shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

C. Install shutoff valve immediately upstream of each dielectric fitting.

D. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

E. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

F. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

J. Install piping to permit valve servicing.

K. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

L. Install piping free of sags and bends.

M. Install fittings for changes in direction and branch connections.

N. Install PEX piping with loop at each change of direction of more than 90 degrees.

O. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump.

P. Install thermostats in hot-water circulation piping.

Q. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

R. 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."

S. 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."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

E. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:

   1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
   2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

F. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
   1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
   2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller and butterfly valves for piping NPS 2-1/2 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.

E. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for calibrated balancing valves.

3.5 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:
   1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
   2. Fittings for NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.6 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.7 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.

B. Install stainless-steel-hose flexible connectors in steel domestic water piping.

3.8 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
   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.
      c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

   3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:

   1. NPS 1and Smaller: 36 inches with 3/8-inch rod.
   2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
   3. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.

F. 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.

G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.9 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for 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. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
   2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
   3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
   4. 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.

3.10 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.11 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Piping Inspections:

      a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
      b. 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:

         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 authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

      c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
      d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

   2. Piping Tests:

      a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

b. 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.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. 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 it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.12 ADJUSTING

A. Perform the following adjustments before operation:
1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.13 CLEANING

A. Clean and disinfect domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

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. Repeat procedures if biological examination shows contamination.
e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.14 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Under-building-slab, domestic water, building-service piping, up to NPS 8 and larger, shall be the following:
1. PP, **SDR 7.4** socket fittings; and fusion-welded joints.

D. Aboveground domestic water piping, NPS 4 and smaller, shall be the following:
1. CPVC, **Schedule 40**; socket fittings; and solvent-cemented joints.

E. Aboveground, combined domestic water-service and fire-service-main piping, NPS 6 to NPS 12, shall be the following:
1. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.

3.15 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.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION

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. Section Includes:

1. Backflow preventers.
2. Wall hydrants.
3. Water-hammer arresters.
4. Trap-seal primer valves.
5. Trap-seal primer systems.
6. Flexible connectors.

B. Related Requirements:

1. Section 220519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Section 221116 "Domestic Water Piping" for water meters.
3. Section 223200 "Domestic Water Filtration Equipment" for water filters in domestic water piping.
4. Section 224713 "Drinking Fountains" for water filters for water coolers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

1. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G [**and NSF 14**].[**Mark "NSF-pw" on plastic piping components.**]

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: [**125 psig (860 kPa)**] unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

B. Manufacturers:
1. Zurn
2. Wilkins
3. Or Approved Equal.

C. Description:

1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: [**12 psig (83 kPa)]**
4. Size: see drawings.
5. Body: Bronze for NPS 2 (DN 50) and smalle
6. End Connections: Threaded for NPS 2 (DN 50) and smaller.
7. Configuration: Designed for [**horizontal, straight-through**] flow.
8. Accessories:

    a. Valves NPS 2 (DN 50) and Smaller: Ball type with threaded ends on inlet and outlet.
    b. Valves NPS 2-1/2 (DN 65) and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
    c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

2.4 WALL HYDRANTS

1. Manufacturers:
    a. Zurn

b. Woodford
c. Or Approved Equal

2. Description: See schedule.

2.5 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers:
   a. Zurn.
   b. Mifab.
   c. Or “Approved equal”.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: [Stainless Steel **Metal bellows**].
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.6 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers:
   a. PPP or Approved Equal
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig (860 kPa) minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.7 FLEXIBLE CONNECTORS

A. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.

1. Working-Pressure Rating: Minimum [**200 psig (1380 kPa)**].
2. End Connections NPS 2 (DN 50) and Smaller: Threaded steel-pipe nipple.
3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 INSTALLATION

A. 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 unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Install water-hammer arresters in water piping according to PDI-WH 201.

C. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
1. Reduced-pressure-principle backflow preventers.
2. Outlet boxes.
3. Supply-type, trap-seal primer valves.

B. 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 Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each [**reduced-pressure-principle backflow preventer**] [**double-check, backflow- prevention assembly**] [**and**] [**double-check, detector-assembly backflow preventer**] according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION

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.

B. Related Sections:
   1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.

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.

B. Shop Drawings: For sovent drainage system. Include plans, elevations, sections, and details.

1.5 INFORMATIONAL SUBMITTALS

A. 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 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 Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
   2. Do not proceed with interruption of sanitary waste service without Architect's 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 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.

C. Heavy-Duty, Hubless-Piping Couplings:
   1. Manufacturers:
      a. ANACO.
      b. Clamp-All Corp.
      c. Ideal Div.; Stant Corp.
      d. Mission Rubber Co.
      e. Tyler Pipe; Soil Pipe Div.
   2. Standards: ASTM C 1277 and ASTM C 1540.
   3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solvent Cement: ASTM D 2564.
1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 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. 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.

4. Pressure Transition Couplings:
   a. Standard: AWWA C219.
   b. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
   c. Center-Sleeve Material: Stainless steel.
   d. Gasket Material: Natural or synthetic rubber.
   e. Metal Component Finish: Corrosion-resistant coating or material.

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: 150 psig.
      3) End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Flanges:
   a. Description:

      1) Standard: ASSE 1079.

2) Factory-fabricated, bolted, companion-flange assembly.
3) Pressure Rating: 150 psig.
4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

4. Dielectric-Flange Insulating Kits:
   a. Description:

      1) Nonconducting materials for field assembly of companion flanges.
      2) Pressure Rating: 150 psig.
      3) Gasket: Neoprene or phenolic.
      4) Bolt Sleeves: Phenolic or polyethylene.
      5) Washers: Phenolic with steel backing washers.

5. Dielectric Nipples:
   a. Description:

      1) Standard: IAPMO PS 66
      2) Electroplated steel nipple.
      3) Pressure Rating: 300 psig at 225 deg F.
      4) End Connections: Male threaded or grooved.
      5) Lining: Inert and noncorrosive, propylene.

2.5 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105/A 21.5.

B. Material: high-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations 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 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
   2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
   3. Vent Piping: 1 percent 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 aboveground PVC piping according to ASTM D 2665.

O. Install underground PVC piping according to ASTM D 2321.

P. 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.

Q. Plumbing Specialties:
1. 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."
2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

R. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

S. 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."

T. 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."

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. 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.

B. 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. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:
1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Shielded, nonpressure transition couplings.
3. In Aboveground Force Main Piping: Fitting-type transition couplings.
4. In Underground Force Main Piping:
   a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
   b. NPS 2 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 and Smaller: Use dielectric unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flange kits.

4. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
   1. Vertical Piping: MSS Type 8 or Type 42, clamps.
   2. Install 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.
      c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
   3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
   2. NPS 3: 60 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
   4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
   5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
   6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Install supports for vertical cast-iron soil piping every 15 feet.

G. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
   2. NPS 3: 48 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
   4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
   5. NPS 10 and NPS 12: 48 inches with 7/8-inch rod.

H. Install supports for vertical PVC piping every 48 inches.

I. 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 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 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.

3.7 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. 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. 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.

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 PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

A. Underground and above ground (unless noted otherwise), soil, waste, and vent piping shall be the following:
   1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
   2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

B. In Return Air Plenum: Soil, waste, and vent piping shall be the following:
   1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.

END OF SECTION

SECTION 221319

SANITARY WASTE 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. Section Includes:
   1. Cleanouts.
   2. Floor drains.
   3. Roof flashing assemblies.
   4. Through-penetration firestop assemblies.
   5. Miscellaneous sanitary drainage piping specialties.
   6. Flashing materials.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FOG: Fats, oils, and greases.

C. FRP: Fiberglass-reinforced plastic.

D. HDPE: High-density polyethylene plastic.

E. PE: Polyethylene plastic.

F. PP: Polypropylene plastic.

G. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.

   1. Wiring Diagrams: Power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.7 COORDINATION

A. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Metal Floor Cleanouts:

1. ASME A112.36.2M, Cast-Iron Cleanouts: see detail on plans.
2. Standard: ASME A112.36.2M for [**cast-iron soil pipe with cast-iron ferrule**] [**threaded, adjustable housing**] cleanout.
3. Size: Same as connected branch.
4. Type: [**Threaded, adjustable housing**].
5. Body or Ferrule: [**Cast iron**].
6. Clamping Device: [**Required**].
7. Outlet Connection: [**Threaded**].
8. Closure: [**Cast-iron plug**].
9. Adjustable Housing Material: [**Cast iron**] with [**threads**].
10. Frame and Cover Material and Finish: [**Nickel-bronze, copper alloy**]
11. Frame and Cover Shape: [**Round**].
12. Top Loading Classification: [**Medium**] Duty.

B. Plastic Wall Cleanouts:

1. See detail on plans.
2. Size: Same as connected branch.
3. Body: PVC.
4. Closure Plug: Stainless Steel.

5. Riser: Drainage pipe fitting and riser to cleanout of same material as drainage piping.

2.2 FLOOR DRAINS

A. Manufacturers:

1. Zurn.
2. Mifab.
3. Josam.

B. Description: See schedules.

2.3 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Description: Manufactured assembly made of [**6.0-lb/sq. ft. (30-kg/sq. m)**, **0.0938-inch-(2.4-mm-)**] thick, lead flashing collar and skirt extending at least [**6 inches (150 mm)**] from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

   a. Open-Top Vent Cap: Without cap.
   b. Low-Silhouette Vent Cap: With vandal-proof vent cap.
   c. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.4 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Standard: UL 1479 assembly of sleeve and stack fitting with firestopping plug.
2. Size: Same as connected soil, waste, or vent stack.
3. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
4. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
5. Special Coating: Corrosion resistant on interior of fittings.

2.5 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Floor-Drain, Trap-Seal Primer Fittings:

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 (DN 15) side inlet.

B. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

C. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend [**1 inch (25 mm)**] [**2 inches (51 mm)**] <**Insert dimension**> above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

D. Stack Flashing Fittings:

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

2.6 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft. (15-kg/sq. m), 0.0469-inch (1.2-mm) thickness.
3. Burning: 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness.

B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:

1. General Applications: 12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm thickness).
2. Vent Pipe Flashing: 8 oz./sq. ft. (2.5 kg/sq. m or 0.27-mm thickness).

C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04- inch (1.01-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

E. Fasteners: Metal compatible with material and substrate being fastened.

F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

G. Solder: ASTM B 32, lead-free alloy.

H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

    a. Coordinate with Structural Drawings prior installation.
    b. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
    c. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
    d. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

E. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

F. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

G. Install through-penetration firestop assemblies in plastic [**conductors**] [**and**] [**stacks**] at floor penetrations.

H. Assemble open drain fittings and install with top of hub [**1 inch (25 mm)**] [**2 inches (51 mm)**] above floor.

I. Install deep-seal traps on floor drains and other waste outlets, if indicated.

J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

L. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

M. Install vent caps on each vent pipe passing through roof.

N. Install wood-blocking reinforcement for wall-mounting-type specialties.

O. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 076200 "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 223300

ELECTRIC, DOMESTIC-WATER HEATERS

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. Commercial, electric, storage, domestic-water heaters.
   2. Flow-control, electric, tankless, domestic-water heaters.
   3. Domestic-water heater accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

   1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of commercial and tankless, electric, domestic-water heater, from manufacturer.

B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

C. Source quality-control reports.

D. Field quality-control reports.

E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

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. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including storage tank and supports.
    b. Faulty operation of controls.
    c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

    a. Commercial, Electric, Domestic-Water Booster Heaters:

        1) Controls and Other Components: Five years.

    b. Commercial, Electric, Storage, Domestic-Water Heaters:

        1) Storage Tank: Ten years.
        2) Controls and Other Components: Five years.

    c. Electric, Tankless, Domestic-Water Heaters: Five year(s).
    d. Compression Tanks: Ten years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Domestic-Water Heaters:

1. Commercial, Storage, Electric Water Heaters:
   a. Bradford White Co.
   b. State Industries.

2. Standard: UL 1453.
3. Tank Construction: ASME-code steel with 150-psig working-pressure rating..

   a. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rod, and controls as required. Attach tappings to tank before testing and labeling. ASME B1.20.1 pipe thread.
   b. Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.
   c. Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.
   d. Jacket: Steel, with enameled finish.

4. Factory-Installed Tank Appurtenances:

   a. Anode Rod: Replaceable magnesium.
   b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
   c. Insulation: Comply with ASHRAE/IESNA 90.1.
   d. Jacket: Steel with enameled finish.
   e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
   f. Temperature Control: Adjustable thermostat.
   g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
   h. Relief Valve: ASME rated and stamped for combination temperature-and-pressure relief valve. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
   i. Gages: Combination temperature-and-pressure type or separate thermometer and pressure gage.

5. Special Requirements: NSF 5 construction.

6. Capacity and Characteristics: See Drawings

2.2 ELECTRIC, TANKLESS, DOMESTIC-WATER HEATERS

A. Flow-Control, Electric, Tankless, Domestic-Water Heaters:

1. Manufacturers:

    a. Controlled Energy Corporation.
    b. Chronomite Laboratories, Inc.
    c. Eemax.
2. Standard: UL 499 for electric, tankless, (domestic-water heater) heating appliance.
3. Construction: Copper piping or tubing complying with NSF 61 Annex G barrier materials for potable water, without storage capacity.

    a. Connections: ASME B1.20.1 pipe thread.
    b. Pressure Rating: 150 psig.
    c. Heating Element: Resistance heating system.
    d. Temperature Control: Flow-control fitting.
    e. Safety Control: High-temperature-limit cutoff device or system.
    f. Jacket: Aluminum or steel with enameled finish or plastic.

4. Support: Bracket for wall mounting.
5. Capacity and Characteristics: See drawings.

2.3 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. AMTROL Inc.
    b. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
    c. State Industries.
    d. Taco, Inc.
2. Description: Steel pressure-rated tank constructed with welded joints and factory- installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:

    a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
    b. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
    c. Air-Charging Valve: Factory installed.

4. Capacity and Characteristics: See drawings.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.

D. Heat-Trap Fittings: ASHRAE 90.2.

E. Manifold Kits: Domestic-water heater manufacturer's factory-fabricated inlet and outlet piping for field installation, for multiple domestic-water heater installation. Include ball-, butterfly-, or gate-type shutoff valves to isolate each domestic-water heater and calibrated balancing valves to provide balanced flow through each domestic-water heater.

1. Comply with requirements for ball-, butterfly-, or gate-type shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."
2. Comply with requirements for balancing valves specified in Section 221119 "Domestic Water Piping Specialties."

F. Pressure-Reducing Valves: ASSE 1003 for water. Set at 25-psig-maximum outlet pressure unless otherwise indicated.

G. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

H. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.

I. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.

J. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

K. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.

L. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

2.4 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base. Comply with requirements for concrete bases specified in Section 033000 "Cast-in-Place Concrete." Section 033053 "Miscellaneous Cast-in- Place Concrete."

1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor domestic-water heaters to substrate.

B. Electric, Tankless, Domestic-Water Heater Mounting: Install electric, tankless, domestic-water heaters at least 18 inches above floor on wall bracket.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

C. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

D. Install commercial, electric, domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

E. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

F. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

G. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

H. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers.

I. Assemble and install inlet and outlet piping manifold kits for multiple electric, domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each electric, domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each electric, domestic-water heater outlet. Comply with requirements for valves and thermometers.

J. Install pressure-reducing valve with integral bypass relief valve in electric, domestic-water booster-heater inlet piping and water hammer arrester in booster-heater outlet piping. Set pressure-reducing valve for outlet pressure of 25 psig. Comply with requirements for pressure-reducing valves and water hammer arresters specified in Section 221119 "Domestic Water Piping Specialties."

K. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

L. Fill electric, domestic-water heaters with water.

M. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

C. Connect hot- and cold-water piping with shutoff valves and unions.

D. Make connections with dielectric fittings where piping is made of dissimilar metal.

E. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.

F. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque- tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain commercial and tankless, electric, domestic-water heaters.

END OF SECTION

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 conventional plumbing fixtures and related components:

1. Faucets for lavatories.
2. Flushometers.
3. Toilet seats.
4. Protective shielding guards.
5. Fixture supports.
6. Water closets.
7. Lavatories.

B. Related Sections include the following:

1. Division 10 Section "Toilet, Bath, and Laundry Accessories."
2. Division 22 Section "Domestic Water Piping Specialties" for backflow preventers, floor drains, and specialty fixtures not included in this Section.
3. Division 22 Section "Drinking Fountains and Water Coolers."
4. Division 31 Section "Facility Water Distribution Piping" for exterior plumbing fixtures and hydrants.

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. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.

D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.

E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub

spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

F. FRP: Fiberglass-reinforced plastic.

G. PMMA: Polymethyl methacrylate (acrylic) plastic.

H. PVC: Polyvinyl chloride plastic.

I. 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 plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

D. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. 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.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
3. Stainless-Steel Commercial, Handwash Sinks: NSF 2 construction.
4. Vitreous-China Fixtures: ASME A112.19.2M.
5. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
6. Water-Closet, Flushometer Tank Trim: ASSE 1037.

H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
4. Faucets: ASME A112.18.1.
5. Hose-Connection Vacuum Breakers: ASSE 1011.
6. Hose-Coupling Threads: ASME B1.20.7.
7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
8. NSF Potable-Water Materials: NSF 61.
9. Pipe Threads: ASME B1.20.1.
10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
11. Supply Fittings: ASME A112.18.1.
12. Brass Waste Fittings: ASME A112.18.2.

I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Brass and Copper Supplies: ASME A112.18.1.
3. Dishwasher Air-Gap Fittings: ASSE 1021.
4. Plastic Tubular Fittings: ASTM F 409.
5. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.

J. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Flexible Water Connectors: ASME A112.18.6.
2. Floor Drains: ASME A112.6.3.
3. Grab Bars: ASTM F 446.
4. Hose-Coupling Threads: ASME B1.20.7.
5. Off-Floor Fixture Supports: ASME A112.6.1M.
6. Pipe Threads: ASME B1.20.1.
7. Plastic Toilet Seats: ANSI Z124.5.
8. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures of unit shell.
b. Faulty operation of controls, blowers, pumps, heaters, and timers.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

PART 2 - PRODUCTS

2.1 LAVATORY FAUCETS

A. Lavatory Faucets:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

a. Chicago Faucets.
b. Elkay Manufacturing Co.
c. Moen, Inc.

2. Description: See plumbing schedule.

2.2 FLUSHOMETERS

A. Flushometers:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

a. Sloan Valve Company.
b. Zurn

2. Description: See plumbing schedule.

2.3 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

a. American Standard Companies, Inc.
b. Bemis Manufacturing Company.
c. Kohler Co.

2. Description: See plumbing schedule.

2.4 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. TRUEBRO, Inc.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

2.5 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:

1. MIFAB Manufacturing Inc.
2. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Water-Closet Supports:

1. Description: See plumbing schedule.

C. Lavatory Supports:

1. Description: See plumbing schedule.

D. Sink Supports:

1. Description: See plumbing schedule.

2.6 WATER CLOSETS

A. Water Closets:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

a. Crane Plumbing, L.L.C./Fiat Products.
b. American Standard Companies, Inc.
c. Zurn
d. Kohler
e. Toto USA.

2. Description: See plumbing schedule.

2.7 LAVATORIES

A. Lavatories:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

a. American Standard Companies, Inc.
b. Toto USA
c. Crane Plumbing, L.L.C./Fiat Products.

2. Description: See plumbing schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.

1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-mounting fixtures with tubular waste piping attached to supports.

F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

G. Install counter-mounting fixtures in and attached to casework.

H. Install fixtures level and plumb according to roughing-in drawings.

I. 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.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

K. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

L. Install flushometer valves for accessible water closets with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

M. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

N. Install toilet seats on water closets.

O. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

P. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

Q. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

R. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

S. Install escutcheons at piping wall 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."

T. Set service basins in leveling bed of cement grout. Grout is specified in Division 22 Section "Common Work Results for Plumbing."

U. 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."

3.3 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."

3.4 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

E. Install fresh batteries in sensor-operated mechanisms.

3.5 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust controls. Replace damaged and malfunctioning units and controls.

C. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

E. Install fresh batteries in sensor-operated mechanisms.

3.6 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 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

SECTION 224713

DRINKING FOUNTAINS

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 drinking fountains and related components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of drinking fountain.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains to include in maintenance manuals.

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" for fixtures for people with disabilities.

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

D. ARI Standard: Comply with ARI's "Directory of Certified Drinking Water Coolers" for style classifications.

E. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.

F. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants," for water coolers. Provide HFC 134a refrigerant, unless otherwise indicated.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filter Cartridges: Equal to 10 percent of amount installed for each type and size indicated, but no fewer than 3 of each.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

A. Drinking Fountains: See Drawings for schedules and description.

1. Manufacturers:

a. Elkay Manufacturing Co.
b. Oasis.
c. Halsey Taylor
d. Acorn Engineering Co.

2.2 FIXTURE SUPPORTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Josam Co.
2. MIFAB Manufacturing, Inc.
3. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Description: ASME A112.6.1M, water cooler carriers. Include vertical, steel uprights with feet and tie rods and bearing plates with mounting studs matching fixture to be supported.

1. Type I: Hanger-type carrier with two vertical uprights.
2. Type II: Bilevel, hanger-type carrier with three vertical uprights.
3. Supports for Accessible Fixtures: Include rectangular, vertical, steel uprights instead of steel pipe uprights.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.

B. Set pedestal drinking fountains on floor.

C. Install recessed drinking fountains secured to wood blocking in wall construction.

D. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

E. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation.

F. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

G. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

H. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Install ball or gate shutoff valve on water supply to each fixture. Comply with valve requirements.

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

B. Adjust water cooler temperature settings.

3.5 FIELD QUALITY CONTROL

A. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.

1. Remove and replace malfunctioning units and retest as specified above.
2. Report test results in writing.

3.6 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 260010

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections and other Division 26 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, as is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.

B. Scope of Work:

1. General: The "Walkover at White Cap Circle" consists of two new single story buildings, approximate square footage 89ft2 each. These building will generally be operated from 8:00am to 6:00pm. (7 days a week).
2. Electrical: Provide all materials and labor associated with complete operational electrical distribution system. Major items of work include, but are not limited to:

   (a) Electrical service:

      (i) Provide a new underground electrical service; it shall consist of underground electrical raceways and concrete pad for Utility furnished transformer.

      (ii) Utility company shall provide medium voltage conductors and pole mounted transformer.

   (b) Lighting Systems: Shall consist of LED type with time clock controls.

   (c) Power systems: Provide miscellaneous duplex receptacles and power for hand dryers.

1.3 ALLOWANCES

A. Electrical: See Division 1 for electrical allowances.

1.4 COORDINATION

A. All electrical work shall be done under sub-contract to a General Contractor, who ultimately responsible for the entire project. Electrical Contractor shall coordinate all work through General Contractor, even in areas where only electrical work is to take place.

B. All questions, requests for information, submittals, and correspondence from the Electrical Contractor shall be submitted via the General Contractor, who will forward to the Architect, who will then forward to the Engineer.

C. Electrical Contractor shall not make any changes to design without written authorization from the Engineer. If changes are requested by the Owner, Architect, General Contractor, Suppliers, Manufacturers, or any others, Contractor should issue a written RFI for response by the Engineer.

D. Electrical Contractor shall issue seven (7) days written notice prior to any activities that require the presence of the Engineer at the job-site. This applies to all inspections required by specifications, and particularly to those where work will be covered (underground raceways, electrical raceways above ceiling).

E. Cooperate fully with other contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

F. Fully coordinate with Landscape Contractor to power irrigation controllers.

G. Issue written notification of the following tasks and allow five (5) days for Engineer to respond and schedule an inspection as required:

1. Upon completion of underground raceways installation and prior to covering up.
2. Upon completion of installing all raceways, labeling all j-boxes.
3. Upon completion of pulling all wiring, making all terminations, labeling and color-coding wires at the panelboards and prior to installing their covers.
4. When ready to request manufacturer's start-up of each piece of equipment.
5. When ready for Substantial Completion Inspection.
6. When ready for Final Inspection.

Failure to issue written notification may result in work having to be redone to allow for proper inspection. It is this contractor's responsibility to make sure Engineer receives notification.

1.5 UTILITIES

1. Coordinate with power, water, telephone, cable and gas utilities to locate all utilities prior to digging in any area.
2. Obtain any approvals required from utilities to relocate utilities.
3. Cost of relocating or bypassing utilities indicated on drawings shall be included in Base Bid.
4. Coordinate with utility for electrical service. Base bid shall include all costs associated with service connection, including permit fees.

1.6 CONTRACTOR USE OF PREMISES

A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public.
2. Driveways and Entrances: Keep driveways and entrances serving the premises, clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the following:

1. Temporary fencing around construction areas.
2. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
3. Temporary fencing around equipment while site work is in progress.

C. Work shall take place with minimal disruption to Owner's operations in areas surrounding the job site.

1.7 SUBMITTALS -Special Requirements

A. Manufacturer's standard dimensioned drawings, performance and product data shall be edited to delete reference to equipment, features, or information, which is not applicable to the equipment being supplied for this project. Including Bill or List of Materials.

B. Faxes and copies of faxes are not acceptable.

C. Electrical Submittals shall be submitted electronically. **Please organize the files as noted below** (PDF format - searchable). Files would need to be properly identified (cover letter, stamped, etc.) from the general contractor.

1. Electrical – Submittal #1
    a. 260519 Low-Voltage Electrical Power Conductors and Cables
    b. 260526 Grounding and Bonding for Electrical Systems
    c. 260529 Hangers and Supports for Electrical Systems
    d. 260533 Raceways and Boxes for Electrical Systems
    e. 260553 Identification for Electrical Systems
    f. 260544 Sleeves and Sleeve Seals for Electrical Raceways and Cabling
    g. 262726 Wiring Devices
    h. 260850 Hand Dryer

2. Electrical Gear Submittal #2
    a. 262416 Panelboards
    b. 262813 Fuses
    c. 262816 Enclosed Switches and Circuit Breakers

3. Light Fixtures Submittal #3
    a. 265621 Exterior Lighting

E. Individual submittals shall not be reviewed until a complete package is received.

F. Allow two weeks for initial submittal review by Engineer, from the day it is received at the Engineer's office.

G. Allow one week for review of resubmittals by Engineer.

H. All submittal review comments shall be forwarded by Engineer to Architect, who will then distribute as per Division 1.

1.8 SCHEDULE OF VALUES -Special Requirements

A. Electrical Contractor shall submit a Schedule of Values reflecting the total value of Electrical Work in the Contract and broken down into the following items as a minimum, with a line item for Materials/Equipment and another for Labor.

ELECTRICAL

1. Electrical gear.
3. Raceways including wiring.
4. Exterior light fixtures
5. Wiring devices.
6. Allowances.
7. Miscellaneous.
8. Administrative and project management.

1.9 CODE COMPLIANCE:

The design for this project is based on:

1. Occupational Safety and Health Act (OSHA)
2. National Electric Code (NEC)
3. National Fire Code
4. International

Building Code 5. UL 916

6. Local ordinances

END OF SECTION

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. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member Company of NETA or an NRTL.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturer:

1. Senator Wire & Cable Company.
2. Southwire Company.
3. Encore Wire

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2, Type XHHW-2 and Type SO.

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC and Type SO with ground wire.

2.2 CONNECTORS AND SPLICES

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls and Partitions: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN/THWN-2, single conductors in raceway.

E. Exposed Branch Circuits: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN/THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

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, which will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

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-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 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 Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements.

    a. MDF and IDF equipment feeder/branch circuit.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

    a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

B. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

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 and bonding systems and equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section "Operation and Maintenance Data," include the following:

a. Instructions for periodic testing and inspection of grounding features at ground rings and grounding connections for separately derived systems based on and NFPA 70B.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

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, solderless **exothermic**-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 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 below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

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. Flexible raceway runs.
6. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the distribution panel to equipment

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

C. 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.

3.5 FIELD QUALITY CONTROL

A. 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 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, 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.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. 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 Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).

E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 260529

HANGERS AND SUPPORTS 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. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

    a. Hangers.
    b. Steel slotted support systems.
    c. Nonmetallic support systems.
    d. Trapeze hangers.
    e. Clamps.
    f. Turnbuckles.
    g. Sockets.
    h. Eye nuts.
    i. Saddles.
    j. Brackets.

2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Trapeze hangers. Include product data for components.
2. Steel slotted-channel systems.
3. Nonmetallic slotted-channel systems.
4. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which hangers and supports will be attached.
3. Size and location of initial access modules for acoustical tile.
4. Items penetrating finished ceiling, including the following:

    a. Lighting fixtures.
    b. Access panels.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M.
2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.; a division of Cooper Industries.
    c. ERICO International Corporation.
    d. GS Metals Corp.
    e. Thomas & Betts Corporation.
    f. Unistrut; Tyco International, Ltd.
    g. Wesanco, Inc.

2. Material: Plain steel.
3. Channel Width: 1-1/4 inches.
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
8. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        1) Hilti Inc.
        2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
        3) MKT Fastening, LLC.
        4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        1) Cooper B-Line, Inc.; a division of Cooper Industries.
        2) Empire Tool and Manufacturing Co., Inc.
        3) Hilti Inc.
        4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
        5) MKT Fastening, LLC
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
    a. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.

b. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
c. Toggle Bolts: All-steel springhead type.
d. Hanger Rods: Threaded steel.
e. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
f. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
g. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
h. Toggle Bolts: All-steel springhead type.
i. Hanger Rods: Threaded steel

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports as scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in] NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1- 1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMTs, and RMCs may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
5. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Architectural Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Sections "Cast-in-Place Concrete" or "Miscellaneous Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements in Sections "Exterior Painting", "Interior Painting" and "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

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. Nonmetal conduits, tubing, and fittings.
3. Nonmetal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.
5. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. LFNC: Liquidtight flexible nonmetallic conduit.

B. RNC: Rigid nonmetallic 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 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corporation.
4. CANTEX Inc.
5. CertainTeed Corp.; Pipe & Plastics Group.
6. Condux International, Inc.
7. ElecSYS, Inc.
8. Electri-Flex Co.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT/Cole-Flex.
11. RACO; a Hubbell Company.
12. Thomas & Betts Corporation.

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. RNC: Type EPC-40-PVCcomplying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. LFNC: Comply with UL 1660.

E. RTRC: Comply with UL 1684A and NEMA TC 14.

F. Fittings for and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

G. Fittings for LFNC: Comply with UL 514B.

2.2 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hoffman.
2. Lamson & Sessions; Carlon Electrical Products.

B. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.

D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Erickson Electrical Equipment Company.
4. Hoffman.
5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
6. O-Z/Gedney; a unit of General Signal.
7. RACO; a Hubbell Company.
8. Robroy Industries, Inc.; Enclosure Division.
9. Spring City Electrical Manufacturing Company.
10. Thomas & Betts Corporation.
11. Walker Systems, Inc.; Wiremold Company (The).

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. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

D. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

E. Device Box Dimensions: 4 inches by 2-1/8 inches by 2-1/8 inches deep.

F. Gangable boxes are allowed as along is permitted by the NEC.

G. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 4X Reinforced Fiberglass outdoor with continuous-hinge cover with flush latch unless otherwise indicated.
1. Nonmetallic Enclosures: Fiberglass.

H. Cabinets:

1. NEMA 250, Type 4X Fiberglass 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.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: Type EPC-40-PVC.
2. Concealed Conduit, Aboveground: Type EPC-40-PVC.
3. Underground Conduit: RNC, Type EPC-80-PVC.
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 4SS.

B. Minimum Raceway Size: 1/2-inch trade size.

C. 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. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. 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.

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 away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

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 of changes in direction.

G. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches of enclosures to which attached.

I. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot 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 of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from RNC, Type EPC-40-PVC TO EMT or GRC before rising above floor.

J. 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.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

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 trade size and insulated throat metal bushings on 1-1/2-inch 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 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 tensile strength. Leave at least 12 inches 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 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 and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
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 temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F.

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 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 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 of flexible conduit for recessed and semirecessed 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 or LFNC in damp or wet locations not subject to severe physical damage.

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. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Z. Locate boxes so that cover or plate will not span different building finishes.

AA. 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.

BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 3 for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 3."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 3."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of

60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 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 Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

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 PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 260544

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

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. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: Nitrile (Buna N rubber 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.
4. Connecting Bolts and Nuts: [Carbon steel, with corrosion-resistant coating,] of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall have VOC content of 150 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Sealant 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."

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

    a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
    b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.

2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

F. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION

SECTION 260553

IDENTIFICAION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.

2. Legend: Indicate voltage and system or service type.

C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Colors for Cables Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical- resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

E. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

F. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical- resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

C. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identi- fies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

D. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.5 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396- inch galvanized-steel backing; and with colors, legend, and size required for applica- tion.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.6 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.7 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.

F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

G. Underground-Line Detectable Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

H. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 30-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Power.
2. Control Wiring.

C. Power-Circuit Conductor Identification: For secondary conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

D. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 240/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splic- es or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

E. Install instructional sign including the color-code for grounded and ungrounded conduc- tors using adhesive-film-type labels.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction box- es, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes with the conductor designation.

H. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, con- trol, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

J. Locations of Underground Lines: Identify with underground-line detectable warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

K. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.

M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

N. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equip- ment used for power transfer and load shedding.

O. Equipment Identification Labels: On each unit of equipment, install unique designation la- bel that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

    a. Indoor Equipment: Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are re- quired, use labels 2 inches high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label Sten- ciled legend 4 inches high.
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

    a. Panelboards, electrical cabinets, and enclosures.
    b. Access doors and panels for concealed electrical items.
    c. Disconnect switches.

3.3 INSTALLATION

Verify identity of each item before installing identification products.

END OF SECTION

SECTION 262416

PANELBOARDS

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. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Load centers.

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. MCCB: Molded-case circuit breaker.

E. SPD: Surge protective device.

F. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of NRTL listing for series rating of installed devices.
7. Include evidence of NRTL listing for SPD as installed in panelboard.
8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include wiring diagrams for power, signal, and control wiring.
10. Key interlock scheme drawing and sequence of operations.
11. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device. Include an Internet link for electronic access to downloadable PDF of the coordination curves.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing**.**

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
    b. Altitude: Not exceeding 6600 feet.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by 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 Architect no fewer than 7 days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Architect's, Construction Manager's and Owner's written permission.
3. Comply with NFPA 70E.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.

1. SPD Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Square D Co.
2. Eaton Corporation.
3. Siemens
4. ABB

2.2 PANELBOARDS COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

F. Enclosures: Flush and Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.
   a. Outdoor Locations: NEMA 250, Type 4 Reinforced Fiberglass.

2. Height: 84 inches maximum.
3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
5. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
6. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
7. Finishes:

   a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
   b. Back Boxes: Same finish as panels and trim.

G. Incoming Mains:

1. Location: coordinated on the field by the electrical contractor.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

H. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.

    a. Plating shall run entire length of bus.
    b. Bus shall be fully rated the entire length.

2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
5. Split Bus: Vertical buses divided into individual vertical sections.

I. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.

J. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

K. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.3 POWER PANELBOARDS

A. Panelboards: NEMA PB 1, distribution type.

B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

C. Mains: Circuit breaker or Lugs only (as noted on plans).

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

B. Mains: Circuit breaker or Lugs only (as noted on plans).

C. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

E. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
4. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
5. Subfeed Circuit Breakers: Vertically mounted.
6. MCCB Features and Accessories:

a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. UL listed for reverse connection without restrictive line or load ratings.
d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
g. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
h. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional with field-adjustable 0.1- to 0.6-second] time delay.
i. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
j. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
k. Multipole units enclosed in a factory assembled to operate as a single unit.
l. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
m. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.6 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

D. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.7 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NECA 407 and NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Comply with NECA 1.

C. Install panelboards and accessories according to NECA 407 and NEMA PB 1.1.

D. Equipment Mounting:

1. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in- Place Concrete." and or Section 033053 "Miscellaneous Cast-in-Place Concrete."
2. Attach panelboard to the vertical finished or structural surface behind the panelboard.

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Mount top of trim 90 inches above finished floor unless otherwise indicated.

G. Mount panelboard cabinet plumb and rigid without distortion of box.

H. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

I. Mounting panelboards with space behind is recommended for damp, wet, or dirty locations. The steel slotted supports in the following paragraph provide an even mounting surface and the recommended space behind to prevent moisture or dirt collection.

J. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.

K. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.
2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

L. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

M. Install filler plates in unused spaces.

N. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. 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.

C. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers and Paragraph 7.19.1 Surge Arrestors, Low-Voltage. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
c. Instruments and Equipment:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573 "Overcurrent Protective Device Coordination Study."

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.

1. Measure loads during period of normal facility operations.

2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Architect. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION

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. Receptacless with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 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 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
   1. Cooper Wiring Devices; a division of Eaton.
   2. Wiring Device-Kellems; a division of Hubbell.
   3. Leviton Mfg. Company Inc.
   4. Pass & Seymour; a division of LeGrand.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

   1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
   2. Devices shall comply with the requirements in this Section.

2.3 GFCI RECEPTACLES

A. General Description:

   1. Straight blade, 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 indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

C. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

2.4 WALL PLATES

A. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, high impact polycarbonate material with lockable cover.

2.5 FINISHES

A. Device Color:

   1. Wiring Devices Connected to Normal Power System: Ivory.

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. Pigtailing existing conductors is 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 in length.
5. 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.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.

9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

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, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black -filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. 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. Test straight-blade convenience outlets in patient-care area and hospital-grade convenience outlets for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz.

D. Wiring device will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION

SECTION 262813

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:
   a. Enclosed switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

   a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
   b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit in electronic format suitable for use in coordination software and in PDF format.
5. Coordination charts and tables and related data.
6. Fuse sizes for elevator feeders and elevator disconnect switches.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017700 "Closeout Procedures," and or **S**ection 017823 "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.
3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse used on the Project. Submit in PDF format.
4. Coordination charts and tables and related data.

1.5 FIELD CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Industries, Inc.; Bussmann Div.
2. Mersen

B. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

B. 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.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

2.3 FUSE COVER

A. Fuse cover shall be BUSSMAN “SAMI”

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Main Service: Class RK1, time delay, current limiting Bussman HI-CAP KRP-C.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION

SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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. Fusible switches.
2. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, 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. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Manufacturer's field service report.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member Company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. 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. Comply with NFPA 70.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by 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 Architect and or Construction Manager no fewer than seven days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Architect's or Construction Manager's written permission.
4. Comply with NFPA 70E.

1.10 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Square D Co.
2. Eaton Corporation.
3. Siemens
4. ABB

2.2 FUSIBLE SWITCHES

A. Type HD, Heavy Duty, Single Throw, 240 or 600-V ac (as per connected voltage), 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicate**d** fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
5. Hookstick Handle: Allows use of a hookstick to operate the handle.
6. Lugs: Mechanical type, suitable for number, size, and conductor material.
7. Service-Rated Switches: Labeled for use as service equipment.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
1. Outdoor Locations: Type 4 Reinforced Fiberglass.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 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. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
    c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573 "Overcurrent Protective Device Coordination Study."

END OF SECTION

SECTION 264210

ELECTRICITY UTILITY ENTRANCE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Arrangement with Utility Company for permanent electric service, including payment of Utility Company charges for service construction.

B. Underground service entrance.

C. Metering equipment.

1.2 RELATED SECTIONS

A. Excavation, Grading and Fill.

C. Section 260533 - Raceways.

E. Section 260526 – Grounding and bonding.

1.3 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.4 SYSTEM DESCRIPTION

A. Utility Company:

1. American Electric Power (AEP).

B. System Characteristics:

1. 240/120 volts, single-phase, three wire, 60 Hertz

C. Service Entrance: Underground.

1.5 SUBMITTALS

A. Submit under provisions of Section 01340.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with Utilities Company written requirements.

B. Maintain one copy of each document on site.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Utility Company drawings.

PART 2 - PRODUCTS

2.1 UTILITY METERS

A. Provide meter can as to comply with Utility Company requirements.

2.2 METERING TRANSFORMER CABINET

A. Size and type: As required by Utility Company.

B. Include provisions for padlocking and sealing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that service equipment is ready to be connected and energized.

3.2 PREPARATION

A. Make arrangements with Utilities Company to obtain permanent electric service to the Project.

B. Coordinate location of Utilities Company’s facilities to ensure proper access is available.

C. Coordinate with utility metering department for meter and type of meter installation.

3.3 INSTALLATION

A. Install service entrance conduits and to service entrance equipment.

END OF SECTION

SECTION 265621

EXTERIOR LED 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. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
   2. Luminaire-mounted photoelectric relays.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. Lumen: Measured output of lamp and luminaire, or both.

E. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

F. Pole: Luminaire support structure, including tower used for large-area illumination.

G. Standard: See "Pole."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.

   1. Arrange in order of luminaire designation.
   2. Include data on features, accessories, and finishes.
   3. Include physical description and dimensions of the luminaires.
   4. Lamps, including life, output (lumens, CCT, and CRI), and energy-efficiency data.
   5. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides," of each luminaire type. The

adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the luminaire as applied in this Project.
For LED luminaires the adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project IES LM-79 and IES LM-80.

a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

6. Photoelectric relays.
7. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, and required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Include diagrams for power, signal, and control wiring.

D. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing laboratory providing photometric data for luminaires.

B. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Product Certificates: For each type of the following:

1. Drivers.
2. Lamp.
3. Photoelectric relay.

D. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

E. Sample warranty.

1.6 PRIOR APPROVAL SUBMITTAL REQUESTS

A. Full submittal data , by type, clearly highlighted and arrowed to identify the specific proposed manufacturer’s nomenclature

B. Full submittal data of driver (LED) data of proposed manufacturer

C. LED lumen data will include
   1. Lumen output
   2. L70 and L90 testing
   3. Confirmation of independent test lab data ITL
   4. Color temperature and CRI with quantity of McAdam Ellipse steps
      a. Data shall include sphere and goniometer results for total lumen, total power, luminaire efficacy, CRI and junction temperature for the specified color temperature
   5. Make and brand of LED diode should be clearly identified on submittal data

D. LED dimming shall be equal in range and quality to the specified drivers, Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in a commercial environment.

E. All substitutions must meet specified fixtures certifications (UL,ETL,CE,CSA, RoHS, DLC, Energy Star)

F. Provide lighting calculations with the prior approval request based on reflectance values and light loss factors provided by the engineer and displayed on lighting calculation drawings. (may be unique by area) Calculations shall be shown on one sheet with dimensions as shown on construction set. Data will be submitted electronically in dxf format on a flash drive and with printed calculations on Architectural E size sheets to scale with construction set sheets.

   1. Discrepancies between prior approval data calculations and the original design calculations will result in immediate disqualification of review due to time based constraints on the bid process

G. Prior approval request may require a sample of both the proposed and specified fixtures provided by the alternate manufacturer at NO additional cost to the project. Samples of both specified and proposed must be provided within 10 working days of request.

H. All data will be submitted electronically and in a bound format

I. Bound data will be secured in hard binder with 3” rings for ease of review or PDF file.

   1. Types will be marked with a tab by type and indexed for ease of reference

J. LED warranty information MUST be included by type and marked in RED to clearly identify the manufacturer’s warranty terms. Warranty data MUST meet or exceed the specified manufacturers terms

K. Prior approvals MUST be received and acknowledged to the specifiers office no less than 10 business days prior to bid.

L. ALL prior approval data must be submitted in one package with complete information. Information that is incomplete will be rejected without review.

M. The prior approval will be returned marked approved or rejected by type with no explanation. If any specification is deemed not equal the review will be stopped, the type rejected with no explanation.

N. Lumen output for the proposed fixture must be highlighted in yellow for clear identification.

O. LED warranty information must be included by type and marked in red to clearly identify the manufacturer's warranty terms. Warranty data must meet or exceed the specified manufacturer's terms.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.8 MAINTENANCE MATERIAL SUBMITTALS

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, Acrylic, and Plastic Lenses, Covers and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.9 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory accredited under the NVLAP for Energy Efficient Lighting Products.

B. 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, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.11 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.12 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace (labor and material) components of luminaires that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including luminaire support components.
b. Faulty operation of luminaires, ballasts, and accessories.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

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. NRTL Compliance: Luminaires shall comply with UL 1598 and be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. Lateral Light Distribution Patterns: Comply with IES RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

E. UL Compliance: Listed for wet location (UL 1598).

F. EMI Filters: Factory installed to suppress conducted EMI as required by MIL-STD-461E. Fabricate luminaires with one filter on each ballast indicated to require a filter.

G. In-line Fusing: Install on the ballast primary for each luminaire.

H. Lamp Rating: Lamp marked for outdoor use and in enclosed locations.

I. Source Limitations: Obtain luminaires from single source from a single manufacturer.

J. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 LED LIGHTING FIXTURES AND LED LAMPS

A. All LED products must be UL, ETL and/or CSA listed

B. All LED products must have LM-79 and LM-80 testing noted on specification sheet by an independent test lab

C. All LED products should be identified as L70 and/or L90 ratings based on independent test lab data

D. All outdoor and wet location listed products must clearly state the IP rating carried on the fixture based on independent test lab data

E. Bulb shape complying with ANSI C79.1.

F. CRI of Minimum 80. CCT of 4100 K.

G. Rated lamp life of **50,000** hours.

H. Lamps dimmable from 100 percent to 0 percent of maximum light output.

I. Nominal Operating Voltage: as noted on light fixture schedule.

J. All LED products must be serviceable for accessible for field repair needs.

K. All outdoor pole mounted products must have surge suppression within each fixture.

L. All outdoor lighting color rendering should be within a 7 step McAdams Ellipse. All outdoor lighting should be 4000 kelvin unless specifically noted

M. All control systems that interface with an LED product will be supported by a project "integrator" until project completion. This includes contact with the installer prior to installation, availability during installation, and final checkout and startup after installation. The quantity of days required for startup will be based on the manufacturer/agents discretion and need.

1. The project integrator must be capable of performing low voltage and dmx terminations. High voltage terminations are performed solely by the electrical subcontractor.
2. Reporting of final startup completion of the controls system back to the engineer is mandatory.
3. Invitation to attend the training with the owners representative should be made to the engineer no less than 5 days prior to training
4. Signature confirmation of training and startup is required within 5 business days after completion back to the engineer's office.

N. All LED drivers should be capable of 0-10 volt controls and DMX control and shall dim to 1% of total lumen output. Where specifically specified the dimming driver may be required to dim to .1% of lumen output , otherwise known as "dim to dark"

O. Driver manufacturers must have a 5 year history producing dimmable electronic LED drivers for the North American market.

P. Ambient driver temperatures must be within -20 degrees to 50 degrees C (-4 degrees to 122 degrees F)

Q. Driver (internal) must limit inrush current.

1. Base specification: meet or exceed NEMA 410 driver inrush standard of 430 amp per 10 amps load with a maximum of 370 amps/2 seconds
2. Preferred specification : Meet or exceed 30ma's at 277 VAC for up to 50 watts of load and 75A at 240us att 277 VAC for 100 watts of load
3. Withstand up to a 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A
4. No visible change in light output with a variation of plus/minus 10percent line voltage input.
5. Total harmonic distortion less than 20%, and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD

2.3 EMERGENCY POWER UNIT

A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate LED's continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire driver.
2. Test Push Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.

    a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

3. Battery: Sealed, maintenance-free, nickel-cadmium type.
4. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
5. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
6. Integral Self-Test: Factory-installed electronic device automatically initiates code- required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.4 LUMINAIRE TYPES - see light fixture schedule on plans

2.5 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Corrosion-resistant aluminum or Stainless steel unless otherwise indicated. Form and support to prevent warping and sagging.

C. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Ballast shall automatically disconnect ballast when door opens.

E. Exposed Hardware Material: Stainless steel.

F. Diffusers and Globes:

1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

H. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

I. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

J. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY," including specific lamp type.
b. Lamp type, wattage, bulb type, and coating (clear or coated) for HID luminaires.
c. ANSI ballast type (M98, M57, etc.) for HID luminaires.
d. CCT and CRI for all luminaires.

2.6 METAL FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker), complying with AAMA 611.
4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls, roofs, and canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Install lamps in each luminaire.

D. Remote Mounting of Ballasts: Distance between the ballast and luminaire shall not exceed that recommended by ballast manufacturer. Verify the following with ballast manufacturer:

1. Maximum distance between ballast and luminaire.
2. Wire size between ballast and luminaire.

E. Wiring Method: Install cables in raceways. Conceal raceway and cables.

F. Fasten luminaire to indicated structural supports.

G. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

H. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls, or a minimum 1/8-inch backing plate attached to wall structural members or using through bolts and backing plates on either side of wall.

I. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height indicated on Drawings.

J. Coordinate layout and installation of luminaires with other construction. Refer to architectural elevations prior to rough-ins.

K. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

L. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems;" for wiring connections and wiring methods.

3.4 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Photoelectric Control Operation: Verify operation of photoelectric controls.

C. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):

a. IES LM-5.
b. IES LM-50.
c. IES LM-52.
d. IES LM-64.
e. IES LM-72.

D. 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.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION

SECTION 268050

HAND DRYERS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnishing and installation of electric hand dyers.

1.2 RELATED SECTIONS

A. Basic Electrical Requirements - Section 260100

B. Wire and Cables - Section 260519

C. Grounding and Bonding- Section 260526

D. Raceways and Boxes - Section 260533

1.3 SUBMITTALS

A. Refer to Division 01 Section "Submittal Procedures" as "action submittals."

1.4 WARRANTY

A. Unit shall be protected by a limited 5-year warranty on all parts except motor brushes. Motor brushes shall be warranted for three years from date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURER / MODEL

A. Dyson Airblade V – No substitutions

2.2 FEATURES

A. Construction: Polycarbonate fascia antibacterial coating. Plastic ABS/PBT back plate mounting with anti-tamper 4/25” pin hex screws. Water protection to IP24. ADA compliant.

B. Filter: Sealed HEPA filter removes bacteria, viruses and 99.7% of particles as small as 0.3 microns.

C. Motor: 1000W, digital V4 brushless, 5,500 per second switching rate, 83,000 rpm speed.

D. Sound Power Level: 79dB(A).

E. Heating Element: None.

F. Electronic Control: Touch-free capacitive sensor activation. Hand dry time 12 seconds based on NSF P335 to a measurement of 0.1g residual moisture.

2.3 ELECTRICAL

A. 115V, 20A, 9.09 amps, 60Hz, Single Phase.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's recommendations and instructions.

END OF SECTION

SECTION 310620.16

UTILITY BACKFILL MATERIALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Material Classifications.

B. Utility Backfill Materials:

1. Concrete sand
2. Gem sand
3. Pea gravel
4. Crushed Aggregate: Crushed stone
5. Crushed Aggregate: Crushed concrete
6. Bank run sand
7. Select backfill
8. Random backfill

C. Material Handling and Quality Control Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No payment will be made for backfill material under this Section. Include payment in unit price for applicable utility installation.

1.3 DEFINITIONS

A. Unsuitable Material: Unsuitable soil materials are the following:

1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.

2. Materials that cannot be compacted to the required density because of either gradation, plasticity, or moisture content.

3. Materials that contain large clods, aggregate, and stones greater than 4 inches in any dimension; debris, vegetation, and waste; or any other deleterious materials.

4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

B. Suitable Material: Suitable soil materials are the following:

1. Those meeting this specification requirements.

2. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement.

C. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for the structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.

D. Foundation Base: Crushed stone aggregate with filter fabric as required, cement stabilized sand, or concrete seal slab. The foundation base provides a smooth, level working surface for the construction of the concrete foundation.

E. Backfill Material: Classified soil material meeting specified quality requirements for the designated application as embedment or trench zone backfill.

F. Embedment Material: Soil material placed under controlled conditions within the embedment zone extending vertically upward from top of foundation to an elevation 12 inches above top of pipe, and including pipe bedding, haunching, and initial backfill.

G. Trench Zone Backfill: Classified soil material meeting specified quality requirements and placed under controlled conditions in the trench zone from top of embedment zone to base coarse in paved areas or to the surface grading material in unpaved areas.

H. Foundation: Either suitable soil of the trench bottom, or material placed as backfill of over-excavation for removal and replacement of unsuitable or otherwise unstable soils.

I. Source: A source selected by the Contractor for supply of embedment or trench zone backfill material. A selected source may be the project excavation, off-site borrow pits, commercial borrow pits, or sand and aggregate production or manufacturing plants.

J. Refer to Section 31 23 16.16 - Excavation and Backfill for Utilities for other definitions regarding utility installation by trench construction.

1.4 REFERENCES

A. ASTM C 33 - Specification for Concrete Aggregate.

B. ASTM C 40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.

C. ASTM C 123 - Test Method for Lightweight Pieces in Aggregate.

D. ASTM C 131 - Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

E. ASTM C 136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates.

F. ASTM C 142 - Test Method for Clay Lumps and Friable Particles in Aggregates.

G. ASTM D 1140 - Test Method for Amount of Materials in Soils Finer Than No. 200 Sieve.

H. ASTM D 2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).

I. ASTM D 2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

J. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

K. ASTM D 4643 - Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.

L. TxDOT Tex-101-E - Preparation of Soil and Flexible Base Materials for Testing.

M. TxDOT Tex-104-E - Test Method for Determination of Liquid Limit of Soils (Part 1)

N. TxDOT Tex-106-E - Test Method - Methods of Calculating Plasticity Index of Soils.

O. TxDOT Tex-110-E - Determination of Particle Size Analysis of Soils.

1.5 SUBMITTALS

A. Conform to requirements of Section 01 33 00 - Submittal Procedures.

B. Submit a description of source, material classification and product description, production method, and application of backfill materials.

C. Submit test results for samples of off-site backfill materials to comply with Paragraph 2.3, Materials Testing.

D. Before stockpiling materials, submit a copy of temporary easement or approval from landowner for stockpiling backfill material on private property.

E. For each delivery of material, provide a delivery ticket which includes source location.

1.6 TESTS

A. Perform tests of sources for backfill material in accordance with Paragraph 2.3.

B. Verification tests of backfill materials may be performed by the Owner in accordance with Section 01 45 29 - Testing Laboratory Services and in accordance with Paragraph 3.3.

C. Random fill obtained from the project excavation as source is exempt from pre-qualification requirements by Contractor but must be inspected by the testing lab for unacceptable materials based on ASTM D 2488.

PART 2 - PRODUCTS

2.1 MATERIAL CLASSIFICATIONS

A. Materials for backfill shall be classified for the purpose of quality control in accordance with the Unified Soil Classification Symbols as defined in ASTM D 2487. Material use and application is defined in utility installation specifications and Drawings either by class, as described in Paragraph 2.1B, or by product descriptions, as given in Paragraph 2.2.

B. Class Designations Based on Laboratory Testing:

1. Class I: Well-graded gravels and sands, gravel-sand mixtures, crushed well-graded rock, little or no fines (GW, SW):

    a. Plasticity index: nonplastic.

    b. Gradation: D60/D10 - greater than 4 percent; amount passing No. 200 sieve - less than or equal to 5 percent.

2. Class II: Poorly graded gravels and sands, silty gravels and sands, little to moderate fines:

    a. Plasticity index: nonplastic to 4.

    b. Gradations:

        (1) Gradation (GP, SP): amount passing No. 200 sieve - less than 5 percent.

        (2) Gradation (GM, SM): amount passing No. 200 sieve - between 12 percent and 50 percent.

        (3) Borderline gradations with dual classifications (e.g., SP-SM): amount passing No. 200 sieve - between 5 percent and 12 percent.

3. Class III: Clayey gravels and sands, poorly graded mixtures of gravel, sand, silt, and clay (GC, SC, and dual classifications, e.g., SP-SC):

    a. Plasticity index: greater than 7.

    b. Gradation: amount passing No. 200 sieve - between 12 percent and 50 percent.

4. Class IVA: Lean clays (CL).

    a. Plasticity Indexes:

        (1) Plasticity index: greater than 7, and above A line.

        (2) Borderline plasticity with dual classifications (CL-ML): PI between 4 and 7.

b. Liquid limit: less than 50.

c. Gradation: amount passing No. 200 sieve - greater than 50 percent.

d. Inorganic.

5. Class IVB: Fat clays (CH)

a. Plasticity index: above A line.

b. Liquid limit: 50 or greater.

c. Gradation: amount passing No. 200 sieve - greater than 50 percent.

d. Inorganic.

6. Use soils with dual class designation according to ASTM D 2487, and which are not defined above, according to the more restrictive class.

2.2 PRODUCT DESCRIPTIONS

A. Soils classified as silt (ML), elastic silt (MH), organic clay and organic silt (OL, OH), and organic matter (PT) are not acceptable as backfill materials. These soils may be used for site grading and restoration in unimproved areas as approved by the Owner. Soils in Class IVB, fat clay (CH) may be used as backfill materials where allowed by the applicable backfill installation specification. Refer to Section 31 23 16.16 - Excavation and Backfill for Utilities.

B. Provide backfill material that is free of stones greater than 4 inches, free of roots, waste, debris, trash, organic material, unstable material, non-soil matter, hydrocarbon or other contamination, conforming to the following limits for deleterious materials:

1. Clay lumps: Less than 0.5 percent for Class I, and less than 2.0 percent for Class II, when tested in accordance with ASTM C 142.

2. Lightweight pieces: Less than 5 percent when tested in accordance with ASTM C 123.

3. Organic impurities: No color darker than standard color when tested in accordance with ASTM C 40.

C. Manufactured materials, such as crushed concrete, may be substituted for natural soil or rock products where indicated in the product specification, and approved by the Engineer, provided that the physical property criteria are determined to be satisfactory by testing.

D. Bank Run Sand: Durable bank run sand classified as SP, SW, or SM by the Unified Soil Classification System (ASTM D 2487) meeting the following requirements:

1. Less than 15 percent passing the number 200 sieve when tested in accordance with ASTM D 1140. The amount of clay lumps or balls not exceeding 2 percent.

2. Material passing the number 40 sieve shall meet the following requirements when tested in accordance with ASTM D 4318:

   a. Liquid limit: not exceeding 25 percent.

   b. Plasticity index: not exceeding 7.

E. Concrete Sand: Natural sand, manufactured sand, or a combination of natural and manufactured sand conforming to the requirements of ASTM C 33 and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

F. Gem Sand: Sand conforming to the requirements of ASTM C 33 for coarse aggregates specified for number 8 size and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	95 to 100
No. 4	60 to 80
No. 8	15 to 40

G. Pea Gravel: Durable particles composed of small, smooth, rounded stones or pebbles and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
1/2"	100
3/8"	85 to 100
No. 4	10 to 30
No. 8	0 to10
No. 16	0 to 5

H. Crushed Aggregates: Crushed aggregates consist of durable particles obtained from an approved source and meeting the following requirements:

1. Materials of one product delivered for the same construction activity from a single source.

2. Non-plastic fines.

3. Los Angeles abrasion test not exceeding 45 percent when tested in accordance with ASTM C 131.

4. Crushed aggregate shall have a minimum of 90 percent of the particles retained on the No. 4 sieve with 2 or more crushed faces as determined by Test Method Tex-460-A, Part I.

5. Crushed stone: Produced from oversize plant processed stone or gravel, sized by crushing to predominantly angular particles from a naturally occurring single source. Uncrushed gravel is not acceptable material for embedment where crushed stone is shown on the applicable utility embedment drawing details.

6. Crushed Concrete: Crushed concrete is an acceptable substitute for crushed stone as utility backfill. Gradation and quality control test requirements are the same as crushed stone. Provide crushed concrete produced from normal weight concrete of uniform quality; containing particles of aggregate and cement material, free from other substances such as asphalt, reinforcing steel fragments, soil, waste gypsum (calcium sulfate), or debris.

7. Gradations, as determined in accordance with Tex-110-E.

Sieve	Percent Passing by Weight for Pipe Embedment by Ranges of Nominal Pipes Sizes		
	>15"	15" - 8"	<8"
1"	95 - 100	100	-
3/4"	60 - 90	90 - 100	100
1/2"	25 - 60	-	90 - 100
3/8"	-	20 - 55	40 - 70
No. 4	0 - 5	0 - 10	0 - 15
No. 8	-	0 - 5	0 - 5

I. Select Backfill: Class III clayey gravel or sand or Class IV lean clay with a plasticity index between 7 and 20 or clayey soils treated with lime in accordance with Section 32 01 00 - Pavement Repair and Resurfacing, to meet plasticity criteria. Structural Select Backfill shall need the requirements described in the design plans or as directed by the Engineer.

J. Random Backfill: Any suitable soil or mixture of soils within Classes I, II, III and IV; or fat clay (CH) where allowed by the applicable backfill installation specification. Refer to Section 31 23 16.16 - Excavation and Backfill for Minor Structures and Section 31 23 23.13 - Excavation and Backfill for Utilities.

K. Cement Stabilized Sand: Conform to requirements of Section 31 32 13.16 - Cement Stabilized Sand.

L. Concrete Backfill: Conform to Class B concrete as specified in Section 33 05 16 - Concrete for Utility Construction.

2.3 MATERIAL TESTING

A. Ensure that material selected, produced and delivered to the project meets applicable specifications and is of sufficient uniform properties to allow practical construction and quality control.

B. Source or Supplier Qualification. Perform testing, or obtain representative tests by suppliers, for selection of material sources and products. Provide test results for a minimum of three samples for each source and material type. Test samples of processed materials from current production representing material to be delivered. Tests shall verify that the materials meet specification requirements. Repeat qualification test procedures each time the source characteristic changes or there is a planned change in source location or supplier. Qualification tests shall include, as applicable:

1. Gradation. Complete sieve analyses shall be reported regardless of the specified control sieves. The range of sieves shall be from the largest particle through the No. 200 sieve.

2. Plasticity of material passing the No. 40 sieve.

3. Los Angeles abrasion test of material retained on the No. 4 sieve.

4. Clay lumps.

5. Lightweight pieces

6. Organic impurities

C. Production Testing. Provide reports to the Owner and the Engineer from an independent testing laboratory that backfill materials to be placed in the Work meet applicable specification requirements.

D. Assist the Owner and Testing Lab in obtaining material samples for verification testing at the source or at the production plant.

PART 3 - EXECUTION

3.1 SOURCES

A. Use of material encountered in the trench excavations is acceptable, provided applicable specification requirements are satisfied. If excavation material is not acceptable, provide from other approved source.

B. Identify off-site sources for backfill materials at least 14 days ahead of intended use so that the Owner or Lab may obtain samples for verification testing.

C. Obtain approval for each material source by the Owner before delivery is started. If sources previously approved do not produce uniform and satisfactory products, furnish materials from other approved sources. Materials may be subjected to inspection or additional verification testing after delivery. Materials which do not meet the specifications will be rejected. Do not use material which, after approval, has become unsuitable for use due to segregation, mixing with other materials, or by contamination. Once a material is approved by the Owner, expense for sampling and testing required to change to a different material will be credited to the Owner through a change order.

D. Bank run sand, select backfill, and random backfill, if available in the project excavation, may be obtained by selective excavation and acceptance testing. Obtain additional quantities of these materials and other materials required to complete the work from off-site sources.

E. The Owner or any provided geotechnical reference information does not represent or guarantee that any soil found in the excavation work will be suitable and acceptable as backfill material.

3.2 MATERIAL HANDLING

A. When backfill material is obtained from either a commercial or non-commercial borrow pit, open the pit to expose the vertical faces of the various strata for identification and selection of approved material to be used. Excavate the selected material by vertical cuts extending through the exposed strata to achieve uniformity in the product.

B. Establish temporary stockpile locations for practical material handling and control, and verification testing by the Owner in advance of final placement. Obtain approval from landowner for storage of backfill material on adjacent private property.

C. When stockpiling backfill material near the project site, use appropriate covers to eliminate blowing of materials into adjacent areas and prevent runoff containing sediments from entering the drainage system.

D. Place stockpiles in layers to avoid segregation of processed materials. Load material by making successive vertical cuts through entire depth of stockpile.

3.3 FIELD QUALITY CONTROL

A. Quality Control

1. The Owner or Engineer may sample, and test backfill at:

a. Sources including borrow pits, production plants and Contractor's designated off-site stockpiles.

b. On-site stockpiles.

c. Materials placed in the Work.

2. The Owner or Engineer may resample material at any stage of work or location if changes in characteristics are apparent.

B. Production Verification Testing: The Owner's testing laboratory will provide verification testing on backfill materials, as directed by the Engineer. Samples may be taken at the source or at the production plant, as applicable.

END OF SECTION

SECTION 311000

SITE CLEARING – PREPARATION OF SITE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Item shall govern for the preparation of the site for construction operations by the removal and disposal of all obstructions, including obstructions not otherwise shown on the plans and specifications.

B. Such obstructions shall be considered to include remains of houses, foundations, floor slabs, concrete, brick, lumber, plaster, septic tank drain fields, basements, abandoned utility pipes or conduits, equipment, fences, retaining walls, outhouses and shacks.

C. This Item shall also include the removal of trees and shrubs and other landscape features not designated for preservation, stumps, brush, roots, vegetation, logs, curb and gutter, driveways, paved parking areas, miscellaneous stone, sidewalks, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron and debris, whether above or below ground except live utility facilities.

1.2 UNIT PRICES

A. No separate payment will be made for work performed under this Section. Include cost of such work in Contract unit prices for items listed in bid form requiring site clearing – preparation of site.

PART 2 - EXECUTION

2.1 PREPARATION

A. All areas, as shown on the plans, shall be cleared of all structures and obstructions as defined above. Those trees, shrubs and other landscape features specifically designated by the Engineer for preservation shall be carefully protected from abuse, marring, or damage during construction operations. Continual parking and/or servicing of equipment under the branches of trees marked for preservation will not be permitted. When trees and shrubs are designated for preservation and require pruning, they shall be trimmed as directed by the Engineer and all exposed cuts over 2 inches in diameter shall be treated with a material approved by the Engineer.

B. Culverts, storm sewers, manholes and inlets shall be removed in proper sequence for maintenance of traffic and drainage.

C. Underground obstructions, except those items designated for preservation, shall be removed to the following depths:

1. In areas to receive embankment: 2 feet below natural ground, except when permitted by the plans, trees and stumps may be cut off as close to natural ground as practicable on areas which are to be covered by at least three feet of embankment.

2. In areas to be excavated: 2 feet below the lower elevation of the excavation.

3. All other areas: 1 foot below natural ground.

2.2 DISPOSAL

A. Unless otherwise instructed by Owner or Engineer, all brush from existing trees and vegetation cleared on project site shall be collected and neatly stored on-site, in an area designated by Owner (for mulching and reuse).

B. Contractor shall remove all debris, rock, trash and other material deemed objectionable by Owner or Engineer. Disposal shall be off-site shall be at contractor's sole expanse.

C. Unless otherwise shown herein, all materials and debris removed shall become the property of the Contractor and shall be removed from the project site in a manner satisfactory to Owner and Engineer.

D. No timber shall be cut or defaced outside of the areas identified for clearing and demolition.

2.3 BACKFILL

A. Holes remaining after removal of all obstructions, objectionable material, trees, stumps, etc., shall be backfilled with approved material, compacted and restored to approximately its original contours by blading, bulldozing, or by other methods, as approved by the Engineer. In areas to be immediately excavated, the backfilling of holes may not be required when approved by the Engineer.

B. Before backfilling, the remaining ends of all abandoned storm sewers, culverts, sanitary sewers, conduits, and water or gas pipes over 3 inches in diameter, shall be plugged with an adequate quantity of concrete to form a tight closure.

END OF SECTION

SECTION 312300

EARTHWORK, EXCAVATION, FILL AND GRADING

PART 1 - GENERAL

1.1 This section shall cover earthwork, including general clearing, removal, disposal or reutilization of all excavated earthen materials necessary and placement of imported fill material for performing the Work as shown on the drawings, including sheeting and bracing, drainage, and other Work incidental to the preparation of the site for subsequent construction Work.

1.2 UNIT PRICES

A. Unit Prices.

1. No separate payment will be made for work performed under this Section unless listed in the bid items. Include cost of such work in Contract unit prices for items listed in bid form requiring earthwork, excavation, fill and grading.

PART 2 - PRODUCTS

2.1 Excavated Material: Contractor will utilize all of the excess excavated soil material that is not deemed objectionable unless otherwise instructed. All material will be placed, spread, compacted to lines and grades shown on plans or as directed by Engineer

2.2 Imported Fill: Select Backfill is acceptable as follows - Class III clayey gravel or sand or Class IV lean clay with a plasticity index between 7 and 20. For pavement subgrade, select fill will serve as an equal to soil treated with lime in accordance with Section 32 11 13.13 – Lime Treatment for Subgrade, to meet plasticity criteria.

2.3 Imported Fill: Random Backfill is acceptable as follows - Any suitable soil or mixture of soils within Classes I, II, III and IV; or fat clay (CH) where allowed by the applicable fill or backfill installation specification. Refer to Section 31 23 16.16 - Excavation and Backfill for Minor Structures.

A. Excavation and Backfill for Utilities. If Random backfill is to be used for pavement subgrade, it shall be treated with lime in accordance with Section 32 11 13.13 – Lime Treatment for Subgrade, to meet plasticity criteria.

PART 3 - EXECUTION

3.1 GENERAL:

A. Prior to commencing construction operations, the contractor shall make all the provisions necessary to assure the protection of all existing improvements, both onsite and offsite. Where identified, he shall protect trees, shrubs, planting and grass areas and shall make provisions for maintaining public travel in an acceptable manner.

B. PROTECTION OF EXISTING IMPROVEMENTS. Before any excavation is started, adequate protection shall be provided for all lawns, trees, shrubs, landscape work, fences,

sidewalks, hydrants, utility poles, street, alley and driveway paving, curbs, storm sewers, ditches, headwalls, catch basins, surface inlets and all other improvements that are to remain in place. Such protection shall be provided as long as necessary to prevent damage from the Contractor's operations. Shrubs, bushes, small trees and flowers, which have to be removed to permit excavation for the waterline, shall be protected and replanted or replaced when the backfill is completed. The Contractor shall exercise every precaution to prevent damage to property within and outside easements.

C. Any damage to driveways, buildings, fences, retaining walls, culverts, drains, paving, sidewalks, etc. which are removed or damaged during construction shall be repaired by contractor. Repair, restoration or replacements of any improvements damaged or removed shall be the obligation of the contractor at no additional cost to Owner.

D. Contractor will obtain all necessary permits in public and private rights-of-way from the Owner or any other local regulatory authority, as required

E. Drainage: Contractor shall make provisions for temporarily handling runoff on site, flows in existing water bodies, ditches, sewers, and trenches by employing pipes, flumes, or other approved methods at all times when his operations would, in any way, interfere with the natural functioning of said water bodies, ditches, sewers and drains. The contractor shall at all times during construction provide and maintain sufficient equipment for the lawful disposal of all ponding water, or water which enters excavations, to render such area firm and dry through the construction phase.

3.2 DISPOSAL OF EXCAVATED MATERIAL

A. Contractor will utilize all of the excess excavated material, unless otherwise instructed. In such event, Contractor shall dispose of material off site at no cost to Owner. All material will be graded and compacted as shown on plans or as directed by Engineer.

3.3 DESCRIPTION

A. Work shall consist of the required excavation and placement of excavated materials, and the placement and compaction of imported fill material, within the limits of the site as shown on the plans. The proper utilization of all excavated and imported fill material and the construction shaping and finishing of all earth work on the entire length of pavement, and all other areas within the site will be done in conformity with the required lines, grades, and typical cross sections in accordance with specification requirements herein outlined.

3.4 CONSTRUCTION METHODS

A. All excavation and corresponding embankment construction shall be performed as specified herein and in the design plans and the completed site shall conform to the established alignment, grades and cross sections.

B. When using either excavated material or imported soil material to perform fill or grading operations, each lift shall be mechanically compacted in 6" (six inch) layers to a minimum density of 90% Standard Proctor, for general areas. Engineer may select random areas for

density testing to confirm minimum compaction. In areas of street construction (subgrade) minimum density shall be 95%. For backfill of utilities (trenches) or structures, minimum density shall be as prescribed in the applicable specifications, or on the plans.

END OF SECTION

SECTION 312319

DEWATERING – CONTROL OF GROUND WATER AND SURFACE WATER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Dewatering, depressurizing, draining, and maintaining trenches, shaft excavations, structural excavations, and foundation beds in a stable condition, and controlling ground water conditions for trench and tunnel excavations.

B. Protecting work against surface runoff and rising flood waters.

C. Disposing of removed water.

1.2 UNIT PRICES

A. Unit Prices.

1. Payment for control of groundwater, regardless of depth, size or number of well points or time required to lower groundwater, is on a linear foot basis measured along the centerline of the structure being installed.

2. No payment will be made for excavation drainage under this Section. Include payment in unit price for applicable utility installation.

3. No payment will be made for control of surface water or surface drainage under this Section. Include payment in unit price for applicable utility installation.

1.3 REFERENCES

A. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49 kg) Rammer and 12-inch (304.8 mm) Drop.

B. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).

C. Federal Register 40 CFR (Vol. 55, No. 222) Part 122, EPA Administered Permit Programs (NPDES), Para.122.26(b)(14) Storm Water Discharge.

1.4 DEFINITIONS

A. Ground water control includes both dewatering and depressurization of water-bearing soil layers.

1. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from slopes or bottoms of excavations, or into tunnels and shafts, and disposing of removed water. The intent of dewatering is to increase stability of tunnel

excavations and excavated slopes; prevent dislocation of material from slopes or bottoms of excavations; reduce lateral loads on sheeting and bracing; improve excavating and hauling characteristics of excavated material; prevent failure or heaving of the bottom of excavations; and to provide suitable conditions for placement of backfill materials and construction of structures and other installations.

2. Depressurization includes reduction in piezometric pressure within strata not controlled by dewatering alone, as required to prevent failure or heaving of excavation bottom or instability of tunnel excavations.

B. Excavation drainage includes placement of drainage materials, such as crushed stone and filter fabric, together with sump pumping in order to keep excavations free of surface and seepage water.

C. Surface drainage includes use of temporary drainage ditches and dikes and installation of temporary culverts and sump pumps with discharge lines as required to protect the Work from any source of surface water.

D. Equipment and instrumentation for monitoring and control of the ground water control system includes piezometers and monitoring wells, and devices, such as flow meters, for observing and recording flow rates.

1.5 PERFORMANCE REQUIREMENTS

A. Conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems.

B. Design a ground water control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 and Section 31 41 33 - Trench Safety Systems, to produce the following results:

1. Effectively reduce the hydrostatic pressure affecting:

   a. Excavations.

   b. Tunnel excavation, face stability or seepage into tunnels.

2. Develop a substantially dry and stable subgrade for subsequent construction operations.

3. Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities, and other work.

4. Prevent the loss of fines, seepage, boils, quick condition, or softening of the foundation strata.

5. Maintain stability of sides and bottom of excavations.

C. Provide ground water control systems may include single-stage or multiple-stage well point systems, deep wells, or combinations of these equipment types.

D. Provide drainage of seepage water and surface water, as well as water from any other source entering the excavation. Excavation drainage may include placement of drainage materials, such as crushed stone and filter fabric, together with sump pumping.

E. Provide ditches, berms, pumps and other methods necessary to divert and drain surface water from excavation and other work areas.

F. Locate ground water control and drainage systems so as not to interfere with utilities, construction operations, adjacent properties, or adjacent water wells.

G. Assume sole responsibility for ground water control systems and for any loss or damage resulting from partial or complete failure of protective measures and any settlement or resultant damage caused by the ground water control operations. Modify ground water control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells, or affect potentially contaminated areas. Repair damage caused by ground water control systems or resulting from failure of the system to protect property as required.

H. Provide an adequate number of piezometers installed at the proper locations and depths as required to provide meaningful observations of the conditions affecting the excavation, adjacent structures, and water wells.

I. Provide environmental monitoring wells installed at the proper locations and depths as required to provide adequate observations of hydrostatic conditions and possible contaminant transport from contamination sources into the work area or into the ground water control system.

J. Decommission piezometers and monitoring wells installed during design phase studies and left for Contractors monitoring and use.

1.6 SUBMITTALS

A. Submittals shall conform to requirements of Section 01 33 00 - Submittals.

B. Submit a Ground Water and Surface Water Control Plan for review by the Owner and Engineer prior to start of any field work. The Plan shall be signed by a Professional Engineer registered in the State of Texas. Submit a plan to include the following:

1. Results of subsurface investigation and description of the extent and characteristics of water bearing layers subject to ground water control.

2. Names of equipment suppliers and installation subcontractors.

3. A description of proposed ground water control systems indicating arrangement, location, depth and capacities of system components, installation details and criteria, and operation and maintenance procedures.

4. A description of proposed monitoring and control system indicating depths and locations of piezometers and monitoring wells, monitoring installation details and criteria, type of equipment and instrumentation with pertinent data and characteristics.

5. A description of proposed filters including types, sizes, capacities and manufacturer's application recommendations.

6. Design calculations demonstrating adequacy of proposed systems for intended applications. Define potential area of influence of ground water control operation near contaminated areas.

7. Operating requirements, including piezometric control elevations for dewatering and depressurization.

8. Excavation drainage methods including typical drainage layers, sump pump application and other necessary means.

9. Surface water control and drainage installations.

10. Proposed methods and locations for disposing of removed water.

C. Submit the following records upon completed initial installation:

1. Installation and development reports for well points, eductors, and deep wells.

2. Installation reports and baseline readings for piezometers and monitoring wells.

3. Baseline analytical test data of water from monitoring wells.

4. Initial flow rates.

D. Submit the following records on a weekly basis during operations:

1. Records of flow rates and piezometric elevations obtained during monitoring of dewatering and depressurization. Refer to Paragraph 3.02, Requirements for Eductor, Well Points, or Deep Wells.

2. Maintenance records for ground water control installations, piezometers, and monitoring wells.

E. Submit the following records at end of work. Decommissioning (abandonment) reports for monitoring wells and piezometers installed by other during the design phase and left for Contractor's monitoring and use.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of agencies having jurisdiction.

B. Comply with Texas Natural Resource Conservation Commission regulations and Texas Water Well Drillers Association for development, drilling, and abandonment of wells used in dewatering system.

C. Obtain permit from EPA under the National Pollutant Discharge Elimination System (NPDES), for storm water discharge from construction sites. Refer to Section 31 25 00 – Erosion & Sedimentation Controls TPDES Permit Requirements.

D. Obtain all necessary permits from agencies with control over the use of groundwater and matters affecting well installation, water discharge, and use of existing storm drains and natural water sources. Because the review and permitting process may be lengthy, take early action to pursue and submit for the required approvals.

E. Monitor ground water discharge for contamination while performing pumping in the vicinity of potentially contaminated sites.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. Equipment and materials are at the option of Contractor as necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review by the Owner and Engineer through submittals required in Paragraph 1.06, Submittals.

B. Eductors, well points, or deep wells, where used, must be furnished, installed and operated by an experienced contractor regularly engaged in ground water control system design, installation, and operation.

C. All equipment must be in good repair and operating order.

D. Sufficient standby equipment and materials shall be kept available to ensure continuous operation, where required.

PART 3 - EXECUTION

3.1 GROUND WATER CONTROL

A. Perform a subsurface investigation by borings as necessary to identify water bearing layers, piezometric pressures, and soil parameters for design and installation of ground water control systems. Perform pump tests, if necessary, to determine the drawdown characteristics of the water bearing layers. The results shall be presented in the Ground Water and Surface Water Control Plan (See Paragraph 1.06B.1).

B. Provide labor, material, equipment, techniques and methods to lower, control and handle ground water in a manner compatible with construction methods and site conditions. Monitor effectiveness of the installed system and its effect on adjacent property.

C. Install, operate, and maintain ground water control systems in accordance with the Ground Water and Surface Water Control Plan. Notify the Engineer in writing of any changes made to accommodate field conditions and changes to the Work. Provide revised drawings and calculations with such notification.

D. Provide for continuous system operation, including nights, weekends, and holidays. Arrange for appropriate backup if electrical power is primary energy source for dewatering system.

E. Monitor operations to verify that the system lowers ground water piezometric levels at a rate required to maintain a dry excavation resulting in a stable subgrade for prosecution of subsequent operations.

F. Where hydrostatic pressures in confined water bearing layers exist below excavation, depressurize those zones to eliminate risk of uplift or other instability of excavation or installed works. Allowable piezometric elevations shall be defined in the Ground Water and Surface Water Control Plan.

G. Remove ground water control installations.

1. Remove pumping system components and piping when ground water control is no longer required.

2. Remove piezometers, including piezometers installed during the design phase investigations and left for Contractor's use, upon completion of testing, in accordance with Section 33 31 11 Part 3.2 – Testing of Sanitary Sewer Pipe Work.

3. Remove monitoring wells when directed by the Engineer.

4. Grout abandoned well and piezometer holes. Fill piping that is not removed with cement-bentonite grout or cement-sand grout.

H. During backfilling, dewatering may be reduced to maintain water level a minimum of 5 feet below prevailing level of backfill. However, do not allow that water level to result in uplift pressures in excess of 80 percent of downward pressure produced by weight of structure or backfill in place. Do not allow water levels to rise into cement stabilized sand until at least 48 hours after placement.

I. Provide a uniform diameter for each pipe drain run constructed for dewatering. Remove pipe drain when it has served its purpose. If removal of pipe is impractical, provide grout connections at 50-foot intervals and fill pipe with cement-bentonite grout or cement-sand grout when pipe is removed from service.

J. Extent of construction ground water control for structures with a permanent perforated underground drainage system may be reduced, such as for units designed to withstand

hydrostatic uplift pressure. Provide a means of draining the affected portion of underground system, including standby equipment. Maintain drainage system during operations and remove it when no longer required.

K. Remove system upon completion of construction or when dewatering and control of surface or ground water is no longer required.

L. Compact backfill to not less than 95 percent of the maximum dry density in accordance with ASTM D 698.

3.2 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEP WELLS

A. For aboveground piping in ground water control system, include a 12-inch minimum length of clear, transparent piping between every eductor well or well point and discharge header so that discharge from each installation can be visually monitored.

B. Install sufficient piezometers or monitoring wells to show that all trench or shaft excavations in water bearing materials are pre-drain prior to excavation. Provide separate piezometers for monitoring of dewatering and for monitoring of depressurization. Install piezometers and monitoring wells for tunneling as appropriate for Contractor's selected method of work.

C. Install piezometers or monitoring wells not less than one week in advance of beginning the associated excavation.

D. Dewatering may be omitted for portions of underdrains or other excavations, but only where auger borings and piezometers or monitoring wells show that soil is pre-drained by an existing system such that the criteria of the ground water control plan are satisfied.

E. Replace installations that produce noticeable amounts of sediments after development.

F. Provide additional ground water control installations, or change the methods, in the event that the installations according to the ground water control plan does not provide satisfactory results based on the performance criteria defined by the plan and by the specification. Submit a revised plan according to Paragraph 1.06B.

3.3 EXCAVATION DRAINAGE

A. Contractor may use excavation drainage methods if necessary, to achieve well-drained conditions. The excavation drainage may consist of a layer of crushed stone and filter fabric, and sump pumping in combination with sufficient wells for ground water control to maintain stable excavation and backfill conditions.

3.4 MAINTENANCE AND OBSERVATION

A. Conduct daily maintenance and observation of piezometers or monitoring wells while the ground water control installations or excavation drainage are operating in an area or seepage into tunnel is occurring. Keep system in good condition.

B. Replace damaged and destroyed piezometers or monitoring wells with new piezometers or wells as necessary to meet observation schedule.

C. Cut off piezometers or monitoring wells in excavation areas where piping is exposed, only as necessary to perform observation as excavation proceeds. Continue to maintain and make observations, as specified.

D. Remove and grout piezometers inside or outside the excavation area when ground water control operations are complete. Remove and grout monitoring wells when directed by the Engineer.

3.5 MONITORING AND RECORDING

A. Monitor and record average flow rate of operation for each deep well, or for each wellpoint or eductor header used in dewatering system. Also monitor and record water level and ground water recovery. These records shall be obtained daily until steady conditions are achieved, and twice weekly thereafter.

B. Observe and record elevation of water level daily as long as ground water control system is in operation, and weekly thereafter until the Work is completed or piezometers or wells are removed, except when Engineer determines that more frequent monitoring and recording are required. Comply with Engineer's direction for increased monitoring and recording and take measures as necessary to ensure effective dewatering for intended purpose.

3.6 SURFACE WATER CONTROL

A. Intercept surface water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps or other approved means. The requirement includes temporary works required to protect adjoining properties from surface drainage caused by construction operations.

B. Divert surface water and seepage water into sumps and pump it into drainage channels or storm drains, when approved by agencies having jurisdiction. Provide settling basins when required by such agencies.

END OF SECTION

SECTION 312323.13

EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavation, trenching, foundation, embedment, and backfill for installation of utilities, including manholes and other pipeline structures.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No additional payment will be made for trench excavation, embedment and backfill under this Section. Include cost in the unit price for installed underground piping, sewer, conduit, or duct work.

2. No separate or additional payment will be made for surface water control, groundwater control, or for excavation drainage. Include in the unit price for the installed piping, sewer, conduit, or duct work.

1.3 DEFINITIONS

A. Pipe Foundation: Suitable and stable native soils that are exposed at the trench subgrade after excavation to depth of bottom of the bedding as shown on the Drawings, or foundation backfill material placed and compacted in over-excavations.

B. Pipe Bedding: The portion of trench backfill that extends vertically from top of foundation up to a level line at bottom of pipe, and horizontally from one trench sidewall to opposite sidewall.

C. Haunching: The material placed on either side of pipe from top of bedding up to springline of pipe and horizontally from one trench sidewall to opposite sidewall.

D. Initial Backfill: The portion of trench backfill that extends vertically from springline of pipe (top of haunching) up to a level line 12 inches above top of pipe, and horizontally from one trench sidewall to opposite sidewall.

E. Pipe Embedment: The portion of trench backfill that consists of bedding, haunching and initial backfill.

F. Trench Zone: The portion of trench backfill that extends vertically from top of pipe embedment up to pavement subgrade or up to final grade when not beneath pavement.

G. Unsuitable Material: Unsuitable soil materials are the following:

1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.

2. Materials that cannot be compacted to required density due to either gradation, plasticity, or moisture content.

3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.

4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

H. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement are considered suitable, unless otherwise indicated.

I. Backfill: Suitable material meeting specified quality requirements, placed and compacted under controlled conditions.

J. Ground Water Control Systems: Installations external to trench, such as well points, eductors, or deep wells. Ground water control includes dewatering to lower ground water, intercepting seepage which would otherwise emerge from side or bottom of trench excavation, and depressurization to prevent failure or heaving of excavation bottom. Refer to Section 31 23 19 - Control of Ground Water and Surface Water.

K. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from trench excavation. Rain water and surface water accidentally entering trench shall be controlled and removed as a part of excavation drainage.

L. Excavation Drainage: Removal of surface and seepage water in trench by sump pumping and using a drainage layer, as defined in ASTM D 2321, placed on the foundation beneath pipe bedding or thickened bedding layer of Class I material.

M. Trench Conditions are defined with regard to the stability of trench bottom and trench walls of pipe embedment zone. Maintain trench conditions that provide for effective placement and compaction of embedment material directly on or against undisturbed soils or foundation backfill, except where structural trench support is necessary.

1. Dry Stable Trench: Stable and substantially dry trench conditions exist in pipe embedment zone as a result of typically dry soils or achieved by ground water control (dewatering or depressurization) for trenches extending below ground water level.

2. Stable Trench with Seepage: Stable trench in which ground water seepage is controlled by excavation drainage.

    a. Stable Trench with Seepage in Clayey Soils: Excavation drainage is provided in lieu of or to supplement ground water control systems to control seepage and provide stable trench subgrade in predominately clayey soils prior to bedding placement.

b. Stable Wet Trench in Sandy Soils: Excavation drainage is provided in the embedment zone in combination with ground water control in predominately sandy or silty soils.

3. Unstable Trench: Unstable trench conditions exist in the pipe embedment zone if ground water inflow or high water content causes soil disturbances, such as sloughing, sliding, boiling, heaving or loss of density.

N. Subtrench: Subtrench is a special case of benched excavation. Subtrench excavation below trench shields or shoring installations may be used to allow placement and compaction of foundation or embedment materials directly against undisturbed soils. Depth of a subtrench depends upon trench stability and safety as determined by the Contractor.

O. Trench Dam: A placement of low permeability material in pipe embedment zone or foundation to prohibit ground water flow along the trench.

P. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below top of foundation as shown on Drawings, and backfilled with foundation backfill material.

Q. Foundation Backfill Materials: Natural soil or manufactured aggregate of controlled gradation, and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill to provide stable support for bedding. Foundation backfill materials may include concrete seal slabs.

R. Trench Safety Systems include both protective systems and shoring systems as defined in Section 31 41 33 - Trench Safety Systems.

S. Trench Shield (Trench Box): A portable worker safety structure moved along the trench as work proceeds, used as a protective system and designed to withstand forces imposed on it by cave-in, thereby protecting persons within the trench. Trench shields may be stacked if so designed or placed in a series depending on depth and length of excavation to be protected.

T. Shoring System: A structure that supports sides of an excavation to maintain stable soil conditions and prevent cave-ins, or to prevent movement of the ground affecting adjacent installations or improvements.

U. Special Shoring: A shoring system meeting special shoring as specified in Paragraph 1.08, Special Shoring Design Requirements, for locations identified on the Drawings.

1.4 REFERENCES

A. ASTM C 12 - Standard Practice for Installing Vitrified Clay Pipe Lines.

B. ASTM D 558 - Test Methods for Moisture-Density Relations of Soil Cement Mixtures.

C. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (304.8-mm) Drop.

D. ASTM D 1556 - Test Method for Density in Place by the Sand-Cone Method.

E. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.

F. ASTM D 2487 - Classification of Soils for Engineering Purposes.

G. ASTM D 2922 - Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

H. ASTM D 3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

I. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

J. TxDOT Tex-101-E - Preparation of Soil and Flexible Base Materials for Testing.

K. TxDOT Tex-110-E - Determination of Particle Size Analysis of Soils.

L. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).

1.5 SCHEDULING

A. Schedule work so that pipe embedment can be completed on the same day that acceptable foundation has been achieved for each section of pipe installation, manhole, or other structures.

1.6 SUBMITTALS

A. Conform to Section 01 33 00 - Submittal Procedures.

B. Submit a written description for information only of the planned typical method of excavation, backfill placement and compaction, including:

1. Sequence of work and coordination of activities.

2. Selected trench widths.

3. Procedures for foundation and embedment placement, and compaction.

4. Procedure for use of trench boxes and other pre-manufactured systems while assuring specified compaction against undisturbed soil.

5. Procedure for installation of Special Shoring at locations identified on the Drawings.

C. Submit a ground and surface water control plan in accordance with requirements in this Section and Section 31 23 19 – Dewatering - Control of Ground Water and Surface Water.

D. Submit backfill material sources and product quality information in accordance with requirements of Section 31 06 20.16 - Utility Backfill Materials.

E. Submit a trench excavation safety program in accordance with requirements of Section 31 41 33 - Trench Safety System. Include designs for special shoring meeting the requirements defined in Paragraph 1.08, Special Shoring Design Requirements.

F. Submit record of location of utilities as installed, referenced to survey control points. Include locations of utilities encountered or rerouted. Give stations, horizontal dimensions, elevations, inverts, and gradients.

1.7 TESTS

A. Density testing of compacted subgrade material for first coarse and second coarse of compacted base shall be made at all driveways and intersecting streets. In addition, one (1) density test per lift per five hundred (500) feet of installed pipeline shall be conducted.

B. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by the Owner in accordance with requirements of Section 01 45 29 - Testing Laboratory Services and as specified in this Section.

C. Perform backfill material source qualification testing in accordance with requirements of Section 32 23 23.16 - Utility Backfill Materials.

1.8 SPECIAL SHORING DESIGN REQUIREMENTS

A. Have special shoring designed or selected by the Contractor's Professional Engineer to provide support for the sides of the excavations, including soils and hydrostatic ground water pressures as applicable, and to prevent ground movements affecting adjacent installations or improvements such as structures, pavements and utilities. Special shoring may be a pre-manufactured system selected by the Contractor’s Professional Engineer to meet the project site requirements based on the manufacturer’s standard design.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Perform excavation with hydraulic excavator or other equipment suitable for achieving the requirements of this Section.

B. Use only hand-operated tamping equipment until a minimum cover of 12 inches is obtained over pipes, conduits, and ducts. Do not use heavy compacting equipment until adequate cover is attained to prevent damage to pipes, conduits, or ducts.

C. Use trench shields or other protective systems or shoring systems which are designed and operated to achieve placement and compaction of backfill directly against undisturbed native soil.

D. Use special shoring systems where required which may consist of braced sheeting, braced soldier piles and lagging, slide rail systems, or other systems meeting requirements as specified in Paragraph 1.09, Shoring Design Requirements.

2.2 MATERIAL CLASSIFICATIONS

A. Embedment and Trench Zone Backfill Materials: Conform to classifications and product descriptions of Section 32 23 23.16 - Utility Backfill Materials.

B. Concrete Backfill: Conform to requirements for Class B concrete as specified in Section 33 05 16 - Concrete for Utility Construction.

C. Concrete for Trench Dams: Concrete backfill or 3 sack premixed (bag) concrete.

D. Timber Shoring Left in Place: Untreated oak.

PART 3 - EXECUTION

3.1 STANDARD PRACTICE

A. Install flexible pipe, including "semi-rigid" pipe, to conform to standard practice described in ASTM D 2321, and as described in this Section. Where an apparent conflict occurs between the standard practice and the requirements of this Section, this Section governs.

B. Install rigid pipe to conform to standard practice described in ASTM C 12, and as described in this Section. Where an apparent conflict occurs between the standard practice and the requirements of this Section, this Section governs.

C. Ditching machines will be permitted at Contractor's option, subject to the approval of the Owner, whenever their use is applicable and practical for work shown on the drawings. A certain amount of hand excavation may be required due to special field conditions and to minimize damage to improvements and trees.

D. In compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Any pipe damaged thereby shall be repaired or replaced at the option of the OWNER and at the expense of the Contractor.

3.2 PREPARATION

A. Establish traffic control to conform with requirements of Section 01 55 26 - Traffic Control and Regulation. Maintain barricades and warning lights for streets and intersections affected by the Work that is considered hazardous to traffic movements.

B. Perform work to conform with applicable safety standards and regulations. Employ a trench safety system as specified in Section 31 41 33 - Trench Safety Systems.

C. Immediately notify the agency or company owning any existing utility line which is damaged, broken, or disturbed. Obtain approval from the Owner and Utility Owner for any repairs or relocations, either temporary or permanent.

D. Remove existing pavements and structures, including sidewalks and driveways, to conform with requirements of Section 02 41 13.13 - Removing Existing Pavements and Structures, as applicable.

E. Install and operate necessary dewatering and surface water control measures to conform with Section 31 23 19 – Dewatering - Control of Ground Water and Surface Water.

F. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed in writing, replace those which are damaged or destroyed in accordance with Section 02 21 13 - Field Surveying.

3.3 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within the grading limits.

B. Protect and support above-grade and below-grade utilities which are to remain.

C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities are indicated on the Drawings.

D. Take measures to minimize erosion of trenches. Do not allow water to pond in trenches. Where slides, washouts, settlements, or areas with loss of density or pavement failures or potholes occur, repair, recompact, and pave those areas at no additional cost to the Owner.

3.4 EXCAVATION

A. Except as otherwise specified or shown on the Drawings, install underground utilities in open cut trenches with vertical sides.

B. Perform excavation work so that pipe, conduit, and ducts can be installed to depths and alignments shown on the Drawings. Avoid disturbing surrounding ground and existing facilities and improvements.

C. Determine trench excavation widths using the following schedule as related to pipe outside diameter (O.D.). Maximum trench width shall be the minimum trench width plus 24 inches.

Nominal Pipe Size, Inches	Minimum Trench Width, Inches

Less than 18	O.D. + 18
18 to 30	O.D. + 24
Greater than 30	O.D. + 36

D. Use sufficient trench width or benches above the embedment zone for installation of well point headers or manifolds and pumps where depth of trench makes it uneconomical or impractical to pump from the surface elevation. Provide sufficient space between shoring cross braces to permit equipment operations and handling of forms, pipe, embedment and backfill, and other materials.

E. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify the Owner and obtain instructions before proceeding.

F. Shoring of Trench Walls.

1. Install Special Shoring in advance of trench excavation or simultaneously with the trench excavation, so that the soils within the full height of the trench excavation walls will remain laterally supported at all times.

2. For all types of shoring, support trench walls in the pipe embedment zone throughout the installation. Provide trench wall supports sufficiently tight to prevent washing the trench wall soil out from behind the trench wall support.

3. Unless otherwise directed by the Owner, leave sheeting driven into or below the pipe embedment zone in place to preclude loss of support of foundation and embedment materials. Leave rangers, walers, and braces in place as long as required to support sheeting, which has been cut off, and the trench wall in the vicinity of the pipe zone.

4. Employ special methods for maintaining the integrity of embedment or foundation material. Before moving supports, place and compact embedment to sufficient depths to provide protection of pipe and stability of trench walls. As supports are moved, finish placing and compacting embedment.

5. If sheeting or other shoring is used below top of the pipe embedment zone, do not disturb pipe foundation and embedment materials by subsequent removal. Maximum thickness of removable sheeting extending into the embedment zone shall be the equivalent of a 1-inch-thick steel plate. Fill voids left on removal of supports with compacted backfill material.

G. Use of Trench Shields. When a trench shield (trench box) is used as a worker safety device, the following requirements apply:

1. Make trench excavations of sufficient width to allow shield to be lifted or pulled freely, without damage to the trench sidewalls.

2. Move trench shields so that pipe, and backfill materials, after placement and compaction, are not damaged nor disturbed, nor the degree of compaction reduced.

3. When required, place, spread, and compact pipe foundation and bedding materials beneath the shield. For backfill above bedding, lift the shield as each layer of backfill is placed and spread. Place and compact backfill materials against undisturbed trench walls and foundation.

4. Maintain trench shield in position to allow sampling and testing to be performed in a safe manner.

3.5 HANDLING EXCAVATED MATERIALS

A. Use only excavated materials which are suitable as defined in this Section and conforming with Section 32 23 23.16 - Utility Backfill Materials. Place material suitable for backfilling in stockpiles at a distance from the trench to prevent slides or cave-ins.

B. When required, provide additional backfill material conforming with requirements of Section 32 23 23.16 - Utility Backfill Materials.

C. Do not place stockpiles of excess excavated materials on streets and adjacent properties. Protect excess stockpiles for use on site. Maintain site conditions in accordance with Section 31 10 00 – Site Clearing – Preparation of Site.

3.6 GROUND WATER CONTROL

A. Implement ground water control according to Section 31 23 19 – Dewatering - Control of Ground Water and Surface Water. Provide a stable trench to allow installation in accordance with the Specifications.

3.7 TRENCH FOUNDATION

A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.

B. Place trench dams in Class I foundations in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.8 PIPE EMBEDMENT, PLACEMENT, AND COMPACTION

A. Immediately prior to placement of embedment materials, the bottoms and sidewalls of trenches shall be free of loose, sloughing, caving, or otherwise unsuitable soil.

B. Place embedment including bedding, haunching, and initial backfill as shown on Drawings.

C. For pipe installation, manually spread embedment materials around the pipe to provide uniform bearing and side support when compacted. Do not allow materials to free-fall from heights greater than 24 inches above top of pipe. Perform placement and compaction directly

against the undisturbed soils in the trench sidewalls, or against sheeting which is to remain in place.

D. Do not place trench shields or shoring within height of the embedment zone unless means to maintain the density of compacted embedment material are used. If moveable supports are used in embedment zone, lift the supports incrementally to allow placement and compaction of the material against undisturbed soil.

E. Place geotextile to prevent particle migration from the in-situ soil into open-graded (Class I) embedment materials or drainage layers.

F. Do not damage coatings or wrappings of pipes during backfilling and compacting operations. When embedding coated or wrapped pipes, do not use crushed stone or other sharp, angular aggregates.

G. Place haunching material manually around the pipe and compact it to provide uniform bearing and side support. If necessary, hold small-diameter or lightweight pipe in place during compaction of haunch areas and placement beside the pipe with sandbags or other suitable means.

H. Install electrical conduit as directed in the design plans or as specified in other Sections.

I. Shovel in-place and compact embedment material using pneumatic tampers in restricted areas, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Compact each lift before proceeding with placement of next lift. Water tamping is not allowed.

J. OPEN CUT BACKFILL - Backfilling of excavated trenches in open cut shall be commenced as soon as possible after the water or sewer line is laid and the jointing and alignment are approved, but not until authorized by the Owner.

BEDDING PROCEDURES - The following bedding procedures will be used for Polyvinyl Chloride (PVC) Pipe, Asbestos Cement Pipe and Vitrified Clay Pipe. Before pipes have been tested and approved, partial backfilling shall be done with approved material free from large clods.

When trench bottom is unstable, or when pipe is to be placed under groundwater (below water table), foundation preparation shall be required, preferably with ground water drawdown procedures. If drawdown equipment is not used or gravel stabilization or approved substitute shall be required and no pipe will be laid until stabilization is to the satisfaction of the Utility Owner.

Sand bedding shall meet Bank Run Sand as per Section 31 06 20.16 – Utility Backfill Materials.

Sand Bedding zone shall extend from a point at least 6 inches below bottom of pipe to a point at least 6 inches above top of pipe, as well as at least 6 inches on each side of pipe and shall be compacted to at least 90% of maximum density as determined by ASTM Standard D698, latest revision.

Sand bedding from 6 inches below bottom of pipe to bottom of pipe shall be placed in one lift and shall be mechanically tamped. Sand bedding from bottom of pipe to spring line of pipe shall be placed by hand in 4 inch lifts and shall be hand tamped with proper tools. Sand bedding from spring line of pipe to 6 inches above top of pipe shall be placed in 6 inch lifts and shall be hand tamped with proper tools.

Final Backfill Above Pipe Zone (6" Above Pipe or Conduit to base of roadway section or finished grade elevation). The backfill above the pipe zone shall be, unless otherwise indicated on the drawings, in accordance with the following.

1. Class "A" Mechanical Compaction. Trench under existing or proposed flexible pavements and gravel surfaces - place Type "D" (as per design plans) sand backfill material in layers not to exceed six (6) inches compacted measurement. Compact with mechanical tampers to a dry density of at least 95% of maximum density as determined by ASTM Standard D698, latest revision. Each layer, before compaction, shall be leveled and evenly distributed on both sides of the pipe so as not to disturb, displace or damage the water or sewer line in any way. When the material does not contain sufficient moisture to obtain thorough compaction, it shall be moistened or wetted as directed by the Utility Owner.

2. Class "B" Mechanical Compaction. Trench under unimproved roadways, unsurfaced road shoulders, unimproved driveways and under turfed or seeded lawn areas - place Type "E" (as per design plans) excavated material in backfill layers not to exceed twelve (12) inches loose measurement. Compact with mechanical tampers to at least 90% of maximum density as determined by ASTM Standard D698, latest revision. Each layer, before compaction, shall be leveled and evenly distributed on both sides of the pipe so as not to disturb, displace or damage the water or sewer line in any way. When the material does not contain sufficient moisture to obtain thorough compaction, it shall be moistened or wetted as directed by the Utility Owner.

K. SPECIAL BACKFILL CONDITIONS - The trenches need not be completely backfilled until all required pressure and leakage tests are performed and until the utilities system as installed conform to the requirements specified.

Trenches improperly backfilled shall be reopened to the depth required for proper compaction, and refilled and compacted as specified, or the condition shall be otherwise corrected as permitted by the Owner. The surface shall be restored to its original condition as nearly as practicable and as hereinafter specified. Immediately after the pipe, or utility lines, is bedded and joined, as indicated on the drawings or specified, the backfill material shall be deposited within the pipe zone in uniform layers not to exceed six (6) inches and at the proper moisture content. The layers shall be compacted with mechanical hand tampers or other approved equipment to the density herein specified. The backfill shall rise the same on each side of the pipe and coincidentally be tamped in layers until there is a cover of 12 inches over the top of the pipe. Walking or working over the pipe will not be permitted until the trench is backfilled to 12 inches above the pipe.

Where pavement on a State Highway or other system roadway is cut, final backfill material and pavement shall be replaced in accordance with Texas Department of Transportation

requirements.

Where pavement is cut in locations other than State Highways, whether gravel topping or hard surfaced, the surfacing shall be restored to its original finish and in equal condition and quantities as found at the beginning of construction. Trenches on hard surfaced roads and State Highways shall be backfilled to a density of 95% as determined by the American Association of State Highway Officials Method T99 for compaction and density of soils.

Successful Contractor shall determine all requirements of various controlling agencies in connection with backfilling, pavement replacement and general construction before starting construction.

In traffic areas including individual driveways, Contractor shall restore traffic surfaces to usable condition immediately upon completion of pipe installation. In such locations, Owner will rely upon hydrostatic test to determine acceptability of construction. All excess dirt from all construction work shall be disposed of promptly by Contractor, either by hauling or at directions of Owner.

L. Place trench dams in Class I embedments in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.9 TRENCH ZONE BACKFILL PLACEMENT AND COMPACTION

A. Place backfill for pipe or conduits and restore surface as soon as practicable. Leave only the minimum length of trench open as necessary for construction.

B. Where damage to completed pipe installation work is likely to result from withdrawal of sheeting, leave the sheeting in place. Cut off sheeting 1.5 feet or more above the crown of the pipe. Remove trench supports within 5 feet from the ground surface.

C. For water and sewer lines, backfill in trench zone, including auger pits, as per the design plans and section 3.8.J.

D. When shown on Drawings, a random backfill of suitable material may be used in trench zone for trench excavations outside pavements.

E. Backfill materials shall be placed in uniform layers and compacted to percentage of density hereinafter specified. Moisture shall be controlled between optimum and 2 percentage points over. Methods to secure optimum moisture content shall be Contractor's responsibility. Compacting equipment and method of compaction shall be the responsibility of Contractor and shall be such that uniform density will be obtained over entire area and depth of material being compacted. Fill material shall be thoroughly broken up before being spread into uniform layers.

Backfill not otherwise specified shall be compacted to at least 95% of maximum density as determined by ASTM Specification D698.

F. For trench excavations outside pavements, a random backfill of suitable material may be used in the trench zone.

1. Fat clays (CH) may be used as trench zone backfill outside paved areas at the Contractor's option. If the required density is not achieved, the Contractor, at his option and at no additional cost to the Owner, may use lime stabilization to achieve compaction requirements or use a different suitable material.

2. Maximum 9-inch compacted lift thickness for clayey soils and maximum 12-inch lift thickness for granular soils.

3. Compact to a minimum of 90 percent of the maximum dry density determined according to ASTM D 698.

4. Moisture content as necessary to achieve density.

G. For electric conduits, remove formwork used for construction of conduits before placing trench zone backfill.

3.10 MANHOLES, JUNCTION BOXES, AND OTHER PIPELINE STRUCTURES

A. Meet the requirements of adjoining utility installations for backfill of pipeline structures, as shown on the Drawings.

3.11 FIELD QUALITY CONTROL

A. Test for material source qualifications as defined in Section 31 06 20.16 - Utility Backfill Materials.

B. Provide excavation and trench safety systems at locations and to depths required for testing and retesting during construction at no additional cost to Owner.

C. Tests will be performed on a minimum of three different samples of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is a noticeable change in material gradation or plasticity.

D. At least three tests for moisture-density relationships will be performed initially for backfill materials in accordance with ASTM D 698, and for cement- stabilized sand in accordance with ASTM D 558. Additional moisture-density relationship tests will be performed whenever there is a noticeable change in material gradation or plasticity.

E. In-place density tests of compacted pipe foundation, embedment and trench zone backfill soil materials will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at the following frequencies and conditions.

1. A minimum of one test for every 20 cubic yards of compacted embedment and for every 50 cubic yards of compacted trench zone backfill material.

2. A minimum of three density tests for each full shift of Work.

3. Density tests will be distributed among the placement areas. Placement areas are: foundation, bedding, haunching, initial backfill and trench zone.

4. The number of tests will be increased if inspection determines that soil type or moisture content are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density, as specified.

5. Density tests may be performed at various depths below the fill surface by pit excavation. Material in previously placed lifts may therefore be subject to acceptance/rejection.

6. Two verification tests will be performed adjacent to in-place tests showing density less than the acceptance criteria. Placement will be rejected unless both verification tests show acceptable results.

7. Recompacted placement will be retested at the same frequency as the first test series, including verification tests.

F. Recondition, recompact, and retest at Contractor's expense if tests indicate Work does not meet specified compaction requirements. For hardened soil cement with nonconforming density, core and test for compressive strength at Contractor's expense.

G. Acceptability of crushed rock compaction will be determined by inspection.

H. Determination of density of backfill, shall be made in conformance with the requirements of ASTM D2922, ASTM D1556 or ASTM D2167.

I. Determination of density of cohesionless material shall be made in accordance with ASTM D2049. Relative density of 75% shall be considered as satisfactory for cohesionless material.

J. Testing shall be performed by a soil consultant employed by the Owner and at no expense to the Contractor to test compaction of backfill material. When soil tests indicate densities less than those specified by this section, the material shall be recompacted and tested at the Contractor's expense.

3.12 DISPOSAL OF EXCESS MATERIAL

A. Dispose of excess materials in accordance with all applicable local and state regulations and as required in the contract documents.

B. The Contractor shall restore or replace all removed or damaged paving, curbing sidewalks, gutters, shrubbery, fences, sod, or other disturbed surfaces of structures in a condition equal to that before the work began and to the satisfaction of the Owner and shall furnish all labor and material incidental thereto, in restoring improved surfaces, new pavement shall be laid. No permanent surface shall be placed within 30 days after the backfilling has been completed, except by order of the Owner.

C. Surplus pipeline material, tools and temporary structures shall be removed by the Contractor. All dirt, rubbish, and excess earth from excavations shall be hauled to a dump provided by the Contractor, and the construction site shall be left clean, to the satisfaction of the Owner.

END OF SECTION

SECTION 312500

EROSION & SEDIMENTATION CONTROLS – TPDES REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section describes the required documentation to be prepared and signed by the Contractor before conducting construction operations, in accordance with the terms and conditions of the General Permit Number TXR150000 for discharges of storm water runoff from small construction sites.

B. The Contractor shall be responsible for implementing the Storm Water Pollution Prevention Plan prepared for this project.

C. Contractor shall review implementation of the Storm Water Pollution Prevention Plan (SWPPP) in a meeting with the Owner and Engineer prior to start of construction.

1.2 UNIT PRICES

A. Unless prescribed elsewhere in the Contract Documents, payment for this item shall be made on a lump sum basis, and shall cover the preparation and submittal of all required forms, payment of permit fees (if any), cost of implementation and maintenance of the storm water control measures as required throughout the project.

1.3 REFERENCES

A. Part II.E.2.of TCEQ General Permit Number TXR150000.

B. Part II.F.3 of TCEQ General Permit Number TXR150000 (notification of MS4 operator)

PART 2 - PRODUCTS - As required by Storm Water Pollution Prevention Plan.

PART 3 - EXECUTION

3.1 NOTICE OF ITENT

A. The Contractor shall complete and sign a Notice of Intent (NOI) as “Operator” and submit it along with all required fees to TCEQ, the Owner, Engineer, City of South Padre Island, and Laguna Madre Water District.

B. A copy of the TCEQ’s TPDES storm water general construction permit TXR150000 acknowledgement certificate shall be submitted to Owner, Engineer, City of South Padre Island, and Laguna Madre Water District and shall be posted at the construction site, as specified.

3.2 STORM WATER POLLUTION PREVENTION PLAN

A. Contractor shall be responsible for implementation, maintenance, and inspection of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other practices shown on the Storm Water Pollution Prevention Plan, or as specified by TCEQ or elsewhere in this or other Specifications.

3.3 RETENTION OF RECORDS

A. The Contractor shall keep a copy of the Storm Water Pollution Prevention Plan at the construction site or at the Contractor's office from the date that it became effective to the date of project completion.

B. At project closeout, the Contractor shall submit to TCEQ a Notice of Termination (NOT) form, along with all applicable fees. Copy of SWPPP and certificate or letter of acknowledgement from TCEQ, and all storm water pollution prevention records and data will be turned over and retained by Owner for a period of 3 years from the date of project completion.

3.4 REQUIRED NOTICES

A. The following notices shall be posted from the date that this SWPPP goes into effect until the date of final site stabilization:

1. TCEQ’s TPDES storm water general construction permit TXR150000 acknowledgement certificate.

2. Notice to drivers of equipment and vehicles, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post such notices at every stabilized construction exit area.

3. In an easily visible location on site, post a notice of waste disposal procedures.

4. If applicable, notice of hazardous material handling and emergency procedures shall be posted on site. Keep copies of Material Safety Data Sheets at a location on site that is known to all personnel.

5. Keep a copy of each signed certification at the construction site or at Contractor’s office.

END OF SECTION

SECTION 314133

TRENCH SAFETY SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Trench safety system for the construction of trench excavations.

B. Trench safety system for structural excavations which fall under provisions of State and Federal trench safety laws.

1.2 UNIT PRICES

A. Payment for this item shall be made on a lump sum basis and shall cover an approved trench safety system plan prepared and sealed by a Texas licensed professional engineer and as per OSHA 29CFR. Costs associated with any changes or revisions to the Contractor's Trench Safety Plan shall be borne on by the Contractor.

B. Payment for trench safety systems used on trench excavations of greater than 5-foot depth is on a linear foot basis measured along the centerline of the trench.

1.3 DEFINITIONS

A. A trench shall be defined as a narrow excavation (in relation to its depth) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.

B. The trench safety system requirements will apply to larger open excavations if the erection of structures or other installations limits the space between the excavation slope and these installation to dimensions equivalent of a trench as defined.

C. Trench Safety Systems include but are not limited to sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering or diversion of water to provide adequate drainage.

1.4 SUBMITTALS

A. Submittals shall conform to requirements of Section 01 33 00 - Submittal Procedures.

B. Submit a safety program specifically for the construction of trench excavation. Design the trench safety program to be in accordance with OSHA 29CFR standards governing the presence and activities of individuals working in and around trench excavations.

C. Construction and shop drawings containing deviations from OSHA standards or special designs shall be sealed by a licensed Engineer retained and paid by the Contractor.

D. Review of the safety program by the Owner or Engineer will only be regarding compliance with this specification and will not constitute approval by the Owner or Engineer nor relieve Contractor of obligations under State and Federal trench safety laws.

1.5 REGULATORY REQUIREMENTS

A. Install and maintain trench safety systems in accordance with the detail specifications set out in the provision of Excavations, Trenching, and Shoring, Federal Occupation Safety and Health Administration (OSHA) Standards, 29CFR, Part 1926, Subpart P, as amended, including Final Rule, published in the Federal Register Vol. 54, No. 209 on Tuesday, October 31, 1989. The sections that are incorporated into these specifications by reference include Sections 1926-650 through 1926-652.

B. A reproduction of the OSHA standards included in "Subpart P - Excavations" from the Federal Register Vol. 54, No. 209 in which the Contractor is responsible for obtaining a copy of this section of the Federal Register.

C. Legislation that has been enacted by the Texas Legislature regarding Trench Safety Systems, is hereby incorporated, by reference, into these specifications. Refer to Texas Health and Safety Code Ann., §756.021 (Vernon 1991).

1.6 INDEMNIFICATION

A. Contractor shall indemnify and hold harmless the Owner, Engineer and their employees and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgements or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches constructed under this Contract.

B. Contractor acknowledges and agrees that this indemnity provision provides indemnity for the Owner and Engineer in case the Owner or Engineer are negligent either by act or omission in providing for trench safety, including, but not limited to safety program and design reviews, inspections, failures to issue stop work orders, and the hiring of the Contractor.

PART 2 - PRODUCTS – [NOT USED]

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and maintain trench safety systems in accordance with provisions of OSHA 29CFR.

B. Install specially designed trench safety systems in accordance with the Contractor's trench excavation safety program for the locations and conditions identified in the program.

C. A competent person, as identified in the Contractor's Trench Safety Program, shall verify that trench boxes and other pre-manufactured systems are certified for the actual installation conditions.

3.2 INSPECTION

A. Contractor, or Contractor's independently retained consultant, shall make daily inspections of the trench safety systems to ensure that the installed systems and operations meet OSHA 29CFR and other personnel protection regulations requirements.

B. If evidence of possible cave-ins or slides is apparent, Contractor shall immediately stop work in the trench and move personnel to safe locations until the necessary precautions have been taken by Contractor to safeguard personnel entering the trench.

C. Maintain a permanent record of daily inspections.

3.3 FIELD QUALITY CONTROL

A. Contractor shall verify specific applicability of the selected or specially designed trench safety systems to each field condition encountered on the project.

END OF SECTION

SECTION 316219

TIMBER PILES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes round timber piles.

B. Related Sections:
   1. Division 06 Section “Rough Carpentry” for dimension lumber framing and for bracing.
   2. Division 06 Section “Heavy Timber Construction” for timber framing and for bracing.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For timber piles. Show fabrication and installation details for piles, including details of driving shoes, tips or boots, and pile butt protection.

C. Qualification Data: For qualified Installer.

D. Round timber pile treatment data as follows, including chemical treatment manufacturer’s written instructions for handling, storing, installing, and finishing treated material:
   1. For each type of preservative-treated timber product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
   2. For waterborne-treated products include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.

E. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.

F. Pile-Driving Records: Submit within three days of driving each pile.

G. Field quality-control reports.

H. Warranty of chemical treatment manufacturer for each type of treatment.

I. Preconstruction Photographs: Photographs or video of existing conditions of adjacent construction. Submit before the Work begins.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.
   1. Installer’s responsibility includes engaging a qualified professional engineer to prepare pile-driving records.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Preinstallation Conference: Conduct conference at Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver piles to Project site in such quantities and at such times to ensure continuity of installation. Handle and store piles at Project site to prevent breaks, cuts, abrasions, or other physical damage and as required by AWPA M4.
   1. Do not drill holes or drive spikes or nails into pile below cutoff elevation.

1.5 PROJECT CONDITIONS

A. Protect structures, underground utilities, and other construction from damage caused by pile driving.

B. Site Information: A geotechnical report has been prepared for this Project and is included in the Project Manual for information only.

C. Preconstruction Photographs: Inventory and record the condition of adjacent structures, underground utilities, and other construction. Provide photographs and/or video of conditions that might be misconstrued as damage caused by pile driving. Comply with Division 01 Section "Photographic Documentation."

PART 2 PRODUCTS

2.1 TIMBER PILES

A. Round Timber Piles: ASTM D 25, unused, clean peeled, one piece from butt to tip; of the following species and size basis:
   1. Species: Southern yellow pine
   2. Size Basis: Class B

B. Pressure-treat round timber piles according to AWPA C3 and AWPA C18 as follows:
   1. Service Condition: Marine piles - dual treatment

2.2 FABRICATION

A. Pile Butt: Trim pile butt and cut perpendicular to longitudinal axis of pile. Chamfer and shape butt to fit tightly to driving cap of hammer.

B. Field-Applied Wood Preservative: Treat field cuts, holes, and other penetrations according to AWPA M4.
   1. Coal-tar roofing cement for treating drilled holes or sealing cutoffs shall be free of asbestos.

C. Pile Splices: Splices will not be permitted.

D. Pile-Length Markings: Mark each pile with horizontal lines at 12-inch intervals; label the distance from pile tip at 60-inch intervals. Maintain markings on piles until driven.

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Conditions: Do not start pile-driving operations until earthwork fills have been completed or excavations have reached an elevation of 6 to 12 inches above bottom of footing or pile cap.

3.2 DRIVING EQUIPMENT

A. Pile Hammer: Air-, steam-, hydraulic-, or diesel-powered type capable of consistently delivering adequate peak-force duration and magnitude to develop the ultimate capacity required for type and size of pile driven and character of subsurface material anticipated.

B. Hammer Cushions and Driving Caps: Between hammer and top of pile, provide hammer cushion and steel driving cap as recommended by hammer manufacturer and as required to drive pile without damage.

C. Leads: Use fixed, semifixed, or hanging-type pile-driver leads that will hold full length of pile firmly in position and in axial alignment with hammer.

3.3 DRIVING PILES

A. General: Continuously drive piles to elevations or penetration resistance indicated. Establish and maintain axial alignment of leads and piles before and during driving.

B. Spudding: Drive spud piles through overlying highly resistant strata or obstructions and withdraw for reuse.

C. Predrilling: Provide pre-excavated holes where indicated, to depths indicated. Drill holes with a diameter less than the largest cross-section dimension of pile.
   1. Firmly seat pile in predrilled hole by driving with reduced energy before starting final driving.

D. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.

E. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:
   1. Location: 4 inches from location indicated after initial driving, and 6 inches after pile driving is completed.
   2. Plumb: Maintain 1 inch in 4 feet from vertical, or a maximum of 4 inches, measured when pile is aboveground in leads.

F. Abandon and cut off rejected piles as directed by Engineer. Leave rejected piles in place and install new piles in locations as directed by Engineer.

G. Cutting Off: Cut off butts of driven piles square with pile axis and at elevations indicated.
   1. Cover cut-off piling surfaces with minimum three coats of preservative treatment according to AWPA M4.

H. Pile-Driving Records: Maintain accurate driving records for each pile, compiled and attested to by a qualified professional engineer. Include the following data:
   1. Project name and number.
   2. Name of Contractor.
   3. Pile species.
   4. Pile location in pile group and designation of pile group.
   5. Sequence of driving in pile group.
   6. Pile dimensions.
   7. Ground elevation.
   8. Elevation of tips after driving.
   9. Final tip and cutoff elevations of piles after driving pile group.
   10. Records of redriving.
   11. Elevation of splices.
   12. Type, make, model, and rated energy of hammer.
   13. Weight and stroke of hammer.
   14. Type of pile-driving cap used.
   15. Cushion material and thickness.
   16. Actual stroke and blow rate of hammer.
   17. Pile-driving start and finish times, and total driving time.
   18. Time, pile-tip elevation, and reason for interruptions.
   19. Number of blows for every 12 inches of penetration, and number of blows per 1 inch for the last 6 inches of driving.
   20. Pile deviations from location and plumb.
   21. Preboring, jetting, or special procedures used.
   22. Unusual occurrences during pile driving.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Pile foundations.
   2. Pile driving operations.

B. Testing Agency: Owner will engage a qualified independent testing agency to perform tests and inspections.

C. Tests and Inspections:
   1. Dynamic Pile Testing: High-strain dynamic monitoring shall be performed and reported according to ASTM D 4945 during initial driving and during restriking on piles.

3.5 DISPOSAL

A. Remove withdrawn piles and cutoff sections of piles from site and legally dispose of them off Owner's property.

END OF SECTION

SECTION 316329

DRILLED PIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Dry-installed straight shaft drilled piers with casings.

B. Related Sections include the following:

1. Division 3 – Section 033000 "Cast-In-Place Concrete" for general structural and building applications of concrete.

1.3 BASIS OF BIDS

A. Base bids on indicated number of drilled piers; design length from top elevation to bottom of shaft, and diameter of shaft.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings Provide Electronic PDF's: For concrete reinforcement detailing fabricating, bending, and placing.

C. Design Mixes: For each class of concrete. Include revised mix proportions when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Laboratory Test Reports: For evaluation of concrete materials and mix design.

D. Welding certificates.

E. Qualification Data: For Drilled Pier Subcontractor and testing agency.

F. Record drawings at Project closeout according to Division 1 Section "Closeout Procedures."

1.5 QUALITY ASSURANCE

A. Drilled-Pier Standard: Comply with provisions in ACI 336.1, "Reference Specifications for the Construction of Drilled Piers," unless modified in this Section.

B. Survey Work: Engage a qualified land surveyor or professional engineer to perform surveys, layouts, and measurements for drilled piers. Before excavating, lay out each drilled pier to lines and levels required. Record actual measurements of each drilled pier's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.

1. Record and maintain information pertinent to each drilled pier and cooperate with Owner's testing and inspecting agency to provide data for required reports.

C. Welding Standards: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.4, "Structural Welding Code--Reinforcing Steel."

D. Trial Drilled Pier: Construct trial drilled pier of diameter and depth and at location indicated or, if not indicated, of same diameter and depth as drilled piers located at least three diameters clear of permanent drilled piers, to demonstrate Installer's construction methods, equipment, standards of workmanship, and tolerances.

1. Excavate shaft, install reinforcement, fill with concrete, and terminate trial drilled pier 30 inches below subgrade and leave in place.
2. Install and remove temporary casings, as required.
3. If Architect or Geotechnical Engineer determine that trial drilled pier does not comply with requirements, excavate for and cast another until it is accepted.

E. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Locate existing underground utilities before excavating drilled piers. If utilities are to remain in place, provide protection from damage during drilled-pier operations.

1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, adapt drilling procedure if necessary to prevent damage to utilities. Cooperate with Owner and utility companies in keeping services and facilities in operation without interruption. Repair damaged utilities to satisfaction of utility owner.

B. Site Information: A geotechnical report has been prepared for this Project and is included elsewhere in the Project Manual for information only.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain. Cut bars true to length with ends square and free of burrs.

2.2 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II.

1. Fly Ash Admixture: ASTM C 618, Class C.

B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, 1-inch maximum aggregate size.

C. Water: Potable, complying with ASTM C 94/C 94M requirements.

D. Admixtures: Certified by manufacturer to contain not more than 0.06 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
3. High-Range, Water-Reducing Admixture: ASTM C 494, Type G.
4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Sand-Cement Grout: Portland cement, ASTM C 150, Type II; clean, natural sand, ASTM C 404; and water to result in grout with a minimum 28-day compressive strength of 1000 psi (6.9 MPa), of consistency required for application.

2.3 STEEL CASINGS

A. Steel Pipe Casings: ASTM A 283/A 283M, Grade C; or ASTM A 36/A 36M, carbon-steel plate, with joints full-penetration welded according to AWS D1.1.

2.4 CONCRETE MIX

A. Prepare design mixes according to ACI 211.1 and ACI 301 for each type and strength of concrete determined by either laboratory trial mix or field test data bases.

1. Use a qualified testing agency for preparing and reporting proposed mix designs for laboratory trial mix basis.

B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): **4,000 psi**
2. Minimum Slump: Capable of maintaining the following slump until completion of placement:
   a. 7 inches (+/- 1 inch).

3. Do not air entrain concrete for drilled piers.

C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 limits as if concrete were exposed to deicing chemicals.

D. Concrete-mix design adjustments may be considered if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant. Resubmit and obtain approval of proposed changes to concrete-mix proportions.

2.5 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. Do not add water to concrete mix after mixing.
2. Maintain concrete temperature to not exceed 90 deg F (32 deg C).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by drilled-pier operations.

3.2 EXCAVATION

A. Unclassified Excavation: Excavation is unclassified and includes excavation to bearing elevations regardless of character of materials or obstructions encountered.

1. Obstructions: Unclassified excavation includes removal of unanticipated boulders, concrete, masonry, or other subsurface obstructions.
2. Obstructions: Removal of unanticipated boulders, concrete, masonry, or other unforeseen obstructions that cannot be removed by conventional augers fitted with soil or rock teeth, drilling buckets of size, power, torque, and downthrust necessary for the Work, will be paid according to Contract provisions for changes in the Work.

B. Classified Excavation: Excavation is classified as standard excavation, special excavation, and obstruction removal and includes excavation to bearing elevations, as follows:

1. Standard excavation includes excavation accomplished with conventional augers fitted with soil or rock teeth, drilling buckets of size, power, torque, and downthrust necessary for the Work.
2. Special excavation includes excavation that requires special equipment or procedures above or below indicated depth of drilled piers where drilled-pier excavation equipment used in standard excavation, operating at maximum power, torque, and downthrust, cannot advance the shaft.

    a. Special excavation requires use of special rock augers, core barrels, air tools, blasting, or other methods of hand excavation.
    b. Earth seams, rock fragments, and voids included in rock excavation area will be considered rock for full volume of shaft from initial contact with rock.

3. Obstructions: Removal of unanticipated boulders, concrete, masonry, or other unforeseen obstructions that cannot be removed by conventional augers fitted with soil or rock teeth, drilling buckets of size, power, torque, and downthrust necessary for the Work, will be paid according to Contract provisions for changes in the Work.

C. Prevent surface water from entering excavated shafts. Conduct water to site drainage facilities.

D. Excavate shafts for drilled piers to indicated elevations. Remove loose material from bottom of excavation.

1. Excavate bottom of drilled piers to level plane within 1:12 tolerance.
2. Remove water from excavated shafts before concreting.
3. Excavate rock sockets of dimensions indicated.
4. Cut series of grooves about perimeter of shaft to height from bottom of shaft, vertical spacing, and dimensions indicated.

E. Notify and allow Owner's testing and inspecting agency to test and inspect bottom of excavation. If unsuitable bearing stratum is encountered, make adjustments to drilled piers as determined by Architect.

1. Do not excavate shafts deeper than elevations indicated, unless approved by Architect.
2. Additional authorized excavation will be paid according to Contract provisions for changes in the Work.

F. Excavate shafts for closely spaced drilled piers and those occurring in fragile or sand strata, only after adjacent drilled piers are filled with concrete and allowed to set.

G. Temporary Casings: Provide watertight steel casings of sufficient length and thickness to prevent water seepage into shaft; to withstand compressive, displacement, and withdrawal stresses; and to maintain stability of shaft walls.

1. Remove temporary casings, maintained in plumb position, during concrete placement and before initial set of concrete.

H. Tolerances: Construct drilled piers to remain within ACI 336.1 tolerances.

1. If location or out-of-plumb tolerances are exceeded, provide corrective construction. Submit design and construction proposals to Architect for review before proceeding.

I. Inspection: Each drilled pier must be inspected and tested by Owner's testing and inspecting agency before placing concrete.

1. Provide and maintain facilities with equipment required for testing and inspecting excavations. Cooperate with testing and inspecting personnel to expedite the Work.
2. Notify Architect and testing agency at least 24 hours before excavations are ready for tests and inspections.

3.3 STEEL REINFORCEMENT

A. Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy bond with concrete.

C. Fabricate and install reinforcing cages symmetrically about axis of shafts in a single unit.

D. Accurately position, support, and secure reinforcement against displacement during concreting. Maintain minimum cover to reinforcement.

E. Use templates to set anchor bolts, leveling plates, and other accessories furnished in work of other Sections. Provide blocking and holding devices to maintain required position during final concrete placement.

F. Protect exposed ends of extended reinforcement, dowels, or anchor bolts from mechanical damage and exposure to weather.

3.4 CONCRETE PLACEMENT

A. Place concrete in continuous operation and without segregation immediately after inspection and approval of shaft by Owner's independent testing and inspecting agency.

1. Construct a construction joint if concrete placement is delayed more than one hour. Level top surface of concrete. Before placing remainder of concrete, clean surface laitance, roughen, and slush concrete with commercial bonding agent or with sand- cement grout mixed at ratio of 1:1.

B. Dry Method: Place concrete to fall vertically down the center of drilled pier without striking sides of shaft or steel reinforcement.

1. Where concrete cannot be directed down shaft without striking reinforcing, place concrete with chutes, tremies, or pumps.
2. Vibrate top 60 inches of concrete.

C. Coordinate withdrawal of temporary casings with concrete placement to maintain at least a 60-inch head of concrete above bottom of casing.

1. Vibrate top 60 inches of concrete after withdrawal of temporary casing.

D. Screed concrete at cutoff elevation level and apply scoured, rough finish. Where cutoff elevation is above the ground elevation, form top section above grade and extend shaft to required elevation.

E. Protect concrete work, according to ACI 301, from hot and cold temperatures that could cause physical damage or reduced strength.
1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
2. Do not use calcium chloride, salt, or other mineral-containing antifreeze agents or chemical accelerators.

F. When hot-weather conditions exist that would seriously impair quality and strength of concrete, place concrete according to ACI 301 to maintain delivered temperature of concrete at no greater than 90 deg F (32 deg C).

1. Place concrete immediately on delivery. Keep exposed concrete surfaces and formed shaft extensions moist by fog sprays, wet burlap, or other effective means for a minimum of seven days.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit reports during excavation and concrete placement for drilled piers.

B. A drilled-pier report will be prepared by Owner's testing and inspecting agency for each drilled pier as follows:

1. Actual top and bottom elevations.
2. Top of rock elevation.
3. Description of soil materials.
4. Description, location, and dimensions of obstructions.
5. Final top centerline location and deviations from requirements.
6. Variation of shaft from plumb.
7. Shaft excavating method.
8. Design and tested bearing capacity of bottom.
9. Depth of rock socket.
10. Levelness of bottom and adequacy of cleanout.
11. Ground-water conditions and water-infiltration rate, depth, and pumping.
12. Description, diameter, and top and bottom elevations of temporary or permanent casings.
13. Description of soil or water movement, sidewall stability, loss of ground, and means of control.
14. Shaft dimensions and variations from original design.
15. Date and time of starting and completing excavation.
16. Inspection report.
17. Position of reinforcing steel.
18. Concrete placing method, including elevation of consolidation and delays.
19. Elevation of concrete during removal of casings.
20. Locations of construction joints.
21. Remarks, unusual conditions encountered, and deviations from requirements.
22. Concrete testing results.

C. Soil Testing: Bottom elevations, bearing capacities, and lengths of drilled piers indicated have been estimated from available soil data. Actual elevations and drilled-pier lengths and bearing capacities will be determined by Owner's testing and inspecting agency. Final evaluations and approval of data will be determined by Architect.

1. Bearing Stratum Tests: Owner's testing agency will take undisturbed core samples from drilled-pier bottoms; test each sample for compression, moisture content, and density; and report results and evaluations.

D. Concrete: Sampling and testing of concrete for quality control may include the following:

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94/C 94M.

a. Slump: ASTM C 143/C 143M; one test at point of placement for each compressive-strength test, but no fewer than one test for each concrete load.
b. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
c. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Mold and store cylinders for laboratory-cured test specimens, unless field-cured test specimens are required.
d. Compressive-Strength Tests: ASTM C 39; one set for each drilled pier, but not more than one set for each truck load. One specimen will be tested at 7 days, 2 specimens will be tested at 28 days, and one specimen will be retained in reserve for later testing if required.

2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, testing will be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
3. When strength of field-cured cylinders is less than 85 percent of companion laboratory- cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.
4. Strength level of concrete will be considered satisfactory if averages of sets of 3 consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi (3.45 MPa).
5. Test results will be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests will contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, concrete type and class, location of concrete batch in drilled pier, design compressive strength at 28 days, concrete-mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
6. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as sole basis for acceptance or rejection.
7. Additional Tests: Testing and inspecting agency will make additional tests of concrete when test results indicate concrete strengths or other requirements have not been met.

a. Continuous coring of drilled piers may be required, at Contractor's expense, when temporary casings have not been withdrawn within specified time limits or where observations of placement operations indicate deficient concrete quality, presence of voids, segregation, or other possible defects.

3.6 DISPOSAL OF MATERIALS

A. Remove surplus excavated material and concrete and legally dispose of it off Owner's property.

END OF SECTION

SECTION 321123

FLEXIBLE BASE - CRUSHED LIMESTONE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This item shall govern the materials, placement compaction of Crushed Limestone Base to the lines and grades that are shown on the construction drawings. Crushed Limestone Base thickness for various pavement types are shown on the plans.

1.2 UNIT PRICES

A. Unit Prices

1. Payment for crushed limestone flexible base is on a square yard basis at the thickness shown in the design plans.

1.3 MATERIAL

A. The flexible base shall be Type A Grade 1 in accordance with the most recent version of the Texas Department of Transportation “Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges”, Item 247 and meeting in the following requirements:

B. Triaxial Class 1: Min. compressive strength, 45 at 0 psi lateral pressure and 175 at 15 psi lateral pressure.

RETAINED ON SQUARE SIEVE NUMBER	PERCENT RETAINED
1-3/4" (44 mm)	0
7/8" (22.23 mm)	10-35
3/8" (9.5 mm)	30-50
NUMBER 4 (4.75 mm)	45-65
NUMBER 40 (0.425mm)	70-85

C. Material passing the Number 40 Sieve shall be known as "Binder Materials" and shall meet the following requirements:

Maximum Liquid Limits (L.L)	=	35
Maximum Plasticity Index (P.I.)	=	10
Wet Ball Mill (max)	=	40
California Bearing Ratio (min.)	=	100

D. All aggregate retained on the Number 10 Sieve shall be comprised of only crushed limestone.

E. The Contractor shall not place crushed limestone on the road bed until the Engineer has accepted the shaped and compacted subgrade.

F. The Contractor must maintain the roadbed free of holes, ruts and depressions and in condition to receive the crushed limestone.

G. The Contractor upon request shall provide certification that the material supplied meets the above requirements prior to delivery to the job site. Samples for testing of the material must be taken prior to the compaction operations.

1.4 CONSTRUCTION METHODS

A. The flexible base material shall be placed on the approved subgrade in courses not to exceed six
(6) inches compacted depth. It shall be the responsibility of the contractor that the required amount of material be delivered and uniformly spread and shaped. All material has been cut into the windrows, it shall be sprinkled, spread, shaped, and rolled in proper sequence to prevent segregation and as necessary for required compaction.

B. The surface on completion shall be smooth and in conformity with typical sections and to the established lines and grades. Any deviation in excess of 1/4 inch in cross-section and in length of 16 feet measured longitudinally shall be corrected.

C. Flexible base shall be compacted to an apparent dry density of not less than 98 percent of the maximum dry density as determined in accordance with ASTM Test method D698 (Standard Proctor). Tests for density will be made within 24 hours after compaction operations are completed. If the material fails to meet the density specified, it shall be reworked as necessary to meet the density required. Prior to placing any succeeding course of flexible base or surfacing on a previously completed course the density and moisture of the top three (3) inches of flexible base shall be checked and if the tests show the density to be more than 2 percent below the specified compaction and moisture content, it shall be reworked as necessary the density and moisture required.

D. The first density and depth test at a specific location will be made by commercial testing laboratory, in accordance with 01 45 29, designated by the Owner and said tests shall be paid for the Owner. If the test fails, all other tests at the location shall be paid for by the Contractor, by deducting from the final payment.

END OF SECTION

SECTION 321313

CONCRETE PAVEMENT AND FLAT WORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. This specification covers the requirements for concrete pavement, valley gutters, sidewalks, driveways, curbs and gutters, and handicap ramps. Concrete shall be composed of portland cement concrete and shall be placed in accordance with the lines and grades established by the Engineer and in conformance with the details shown on the plans.

1.2 UNIT PRICES

A. Unit Prices

1. Payment for concrete pavement is on a square foot basis at the thickness shown in the design plans.

2. Payment for concrete valley gutters is on a square foot basis at the thickness shown in the design plans.

3. Payment for sidewalks is on a square foot basis at the thickness shown in the design plans.

4. Payment for curb and gutters is on a linear foot basis at the thickness shown in the design plans. Measurement shall occur along the face of the curb at the gutter line regardless of each cross section.

5. Payment for driveways is on a square foot basis at the thickness shown in the design plans.

6. Payment for handicap ramps is on a per unit basis, regardless of the ramp type installed, as shown in the design plans. Detectable warning systems shall be included in the unit costs of the handicap ramp.

1.3 PRODUCTS

A. SAND BEDDING: Bedding material shall be placed over approved, limed subgrade, as specified in the drawing details. Sand shall be Bank Run Sand or River Sand, as follows: Durable bank run sand classified as SP, SW, or SM by the Unified Soil Classification System (ASTM D 2487) meeting the following requirements:

1. Less than 15 percent passing the number 200 sieve when tested in accordance with ASTM D 1140. The amount of clay lumps or balls not exceeding 2 percent.

2. Material passing the number 40 sieve shall meet the following requirements when tested

in accordance with ASTM D 4318:

a. Liquid limit: not exceeding 25 percent.

b. Plasticity index: not exceeding 7.

Contractor shall provide reports to the Owner and the Engineer from an independent testing laboratory that backfill materials to be placed in the Work meet applicable specification requirements. Contractor shall assist Owner, Owner's representative and Testing Lab in obtaining samples, from the delivered materials, for verification testing.

B. CONCRETE: Concrete shall conform to the details in the plans except as otherwise specified. Concrete shall have a minimum compressive strength of 3000 psi at 28 days or as shown in the design plans. Maximum size of aggregate shall be 1-1/2 inches. In climates where freezing is not a factor but where air entrainment is used in local commercial practice to improve the workability and place ability of concrete, concrete having air content percent of 4-1/2 plus or minus 1-1/2 percent may be specified as Contractor's option to non air-entrained concrete. Mixtures may have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer. The desired slump will be inserted. Suggested limits are 3 inches plus or minus 1 inch for hand placed concrete or for slip formed concrete. The concrete slump shall be 3 inches where determined in accordance with ASTM C 143.

C. REINFORCING STEEL: Provide Grade 60 deformed steel for bar reinforcement in accordance with TXDOT Item 440, "Reinforcing Steel." Provide approved positioning and supporting devices (baskets and chairs) capable of securing and holding the reinforcing steel in proper position before and during paving. Provide corrosion protection when shown on the plans.

D. DOWELS: Provide smooth, straight dowels of the size shown on the plans, free of burrs, and conforming to the requirements of Item 440, "Reinforcing Steel." Coat dowels with a thin film of grease or other approved de-bonding material. Provide dowel caps on the lubricated end of each dowel bar used in an expansion joint. Provide dowel caps filled with a soft compressible material with enough range of movement to allow complete closure of the expansion joint.

E. Tie Bars. Provide straight deformed steel tie bars. Provide either multiple-piece tie bars or single-piece tie bars as shown on the plans. Provide multiple-piece tie bars composed of 2 pieces of deformed reinforcing steel with a coupling capable of developing a minimum tensile strength of 125% of the design yield strength of the deformed steel when tensile-tested in the assembled configuration. Provide a minimum length of 33 diameters of the deformed steel in each piece. Use multiple-piece tie bars from the list of "Prequalified Multiple Piece Tie Bar Producers" maintained by the Construction Division, or submit samples for testing in accordance with Tex-711-I.

F. Joint Filler Strips and Sealants: Expansion Joints shall be located at maximum 40 foot spacing. Expansion joint filler shall consist of hard-pressed fiberboard. Joint sealant, cold

applied self-leveling shall be a premium grade polyurethane sealant (gray in color) or equal approved by the Engineer.

1.4 CONSTRUCTION METHODS

A. Placing During Warm Weather: The air temperature of the concrete as placed shall not exceed 95 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. In no case shall the placing air temperature exceed 100 degrees F.

B. FORM WORK: Form work shall be designed and constructed to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2-inch nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 -12 feet. Radius bends may be formed with 3/4-inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of two welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

C. FORM SETTING: Forms shall be carefully set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of three stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to insure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory. Forms for sidewalks shall be set with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10-foot long section. After forms are set, grade and alignment shall be checked with a 10-foot straightedge. Forms shall have a transverse slope [as indicated] 1/4-inch per foot with the low side adjacent to the roadway. Side forms shall not be removed for 18 hours after finishing has been completed.

D. CONCRETE PLACEMENT AND FINISHING: Concrete shall be placed in the forms in one layer of such thickness that when consolidated and finished the sidewalks will be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a wood float, bull float, or darby, edged and broom finished. After straight edging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be

finished to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction perpendicular to that of the traffic. All slab edges, including those at formed joints, shall be finished carefully with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished. All slab edges, including those at formed joints, shall be sealed with a rubberized asphalt sealant to control water damage to the subgrade and control of weed and grass growth in the edges and joints.

E. Tolerances: Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

A. Joints: Expansion, contraction and sawed joints shall be installed in accordance with Section 32 13 73 – Concrete Paving Joints and Sealants.

F. CURING AND PROTECTION: Concrete shall be protected against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Unhardened concrete shall be protected from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

G. Protection: Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

H. FIELD QUALITY CONTROL: The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below, and any additional tests to ensure that the requirements of these specifications are met.

I. Strength Testing: The Contractor shall provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 150 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C 172. Cylinders for acceptance shall be molded in conformance with ASTM C 31 by an approved testing laboratory. Each strength test result shall be the average of two test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. At least one concrete cylinder should be made to determine an early 7-day strength so further construction can be conducted. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

J. Slump Test: One slump test shall be made on randomly selected batches of each class of concrete for every 150 cubic yards, or fraction thereof, of concrete placed during each shift. All slump tests are to be done on the middle third of the concrete within the concrete truck. Additional tests will be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noticed along the edges of slip-formed concrete. Additional tests can be requested by the engineer or the testing laboratory at any time of the concrete job.

K. Surface Evaluation: The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks. Exposed surfaces of the finished work will be inspected by the Engineer and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

END OF SECTION

SECTION 321413

UNIT PAVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete paver units
B. Bedding and joint sand.

1.03 REFERENCES

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

1. C 33, Specification for Concrete Aggregates.
2. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
3. C 140, Sampling and Testing Concrete Masonry Units.
4. C 144, Standard Specification for Aggregate for Masonry Mortar.
5. C 936, Specification for Solid Interlocking Concrete Paving Units.
6. C 979, Specification for Pigments for Integrally Colored Concrete.
7. D 698, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5-lb (2.49 kg) Rammer and 12 in. (305 mm) drop.
8. D 1557, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (4.54 kg) Rammer and 18 in. (457 mm) drop.

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in the manufacture of concrete interlocking pavers for a minimum of five (5) years.

B. Installation shall be by a contractor and crew with at least five (5) years of experience in placing interlocking concrete pavers on projects of similar nature or dollar cost.

C. Installation Contractor shall conform to all local, state/provincial licensing and bonding requirements.

1.05 SUBMITTALS

A. Submit product drawings and data.
B. Submit full size sample sets of concrete paving units to indicate color and shape selections. Color will be selected by SSP from manufacturer's available colors.
C. Submit sealer tech specs (Techniseal 'Natural Look (iN)', matte finish, penetrating paver sealer, product code 60304120.)
D. Submit sieve analysis for grading of bedding and joint sand.
E. Indicate layout, pattern, and relationship of paving joints to fixtures per plans and details.
F. Substitutions: Substitutions shall be submitted 7 days prior to bid opening for acceptance.

1.06 MOCK-UPS

A. Install a 12 ft. x 12 ft. paver area as described in Article 3.02. This area will be used to determine surcharge of the bedding sand layer, joint sizes, lines, laying pattern(s), color(s), and texture of the job. This area shall be the standard from which the work will be judged. Consideration shall be given with regard to differences in age of materials from time of mock-up erection to time of actual product delivery.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.
B. Sand shall be covered with waterproof covering to prevent exposure to rainfall or removal by wind. The covering shall be secured in place.
C. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

1.08 MAINTENANCE/WARRANTY

A. Maintenance Requirements: Maintain the work of this Section for one year after 'substantial completion' and until final written acceptance by Owner. Notify the owner in writing of 'substantial completion'. Maintenance period begins after owner's written acceptance of 'substantial completion'.

B. Maintenance Service: Perform the following maintenance operations during construction and throughout the 90 day maintenance period until final acceptance by Owner:

1. Re-sand all joints and gaps in pavers as required or requested by owner. Use polymeric sand to fill all joints.
2. Re-level pavers as required or requested by owner.
3. Control/eradicate any weed or vegetative growth within paver areas.

PART 2 PRODUCTS

2.01 CONCRETE PAVERS

A. Concrete pavers shall be supplied by:

Keystone Hardscapes/Pavestone
1900 Clovis Barker Road
San Marcos, TX 78666
512.558.7283
512.558.7289 (Fax)

B. Pavers shall be Keystone Hardscapes - "Holland"

C. Color, and overall dimensions shall be:

Field:
1. Paver – 7.87” x 3.94” x 3.15” thickness (80mm)
2. Color light brown / tan mix
3. Pattern shall be 45 degree herringbone (provide mock up for review and approval)

Banding:
1. Paver – 7.87” x 3.94” x 3.15” thickness (80mm)
2. Color dark brown
3. Pattern shall be soldier course (as shown on plans)

Note: Paver Colors to be confirmed by Owner in writing prior to ordering.

D. Pavers shall meet the following requirements set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units:
   1. Average compressive strength of 8,000 psi (55 MPa) with no individual unit under 7,200 psi (50 MPa).
   2. Average absorption of 5% with no unit greater than 7% when tested in accordance with ASTM C 140.
   3. Resistance to 50 freeze-thaw cycles when tested in accordance with ASTM C 67.
E. Pigment in concrete pavers shall conform to ASTM C 979.
F. Material shall be manufactured in individual layers on production pallets.
G. Materials shall be manufactured to produce a solid homogeneous matrix in the produced unit.
H. Seal all paver surfaces when thoroughly dry. Use Techniseal ‘Natural Look (iN)’, matte finish, penetrating paver sealer, product code 60304120.

2.02 VISUAL INSPECTION

A. All units shall be sound and free of defects that would interfere with the proper placing of unit or impair the strength or permanence of the construction.

2.03 SAMPLING AND TESTING

A. Manufacturer shall provide access to lots ready for delivery to the Owner or his authorized representative for testing in accordance with ASTM 936-82 for sampling of material prior to commencement of paver placement.
B. Manufacturer shall provide a minimum of three (3) years testing backup data showing manufactured products that meet and exceed ASTM 936-82 when tested in compliance with ASTM C-140.
C. Sampling shall be random with a minimum of nine (9) specimens per 20,000 sq. ft. per product shape and size with repeated samples taken every additional 20,000 sq. ft. or a fraction thereof.
D. Test units in accordance with ASTM for compressive strength, absorption and dimensional tolerance. A minimum of three (3) specimens per test required for an average value. Testing of full units is preferred.

2.04 REJECTION

A. In the event the shipment fails to conform to the specified requirements, the manufacturer may sort it, and new test units shall be selected at random by the Owner from the retained lot and tested at the expense of the manufacturer. If the second set of test units fails to conform to the specified requirements, the entire lot shall be rejected.

2.05 EXPENSE OF TESTS

A. The expense of inspection and testing shall be borne by the Owner.

2.06 BEDDING AND JOINT SAND

A. Bedding and joint sand shall be clean, non-plastic, free from deleterious or foreign matter. The sand shall be natural or manufactured from crushed rock. Limestone screenings or stone dust shall not be used.

B. Grading of sand samples for the bedding course and joints shall be done according to ASTM C 136. The bedding sand shall conform to the grading requirements of ASTM C 33 as shown in Table 1 below.

Table 1

Grading Requirements for Bedding Sand

ASTM C 136

Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (600 µm)	25 to 60
No. 50 (300 µm)	10 to 30
No. 100 (150 µm)	2 to 10

Bedding sand may be used for joint sand for the initial filling of joints but must be supplemented with polymeric sand or gel to completely fill the joints. If joint sand other than bedding sand is used, the gradations shown in Table 2 are recommended. Joint sand should never be used for bedding sand.

C. The joint sand shall conform to the grading requirements of ASTM C 144 as shown in Table 2 below:

Table 2

Grading Requirements for Joint Sand

ASTM C 144 Natural Sand

Sieve Size	Percent Passing
No. 4 (4.75 mm)	100

No. 8 (2.36 mm)	95 to 100
No. 16 (1.18 mm)	70 to 100
No. 30 (600 µm)	40 to 75
No. 50 (300 µm)	10 to 35
No. 100 (150 µm)	2 to 15
No. 200 (75 µm)	0

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subgrade preparation, compacted density and elevations conform to the specifications. Compaction of the soil subgrade to at least 95% Standard Proctor Density per ASTM D 698 is recommended. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils. Owner/SSP Design will inspect subgrade preparation, elevations, and conformance to specifications.
B. Verify that aggregate base materials, thickness, compaction, surface tolerances, and elevations conform to the civil engineers grading plans and specifications.
C. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved.
D. Verify that base is dry, uniform, even, and ready to support sand, pavers, and imposed loads.
E. Beginning of bedding sand and paver installation means acceptance of base and edge restraints.

3.02 INSTALLATION

A. Refer to Engineer’s plans for sub-base preparation, concrete work and final grades/elevations.
B. Apply herbicide on any vegetative matter within paver areas.
C. Apply pre-emergent herbicide to base course prior to installing leveling sand.
D. Spread sand evenly over the base course and screed to a nominal 1 in. thickness, not exceeding 1-1/2 in. thickness. The screeded sand should not be disturbed. Place sufficient sand to stay ahead of the laid pavers. Do not use the bedding sand to fill depressions in the base surface.
E. Ensure that pavers are free of foreign materials before installation.
F. Lay the pavers in pattern as indicated on plans using specified paver types. Maintain straight pattern lines as indicated on plans or details. Paving banding pattern shall be installed as indicated on plans or details.
G. Joints between pavers shall not exceed 3/16” in width. Miter cut pavers shall be used to minimize gaps and joints.
H. Fill gaps at the edges of the paved area with cut pavers or edge units.
I. Cut pavers to be cut/sawn using a masonry saw. Paver splitters shall not be used.
J. Use a low amplitude, high frequency plate vibrator to vibrate the pavers into the sand. Use Table 3 below to select size of compaction equipment:

Table 3	
Paver Thickness	Minimum Centrifugal Compaction Force
60 mm	3000 lbs. (13 kN)
80 mm	500 lbs (22 kN)

K. Vibrate the pavers, sweeping polymeric sand or gel into the joints and vibrating until they are fully compacted. This will require at least two or three passes with the vibrator. Do not vibrate within 3 ft. (1 m) of the unrestrained edges of the paving units.
L. Install 'hidden' concrete edge restraints as shown on details using Min. 2500 PSI concrete with fibre-mesh reinforcement and rebar.
M. All work to within 3 ft. (1 m) of the laying face must be left fully compacted with sand-filled joints at the completion of each day.
N. Sweep off excess sand when the job is complete.
O. The final surface elevations shall not deviate more than 3/8 in. (10 mm) under a 10 ft. (3 m) long straightedge.
P. The surface elevation of pavers shall be 1/8 in. to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.
I. Apply penetrating sealer when pavers are completely dry and clean. Matte finish, (Techniseal 'Natural Look (iN)', matte finish, penetrating paver sealer, product code 60304120).
Q. The re-sanding of paver joints using polymeric sand shall be accomplished by contractor for a period of one (1) year after completion of work.

3.03 FIELD QUALITY CONTROL

A. After removal of excess sand, check and adjust final elevations for conformance to the grading and drainage plans.
B. Clean pavers and project site

END OF SECTION

SECTION 330516

CONCRETE FOR UTILITY CONSTRUCTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete work for utility construction or rehabilitation, such as slabs on grade, small vaults, site-cast bases for precast units, and in-place liners for manhole rehabilitation.

1.2 UNIT PRICES

A. Unit Prices.

1. No payment will be made for concrete for utility construction under this Section. Include cost in applicable utility structures and fittings.

1.3 REFERENCES

A. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
C. ACI 302.1R - Guide for Concrete Floor and Slab Construction.
D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
E. ACI 308 - Standard Practice for Curing Concrete.
F. ACI 309R - Guide for Consolidation of Concrete.
G. ACI 311 - Batch Plant Inspection and Field Testing of Ready Mixed Concrete.
H. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.
I. ACI 318 - Building Code Requirements for Reinforced Concrete.
J. ACI 544 - Guide for Specifying, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete.
K. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
L. ASTM A 185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
M. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
N. ASTM A 767 - Standard Specifications for Zinc-coated (Galvanized) Bars for Concrete Reinforcement.
O. ASTM A 775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
P. ASTM A 820 - Steel Fibers for Fiber Reinforced Concrete.
Q. ASTM A 884 - Specification for Epoxy-coated Steel Wire and Welded Wire Fabric for Reinforcement.
R. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
S. ASTM C 33 - Standard Specification for Concrete Aggregates.
T. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

U. ASTM C 42 - Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
V. ASTM C 94 - Standard Specification for Ready-Mixed Concrete.
W. ASTM C 138 - Standard Test Method for Unit Weight Yield and Air Content (Gravimetric) of Concrete.
X. ASTM C 143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
Y. ASTM C 150 - Standard Specification for Portland Cement.
Z. ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete.
AA. ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method.
BB. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
CC. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
DD. ASTM C 309 - Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.
EE. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
FF. ASTM C 595 - Standard Specification for Blended Hydraulic Cements.
GG. ASTM C 685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
HH. ASTM C 1017 - Chemical Admixtures for Use in Producing Flowing Concrete.
I. ASTM C 1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
JJ. ASTM C 1077 - Standard Practice for Laboratory Testing of Concrete and Concrete Aggregate for Use in Construction and Criteria for Laboratory Evaluation.
KK. ASTM D 638 - Test Method for Tensile Properties of Plastics.
LL. ASTM D 746 - Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
MM. ASTM D 747 - Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam.
NN. CRSI MSP-1 - Manual of Standard Practice.
OO. CRSI - Placing Reinforcing Bars.
PP. Federal Specification SS-S-210A - Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints
QQ. NRMCA - Concrete Plant Standards.

1.4 SUBMITTALS

A. Conform to Section 01 33 00 - Submittal Procedures.

B. Submit proposed mix design and test data for each type and strength of concrete in the Work.

C. Submit laboratory reports prepared by an independent testing laboratory stating that materials used comply with requirements of this Section.

D. Submit manufacturer's mill certificates for reinforcing steel. Provide specimens for testing when required by the Engineer.

E. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Specification.

F. When required on Drawings, submit shop drawings showing reinforcement type, quantity, size, length, location, spacing, bending, splicing, support, fabrication details, and other pertinent information.

G. For waterstops, submit product information sufficient to indicate compliance with this Section, including manufacturer's descriptive literature and specifications.

1.5 HANDLING AND STORAGE

A. Cement: Store cement off the ground in a well-ventilated, weatherproof building.

B. Aggregate: Prevent mixture of foreign materials with aggregate and preserve gradation of aggregate.

C. Reinforcing Steel: Store reinforcing steel to protect it from mechanical injury and formation of rust. Protect epoxy-coated steel from damage to the coating.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cementitious Material:

1. Portland Cement: ASTM C 150, Type II, unless the use of Type III is authorized by the Engineer; or ASTM C 595, Type IP. For concrete in contact with sewage use Type II cement.

2. When aggregates are potentially reactive with alkalis in cement, use cement not exceeding 0.6 percent alkali content in the form of Na2O + 0.658K20.

B. Water: Clean, free from harmful amounts of oils, acids, alkalis, or other deleterious substances, and meeting requirements of ASTM C 94.

C. Aggregate:

1. Coarse Aggregate: ASTM C 33. Unless otherwise indicated, use the following ASTM standard sizes: No. 357 or No. 467; No. 57 or No. 67, No. 7. Maximum size: Not larger than 1/5 of the narrowest dimension between sides of forms, nor larger than 3/4 of minimum clear spacing between reinforcing bars.

2. Fine Aggregate: ASTM C 33.

3. Determine the potential reactivity of fine and coarse aggregate in accordance with the Appendix to ASTM C 33.

D. Air Entraining Admixtures: ASTM C 260.

E. Chemical Admixtures:

1. Water Reducers: ASTM C 494, Type A.

2. Water Reducing Retarders: ASTM 494, Type D.

3. High Range Water Reducers (Superplasticizers): ASTM C 494, Types F and G.

F. Prohibited Admixtures: Admixtures containing calcium chloride, thiocyanate, or materials that contribute free chloride ions in excess of 0.1 percent by weight of cement.

G. Reinforcing Steel:

1. Use new billet steel bars conforming to ASTM A 615, ASTM A 767, or ASTM A 775, grade 40 or grade 60, as shown on Drawings. Use deformed bars except where smooth bars are specified. When placed in work, keep steel free of dirt, scale, loose or flaky rust, paint, oil or other harmful materials.

2. Where shown, use welded wire fabric with wire conforming to ASTM A 185 or ASTM A 884. Supply the gauge and spacing shown, with longitudinal and transverse wires electrically welded together at points of intersection with welds strong enough not to be broken during handling or placing.

3. Wire: ASTM A 82. Use 16-1/2 gauge minimum for tie wire, unless otherwise indicated.

H. Fiber:

1. Fibrillated Polypropylene Fiber:

a. Addition Rate: 1.5 pounds of fiber per cubic yard of concrete.

b. Physical Properties:
(1) Material: Polypropylene.
(2) Length: 1/2 inch or graded
(3) Specific Gravity: 0.9l.

c. Acceptable Manufacturer: W. R. Grace Company, Fibermesh, or approved equal.

2. Steel Fiber: Comply with applicable provisions of ACI 544 and ASTM A 820.

a. Ratio: 50 to 200 pounds of fiber per cubic yard of concrete.

b. Physical Properties

(1) Material: Steel.
(2) Aspect Ratio (for fiber lengths of 0.5 to 2.5-inch, length divided by diameter or equivalent diameter): 30:1 to 100:1.
(3) Specific Gravity: 7.8.
(4) Tensile Strength: 40-400 ksi.
(5) Young's Modulus: 29,000 ksi.
(6) Minimum Average Tensile Strength: 50,000 psi.
(7) Bending Requirements: Withstand bending around 0.125-inch diameter mandrel to an angle of 90 degrees, at temperatures not less than 60 degrees F, without breaking.

I. Curing Compounds: Type 2 white-pigmented liquid membrane-forming compounds conforming to ASTM C 309.

2.2 FORMWORK MATERIALS

A. Lumber and Plywood: Seasoned and of good quality, free from loose or unsound knots, knot holes, twists, shakes, decay and other imperfections which would affect strength or impair the finished surface of concrete. Use S4S lumber for facing or sheathing. Forms for bottoms of caps: At least 2-inch (nominal) lumber, or 3/4-inch form plywood backed adequately to prevent misalignment. For general use, provide lumber of 1-inch nominal thickness or form plywood of approved thickness.

B. Formwork for Exposed Concrete Indicated to Receive Rubbed Finish: Form or form-lining surfaces free of irregularities; plywood of 1/4-inch minimum thickness, preferably oiled at the mill.

C. Chamfer Strips and Similar Moldings: Redwood, cypress, or pine that will not split when nailed and which can be maintained to true line. Use mill-cut molding dressed on all faces.

D. Form Ties: Metal or fiberglass of approved type with tie holes not larger than 7/8 inch in diameter. Do not use wire ties or snap ties.

E. Metal Forms: Clean and in good condition, free from dents and rust, grease, or other foreign materials that tend to disfigure or discolor concrete in a gauge and condition capable of supporting concrete and construction loads without significant distortion. Countersink bolt and rivet heads on facing sides. Use only metal forms which present a smooth surface, and which line up properly.

2.3 PRODUCTION METHODS

A. Use either ready-mixed concrete conforming to requirements of ASTM C 94, or concrete produced by volumetric batching and continuous mixing in accordance with ASTM C 685.

2.4 MEASUREMENT OF MATERIALS

A. Measure dry materials by weight, except volumetric proportioning may be used when concrete is batched and mixed in accordance with ASTM C 685.

B. Measure water and liquid admixtures by volume.

2.5 DESIGN MIX

A. Use design mixes prepared by a certified testing laboratory in accordance with ASTM C 1077 and conforming to requirements of this section.

B. Proportion concrete materials based on ACI 211.1 to comply with durability and strength requirements of ACI 318, Chapters 4 and 5, and this specification. Prepare mix design of Class A concrete so minimum cementitious content is 564 pounds per cubic yard. Submit concrete mix designs to the Engineer for review.

C. Proportioning on the basis of field experience or trial mixtures in accordance with requirements at Section 5.3 of ACI 318 may be used, if approved by the Engineer.

D. Classification:

Class	Type	Minimum Compressive Strength (lbs/sq. in.)		Maximum W/C Ratio	Air Content (Percent)	Consistency range in slump (inches)
		7-day	28-day			
A	Structural	3200	4000	0.45	4+ 1	2 to 4*
B	Pipe Block Fill, Thrust Block	----	2500	----	4+ 1	5 to 7
*When ASTM C 494, Type F or Type G admixture is used to increase workability, this range may be 6 to 9.						

E. Add steel or polypropylene fibers only when called for on the Drawings or in another section of these Specifications.

F. Determine air content in accordance with ASTM C 138, ASTM C 173 or ASTM C 231.

G. Use of Concrete Classes: Use classes of concrete as indicated on the Drawings and other Specifications. Use Class B for unreinforced concrete used for plugging pipes, seal slabs, thrust blocks, trench dams, and concrete fill unless indicated otherwise. Use Class A for all other applications.

2.6 PVC WATERSTOPS

A. Extrude from virgin polyvinyl chloride elastomer. Use no reclaimed or scrap material. Submit waterstop manufacturer's current test reports and manufacturer's written certification that the material furnished meets or exceeds Corps of Engineers Specification CRD-C572 and other specified requirements.

B. Flat Strip and Center-Bulb Waterstops:

1. Thickness: not less than 3/8 inch
2. Acceptable Manufacturers:

a. Kirkhill Rubber Co., Brea, California
b. Water Seals, Inc., Chicago, Illinois
c. Progress Unlimited, Inc., New York, New York
d. Greenstreak Plastic Products Co., St. Louis, Missouri
e. Approved equal.

2.7 RESILIENT WATERSTOP

A. Resilient Waterstop: Where shown on the Drawings; either a bentonite- or adhesive-type material.

B. Bentonite Waterstop:

1. Material: 75 percent bentonite, mixed with butyl rubber-hydrocarbon containing less than 1.0 percent volatile matter, and free of asbestos fibers or asphaltic.
2. Manufacturer's rated temperature ranges: For application, 5 to 125 degrees F; in service, -40 to 212 degrees F.

3. Cross-sectional dimensions, unexpanded waterstop: 1 inch by 3/4 inch.

4. Provide with adhesive backing capable of producing excellent adhesion to concrete surfaces.

C. Adhesive Waterstop:

1. Preformed plastic adhesive waterstop at least 2 inches in diameter.

2. Meets or exceeds requirements of Federal Specification SS-S-210A.

3. Supplied wrapped completely by a 2-part protective paper.

4. Submit independent laboratory tests verifying that the material seals joints in concrete against leakage when subjected to a minimum of 30 psi water pressure for at least 72 hours.

5. Provide primer, to be used on hardened concrete surfaces, from the same manufacturer who supplies the waterstop material.

6. Acceptable Manufacturer: Synko-Flex Preformed Plastic Adhesive Waterstop, Synko-Flex Products, Inc.; or approved equal.

PART 3 - EXECUTION

3.1 FORMS AND SHORING

A. Provide mortar-tight forms sufficient in strength to prevent bulging between supports. Set and maintain forms to lines designated such that finished dimensions of structures are within the tolerances specified in ACI 117. Construct forms to permit removal without damage to concrete. Forms may be given slight draft to permit ease of removal. Provide adequate cleanout openings. Before placing concrete, remove extraneous matter from within forms.

B. Install rigid shoring having no excessive settlement or deformation. Use sound timber in shoring centering. Shim to adjust and tighten shoring with hardwood timber wedges.

C. Design Loads for Horizontal Surfaces of Forms and Shoring: Minimum fluid pressure, 175 pounds per cubic foot; live load, 50 pounds per square foot. Maximum unit stresses: 125 percent of allowable stresses used for form materials and for design of support structures.

D. Back formwork with a sufficient number of studs and wales to prevent deflection.

E. Re-oil or lacquer the liner on the job before using. Facing may be constructed of 3/4-inch plywood made with waterproof adhesive backed by adequate studs and wales. In such cases, form lining will not be required.

F. Unless otherwise indicated, form outside corners and edges with triangular 3/4-inch chamfer strips (measured on sides).

G. Remove metal form ties to depth of at least 3/4 inch from surface of concrete. Do not burn off ties. Do not use pipe spreaders. Remove spreaders which are separate from forms as concrete is being placed.

H. Treat facing of forms with approved form coating before concrete is placed. When directed by Engineer, treat both sides of face forms with coating. Apply coating before reinforcement is placed. Immediately before the concrete is placed, wet surface of forms which will come in contact with concrete.

3.2 PLACING REINFORCEMENT

A. Place reinforcing steel accurately in accordance with approved Drawings. Secure steel adequately in position in forms to prevent misalignment. Maintain reinforcing steel in place using approved concrete and hot-dip galvanized metal chairs and spacers. Place reinforcing

steel in accordance with CRSI Publication "Placing Reinforcing Bars." Request inspection of reinforcing steel by the Engineer and obtain acceptance before concrete is placed.

B. Minimum spacing center-to-center of parallel bars: 2-1/2 times nominal bar diameter. Minimum cover measured from surface of concrete to face of reinforcing bar unless shown otherwise on the Drawings: 3 inches for surfaces cast against soil or subgrade, 2 inches for other surfaces.

C. Detail bars in accordance with ACI 315. Fabricate reinforcing steel in accordance with CRSI Publication MSP-1, "Manual of Standard Practice." Bend reinforcing steel to required shape while steel is cold. Excessive irregularities in bending will be cause for rejection.

D. Do not splice bars without written approval of the Engineer. Approved bar bending schedules or placing drawings constitute written approval. Splice and development length of bars shall conform to ACI 318, Chapters 7 and 12, and as shown on Drawings. Stagger splices or locate at points of low tensile stress.

3.3 EMBEDDED ITEMS

A. Install conduit and piping as shown on Drawings. Accurately locate and securely fasten conduit, piping, and other embedded items in forms.

B. Install waterstops as specified in other sections and according to manufacturer's instructions. Securely position waterstops at joints as indicated on Drawings. Protect waterstops from damage or displacement during concrete placing operations.

3.4 BATCHING, MIXING AND DELIVERY OF CONCRETE

A. Measure, batch, mix, and deliver ready-mixed concrete in accordance with ASTM C 94, Sections 8 through 11. Produce ready-mixed concrete using an automatic batching system as described in NRMCA Concrete Plant Standards, Part 2 - Plant Control Systems.

B. Measure, mix and deliver concrete produced by volumetric batching and continuous mixing in accordance with ASTM C 685, Sections 6 through 8.

C. Maintain concrete workability without segregation of material and excessive bleeding. Obtain approval of the Engineer before adjustment and change of mix proportions.

D. Ready-mixed concrete delivered to the site shall be accompanied by batch tickets providing the information required by ASTM C 94, Section 16. Concrete produced by continuous mixing shall be accompanied by batch tickets providing the information required by ASTM C 685, Section 14.

E. When high temperatures are expected, prepare ingredients, place, cure and protect in accordance with ACI 301, ACI 305.1, and as follows:

1. When high air temperatures are expected that would affect quality of concrete, postpone concrete placement. Do not mix concrete when air temperature is at or above 95 degrees F and rising.
2. Maintain concrete temperature below 90 degrees F at the time of placement, furnish test data or other proof that admixtures and mix ingredients for not produce flash set plastic shrinkage, or cracking as a result of heat of hydration and the ambient air temperatures. Cool ingredients before mixing to maintain fresh concrete temperatures as specified or less.
3. Provide windbreaks, shading, fog spraying, sprinkling, wet cover or other means as necessary to maintain at or below specified temperature.

F. When adverse weather conditions affect quality of concrete, postpone concrete placement. Do not mix concrete when air temperature is at or below 40 degrees F and falling. Concrete may be mixed when temperature is 35 degrees F and rising. Take temperature readings in the shade, away from artificial heat. Protect concrete from temperatures below 32 degrees F until the concrete has cured for a minimum of 3 days at 70 degrees F or 5 days at 50 degrees F.

G. Clean, maintain and operate equipment so that it thoroughly mixes material as required.

H. Hand-mix only when approved by the Engineer.

3.5 PLACING CONCRETE

A. Give sufficient advance notice to the Engineer (at least 24 hours prior to commencement of operations) to permit inspection of forms, reinforcing steel, embedded items and other preparations for placing concrete. Place no concrete prior to the Engineer's approval.

B. Schedule concrete placing to permit completion of finishing operations in daylight hours. However, if necessary, to continue after daylight hours, light the site as required. If rainfall occurs after placing operations are started, provide covering to protect the work.

C. Use troughs, pipes and chutes lined with approved metal or synthetic material in placing concrete so that concrete ingredients are not separated. Keep chutes, troughs and pipes clean and free from coatings of hardened concrete. Allow no aluminum material to be in contact with concrete.

D. Limit free fall of concrete to 4 feet. Do not deposit large quantities of concrete at one location so that running or working concrete along forms is required. Do not jar forms after concrete has taken an initial set; do not place any strain on projecting reinforcement or anchor bolts.

E. Use tremies for placing concrete in walls and similar narrow or restricted locations. Use tremies made in sections, or provide in several lengths, so that outlet may be adjusted to proper height during placing operations.

F. Compact each layer of concrete with concrete spading implements and mechanical vibrators of approved type and adequate number for the size of placement. When immersion vibrators

cannot be used, use form vibrators. Apply vibrators to concrete immediately after depositing. Move the vibrator vertically through the layer of concrete just placed and several inches into plastic layer below. Do not penetrate or disturb layers previously placed which have partially set. Do not use vibrators to aid lateral flow concrete. Closely supervise consolidation to ensure uniform insertion and duration of immersion.

G. Handling and Placing Concrete: Conform to ACI 302.1R, ACI 304R and ACI 309R.

3.6 WATERSTOPS

A. Embed waterstops in concrete across joints as shown. Waterstops shall be continuous for the extent of the joint; make splices necessary to provide such continuity in accordance with manufacturer's instructions. Support and protect waterstops during construction operations; repair or replace waterstops damaged during construction.

B. Install waterstops in concrete on one side of joints, leaving other side exposed until the next pour. When a waterstop will remain exposed for 2 days or more, shade and protect the exposed waterstop from direct rays of the sun during the entire exposure and until the exposed portion of the waterstop is embedded in concrete.

C. Splicing PVC Waterstops:
   1. Splice waterstops by heat-sealing adjacent waterstop sections in accordance with the manufacturer's printed instructions.

   2. Butt end-to-end joints of two identical waterstop sections may be made in the forms during placement of waterstop material.

   3. Prior to placement in formwork, prefabricate waterstop joints involving more than two ends to be joined together, an angle cut, an alignment change, or the joining of two dissimilar waterstop sections, allowing not less than 24-inch long strips of waterstop material beyond the joint. Upon inspection and approval by the Engineer, install prefabricated waterstop joint assemblies in formwork, and butt-weld ends of the 24-inch strips to the straight-run portions of waterstop in the forms.

D. Setting PVC Waterstops:

   1. Correctly position waterstops during installation. Support and anchor waterstops during progress of the work to ensure proper embedment in concrete and to prevent folding over of the waterstop by concrete placement. Locate symmetrical halves of waterstops equally between concrete pours at joints, with center axis coincident with joint openings. Thoroughly work concrete in joint vicinity for maximum density and imperviousness.

   2. Where a waterstop in a vertical wall joint does not connect with any other waterstop and is not intended to be connected to a waterstop in a future concrete placement, terminate the waterstop 6 inches below the top of the wall.

E. Replacement of Defective Field Joints: Replace waterstop field joints showing evidence of misalignment, offset, porosity, cracks, bubbles, inadequate bond or other defects with products and joints complying to the Specifications.

F. Resilient Waterstop:

1. Install resilient waterstop in accordance with manufacturer's instructions and recommendations.

2. When requested by the Engineer, provide technical assistance by manufacturer's representative in the field at no additional cost to the Owner.

3. Use resilient waterstop only where complete confinement by concrete is provided; do not use in expansion or contraction joints.

4. Where resilient waterstop is used in combination with PVC waterstop, lap resilient waterstop over PVC waterstop a minimum of 6 inches and place in contact with the PVC waterstop. Where crossing PVC at right angles, melt PVC ribs to form a smooth joining surface.

5. At the free top of walls without connecting slabs, stop the resilient waterstop and grooves (where used) 6 inches from the top in vertical wall joints.

6. Bentonite Waterstop:

   a. Locate bentonite waterstop as near as possible to the center of the joint and extend continuous around the entire joint. Minimum distance from edge of waterstop to face of member: 5 inches.

   b. Where thickness of concrete member to be placed on bentonite waterstop is less than 12 inches, place waterstop in grooves at least 3/4-inch-deep and 1-1/4 inches wide formed or ground into concrete. Minimum distance from edge of waterstop placed in groove to face of member: 2.5 inches.

   c. Do not place bentonite waterstop when waterstop material temperature is below 40 degrees F. Waterstop material may be warmed so that it remains above 40 degrees F during placement but means used to warm it shall in no way harm the material or its properties. Do not install waterstop where air temperature falls outside manufacturer's recommended range.

   d. Place bentonite waterstop only on smooth and uniform surfaces; grind concrete smooth if necessary, to produce satisfactory substrate, or bond waterstop to irregular surfaces using an epoxy grout which completely fills voids and irregularities beneath the waterstop material. Prior to installation, wire brush the concrete surface to remove laitance and other substances that may interfere with bonding of epoxy.

e. In addition to the adhesive backing provided with the waterstop, secure bentonite waterstop in place with concrete nails and washers at 12-inch maximum spacing.

7. Adhesive Waterstop:

a. With a wire brush thoroughly clean the concrete surface on which the waterstop is to be placed and then coat with primer.

b. If the surface is too rough to allow the waterstop to form a complete contact, grind to form an adequately smooth surface.

c. Install the waterstop with the top protective paper left in place. Overlap joints between strips a minimum of 1 inch and cover back over with protective paper.

d. Do not remove protective paper until just before final formwork completion. Concrete shall be placed immediately. The time that the waterstop material is uncovered prior to concrete placement shall be minimized and shall not exceed 24 hours.

3.7 CONSTRUCTION JOINTS

A. Definitions:

1. Construction joint: Contact surface between plastic (fresh) concrete and concrete that has attained initial set.

2. Monolithic: Manner of concrete placement to reduce or eliminate construction joints; joints other than those indicated on Drawings will not be permitted without written approval of Engineer. Where so approved, make additional construction joints with details equivalent to those indicated for joints in similar locations.

3. Preparation for Construction Joints: Roughen surface of concrete previously placed, leaving some aggregate particles exposed. Remove laitance and loose materials by sandblasting or high-pressure water blasting. Keep surface wet for several hours prior to placing of plastic concrete.

3.8 CURING

A. Comply with ACI 308. Cure by preventing loss of moisture, rapid temperature change and mechanical injury for a period of 7 curing days when Type II or IP cement has been used and for 3 curing days when Type III cement has been used. Start curing as soon as free water has disappeared from the concrete surface after placing and finishing. A curing day is any calendar day in which the temperature is above 50 degrees F for at least 19 hours. Colder days may be counted if air temperature adjacent to concrete is maintained above 50 degrees F. In continued cold weather, when artificial heat is not provided, removal of forms and shoring may be permitted at the end of calendar days equal to twice the required number of

curing days. However, leave soffit forms and shores in place until concrete has reached the specified 28-day strength, unless directed otherwise by the Engineer.

B. Cure formed surfaces not requiring rubbed-finished surface by leaving forms in place for the full curing period. Keep wood forms wet during the curing period. Add water as needed for other types of forms. Or, at Contractor's option, forms may be removed after 2 days and curing compound applied.

C. Finishes:

1. Broom Finish:

a. After completion of straightedge operation, make first pass of traverse broom as soon as construction operations permit and before water sheen has disappeared from surface. Follow with as many passes as required to produce desired textured depth. Permit no unnecessary delays between passes. Keep drag wet, clean and free from encrusted mortar during use.

2. Rubbed Finish:

a. At formed surfaces requiring rubbed finish, remove forms as soon as practicable without damaging the surface and immediately apply rub completely within 4 hours.

b. After rubbed-finish operations are complete, continue curing formed surfaces by using either approved curing/sealing compounds or moist cotton mats until normal curing period is complete.

D. Unformed Surfaces: Cure by membrane curing compound method.

1. After concrete has received a final finish and surplus water sheen has disappeared, immediately seal surface with a uniform coating of approved curing compound, applied at the rate of coverage recommended by manufacturer or as directed by the Engineer. Do not apply less than 1 gallon per 180 square feet of area. Provide satisfactory means to properly control and check rate of application of the compound.

2. Thoroughly agitate the compound during use and apply by means of approved mechanical power pressure sprayers equipped with atomizing nozzles. For application on small miscellaneous items, hand-powered spray equipment may be used. Prevent loss of compound between nozzle and concrete surface during spraying operations.

3. Do not apply compound to a dry surface. If concrete surface has become dry, thoroughly moisten surface immediately prior to application. At locations where coating shows discontinuities, pinholes or other defects, or if rain falls on a newly coated surface before film has dried sufficiently to resist damage, apply an additional coat of compound at the specified rate of coverage.

3.9 REMOVAL OF FORMS AND SHORING

A. Remove forms from surfaces requiring rubbing only as rapidly as rubbing operation progresses. Remove forms from vertical surfaces not requiring rubbed-finish when concrete has aged for the required number of curing days. When curing compound is used, do not remove forms before 2 days after concrete placement.

B. Leave soffit forms and shores in place until concrete has reached the specified 28-day strength, unless directed otherwise by the Engineer.

3.10 DEFECTIVE WORK

A. Immediately repair any defective work discovered after forms have been removed. If concrete surface is bulged, uneven, or shows excess honeycombing or form marks which cannot be repaired satisfactorily through patching, remove and replace the entire section.

3.11 FINISHING

A. Patch honeycomb, minor defects and form tie holes in concrete surfaces with carr-bond and verticoat or approved equal. Repair defects by cutting out unsatisfactory material and replacing with new concrete, securely keyed and bonded to existing concrete. Finish to make junctures between patches and existing concrete as inconspicuous as possible. Use a stiff mixture and thoroughly tamp into place. After each patch has stiffened sufficiently to allow for greatest portion of shrinkage, strike off mortar flush with the surface.

B. Apply a rubbed finish to exposed surfaces of formed concrete structures as noted on Drawings. After pointing has set sufficiently, wet the surface with a brush and perform first surface rubbing with No. 16 carborundum stone, or approved equal. Rub sufficiently to bring surface to paste, to remove form marks and projections, and to produce a smooth, dense surface. Add cement to form surface paste as necessary. Spread or brush material, which has been ground to paste, uniformly over surface and allow to reset. In preparation for final acceptance, clean surfaces and perform final finish rubbing with No. 30 carborundum stone or approved equal. After rubbing, allow paste on the surface to reset; then wash surface with clean water. Leave structure with a clean, neat and uniform-appearing finish.

C. Apply a wood float finish to concrete slabs.

3.12 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Section 01 45 29 - Testing Laboratory Services.

B. Unless otherwise directed by Engineer, the following minimum testing of concrete is required. Testing shall be performed by qualified individuals employed by an approved independent testing agency and conform to the requirements of ASTM C 1077.

1. Take concrete samples in accordance with ASTM C 172.

2. Make one set of four compression test specimens, or as directed by the Engineer, for each mix design at least once per day and for each 150 cubic yards or fraction thereof. Make, cure and test the specimens in accordance with ASTM C 31 and ASTM C 39.

3. When taking compression test specimens, test each sample for slump according to ASTM C 143, for temperature according to ASTM C 1064, for air content according to ASTM C 231, and for unit weight according to ASTM C 138.

4. Inspect, sample and test concrete in accordance with ASTM C 94, Section 13, 14, and 15, and ACI 311-5R.

C. Test Cores: Conform to ASTM C 42.

D. Testing High Early Strength Concrete: When Type III cement is used in concrete, the specified 7-day and 28-day compressive strengths shall be applicable at 3 and 7 days, respectively. For Early Strength Concrete, a set of 5 specimen cylinders shall be required.

E. If 7-day or 3-day test strengths (as applicable for type of cement being used) fail to meet established strength requirements, extended curing or resumed curing on those portions of structure represented by test specimens may be required. If additional curing fails to produce the required strength, strengthening or replacement of portions of structure which fail to develop required strength may be required by the Engineer, at no additional cost to the Owner.

3.13 PROTECTION

A. Protect concrete against damage until final acceptance by the Owner.

B. Protect fresh concrete from damage due to rain, hail, sleet, or snow. Provide such protection while the concrete is still plastic, and whenever such precipitation is imminent or occurring.

C. Do not backfill around concrete structures or subject them to design loadings until components of the structure needed to resist the loading are complete and have reached the specified 28-day compressive strength, except as authorized otherwise by the Engineer.

END OF SECTION

SECTION 331413

WATERLINE PIPEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section shall cover the furnishing, laying, jointing and testing of all water pipe, including water appurtenances, both in open cut and in tunnels, as shown on the drawings, or as directed by the Engineer.

1.2 UNIT PRICES

A. Unit Prices.

1. Payment for water mains installed by open-cut or augered, with or without casing, is on a linear foot basis for each size of pipe installed.

2. Payment for water services installed by open-cut or augered, with or without casing, is on a unit price basis for each diameter service, long and short services.

3. No separate payment will be made for water pipe branches associated with fire hydrant assemblies. Include cost of such pipework in Contract unit prices for items listed in bid form requiring fire hydrants.

4. No separate payment will be made for waterline fittings associated with pipe work, unless listed in the contract unit prices. Include cost of such items in the Contract unit prices for items listed in bid form requiring waterline pipework.

5. No separate payment will be made for thrust blocks and pipe restraints associated with pipe work. Include cost of such items in the Contract unit prices for items listed in bid form requiring waterline pipework.

6. Payment of valves will be on a unit price basis for each valve installed for each size and type of valve.

7. Payment of fire hydrants will be on a unit basis for each fire hydrant assembly installed. Fire hydrant assembly include connecting tee, water pipe branches (regardless of length), gate valve, fire hydrant and necessary restraints and thrust blocking.

PART 2 - PRODUCTS

2.1 MATERIAL

The material used in pipe work shall be furnished by the Contractor, as approved by the Owner, to meet the requirements of the Work of the Contractor as specified herein.

A. Water Pipe - Use PVC compounds in the manufacture of pipe that contain no ingredient in an amount that has been demonstrated to migrate into water in quantities considered to be toxic. Provide pipe, which is homogeneous throughout, free of voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties. Deliver pipe with surfaces free from nicks and scratches with joining surfaces of spigots and joints free from gouges and imperfections which could cause leakage. For PVC pressure pipe used for water mains, provide self-extinguishing PVC pipe that bears Underwriters' Laboratories mark of approval and is acceptable without penalty to Texas State Fire Insurance Committee for use in fire protection lines.

1. Water pipe for main lines may be of any of the following classifications. Any pipe found defective, not meeting the specifications, or improperly installed, shall be rejected and so marked, and shall be replaced by pipe approved by the Owner at no additional cost to the Owner.

    a. Polyvinyl chloride pipe for waterlines 14-inch diameter or greater shall conform to or exceed Ultra-Blue AWWA C-909 Molecularly Oriented Polyvinyl Chloride (PVCO); nominal 20-foot lengths; cast-iron equivalent outside diameter. All waterline piping shall be the color WHITE. Gaskets shall meet the requirements of ASTM F 477. Use elastomeric factory-installed gaskets to make joints flexible and watertight. Do not use PVC gasket material for water mains in potentially contaminated areas.

    b. Polyvinyl chloride pipe for waterlines 6-inch to 12-inch shall conform to or exceed AWWA F1483 Ultra-Blue Class 200 Molecularly Oriented Polyvinyl Chloride (PVCO); nominal 20-foot lengths; steel pipe equivalent outside diameters. All waterline piping shall be the color WHITE. Gaskets shall meet the requirements of ASTM F 477. Use elastomeric factory-installed gaskets to make joints flexible and watertight. Do not use PVC gasket material for water mains in potentially contaminated areas.

    c. Pipe 6 through 12-inch: Certain Teed Certalok Yelomine SDR21 Class 200 (ASTM D2241) RJ Restrained Joint PVC Pipe; nominal 20-foot lengths; steel pipe equivalent outside diameters.

    d. Pipe 14-inch and greater: Certain Teed Certalok DR25 C905 RJ Restrained Joint PVC Pipe; nominal 20-foot lengths; steel pipe equivalent outside diameters.

    e. Pipe 6-inch through 12-inch: Fusible AWWA C-900 DR-25 PVC; nominal 20, 30, or 40-foot lengths; steel pipe equivalent outside diameters.

    f. Pipe 14-inch through 36-inch: Fusible AWWA C-905 DR-25 PVC; nominal 20, 30, or 40-foot lengths; steel pipe equivalent outside diameters.

2. Waterline Fittings - Fittings for water lines may be of any of the following classifications.

    a. Fittings for polyvinyl chloride (PVC) pipe 4-inch through 12-inch shall meet AWWA Standard C-100 or C153 "Ductile-Iron Compact Fittings, 3 inch through 12 inch for

Water and Other Liquids," and C104, latest revision, and shall be sized to fit PVC water pipe. No adapters for fittings with outside diameters different from PVC pipe shall be used. All fittings shall be coated on the interior with AWWA C-550, Induron 3300 or approved equal, non-toxic, impacts no taste to water, functions as physical, chemical and electrical barrier between base material and surroundings, minimum 10-mil wet thickness, fusion-bonded epoxy. Exterior surfaces shall be prime coated with asphaltic coating conforming to ANSI A 21.10, ANSI A 21.15, or ANSI A 21.51 for pipe and fittings in open cut excavation and in casings. All fittings shall be wrapped in a plastic protector in conformance with AWWA Standard C-105 and ANSI A21.5 (2.5 to 3 percent carbon black content, low or high density) "Polyethylene Encasement for Gray and Ductile Cast-Iron piping for Water and Other Liquids" and conforming to ASTM D 1248. Fitting wrapping shall be installed in such a manner as to curtail or prevent corrosion of the metallic fittings.

(1) Flanged Fittings: ANSI A 21.10; ANSI B 16.1 cast or ductile iron. Flanges: ANSI B 16.1, Class 125; pressure rated at 250 psig. Bolts shall be corten or carbon steel with greased ends.

(2) Mechanical Joint Fittings: ANSI A 21.11 (AWWA C 110); pressure rated at 250 psi. Bolts shall be corten or carbon steel with greased ends.

(3) Restraining Joints:

a. Fittings: Mega Lug by Ebaa Iron Inc. or JCM 610 Sur-Grip Fitting Restrainer by JCM Industries, Inc., or approved equal.

b. Bell and Spigot: Mega Lug by Ebaa Iron Inc. or JCM 610 Sur-Grip Fitting Restrainer by JCM Industries, Inc., or approved equal.

(4) Flexible (Dresser Type) Coupling

a. Install where shown on Drawings or where allowed by the Engineer for Contractor's convenience. Use galvanized flexible couplings when installed on galvanized pipe which is cement lined, or when underground. Provide gaskets manufactured from Neoprene, Buna-N, or approved equal.

b. For steel pipe; sleeve-type flexible couplings, Smith-Blair type, or approved equal. Thickness of middle ring equal to or greater than thickness of pipe wall.

c. Flanged adapter couplings for steel pipe; Dresser Style 128, Rockwell Type 913, or approved equal.

d. Use Type 316 stainless steel bolts, nuts and washers where flexible couplings are installed underground. Coat entire coupling with 20-mil of T.C. Mastic as manufactured by the Tape Coat Company, Inc., Bitumastic No. 50 as manufacturer by Koppers Company, Inc., or approved equal.

(5) Victaulic Joints: Make joint with Victaulic Style 77 coupling fitted with Grade H molded synthetic rubber gasket or approved equal.

b. Fittings for polyvinyl chloride (PVC) Schedule 40 pipe less than 4 inch shall conform to ASTM Standard D2466, latest revision.

c. Taps for PVC Water Mains: Use Mueller SS Stainless Steel Service Saddle with all 304SS exterior hardware or approved equal. Saddle shall be flanged, machined recess, AWWA C207, Class D, ANSI 150-pound drilling. Flange bolts shall be 304SS or 316SS. Saddle to include gasket affixed around recess of tap opening to prevent rolling or binding during installation.

Any fittings found defective, not meeting the specifications, or improperly installed, shall be rejected and so marked, and shall be replaced by fittings approved by the Owner, at no additional cost to the Owner.

3. Service Connections - Water service connections shall be installed as per the design plans and as approved by the Utility Owner.

a. Provide Type K annealed, seamless, copper tubing: 3/4-inch to 2-inch in diameter conforming to requirements of ASTM B88 and manufactured in the USA. Provide 3/4-inch to 2-inch in diameter tubing in coils of minimum 60-feet in length. Provide flared or compression-type brass fittings for use with Type K annealed copper tubing in accordance with AWWA C800.

b. Cross-linked polyethylene (PEX) water service line shall confirm to AWWA C904.

c. Polyvinyl chloride casing for water service lines shall be Schedule 40 PVC and shall conform to ASTM Standard "Polyvinyl Chloride (PVC) Plastic Pipe" D-1785, latest revision.

d. Provide bronze service clamp taps (Ford Meter Box, Mueller Company or approved equal) for water main and service sizes shown in the design plans. Angled curb stops, corporation stops, and other brass fittings shall meet AWWA C 800 as manufactured by Ford Meter Box or Mueller Company. Curb stops shall be compression-type fitting inlet end with O-ring straight plug type and Teflon ball valve. Curb stop female outlets shall be iron-pipe thread or swivel-nut, meter-spud thread on 3/4-inch and 1-inch stops and 2-hole flange on 1-1/2 and 2-inch sizes.

Any material found defective, not meeting the specifications, or improperly installed, shall be rejected and so marked and shall be replaced with material approved by the Owner's Engineer at no additional cost to the Owner. Service line tubing crossings under traveled roadways shall be installed as specified on the plans with a minimum cover of 30" below roadway surface.

4. Valves

a. Gate valves (2 to 16-inch diameter) shall conform to the following:

(1) Non-directional, resilient seated (AWWA C 509), 200 psig, bronze mounting, Mechanical Joint ends, and nut-operated unless otherwise specified. Provide resilient seated valves manufactured by Mueller 2360 Series or approved equal.
(2) Design: Fully encapsulated rubber wedge or rubber seat ring mechanically attached with minimum 304 stainless-steel fasteners or screws; threaded connection isolated from water by compressed rubber around opening.
(3) Body: Cast iron, flange bonnet and stuffing box together with 304 SS or 316 SS bolts. Manufacturer's initials, pressure rating, and year manufactured shall be cast in body.
(4) Bronze: Valve components in waterway to contain no more than 15 percent zinc and not more than 2 percent aluminum.
(5) Stems: ASTM B 763 bronze, alloy number 995 minimum yield strength of 40,000 psi; minimum elongation in 2-inches of 12 percent, non-rising.
(6) O-rings: AWWA C 509, sections 2.2.6 and 4.8.2.
(7) Stem Seals: Consist of three O-rings, two above and one below thrust collar with anti-friction washer located above thrust collar.
(8) Stem Nut: Independent or integrally cast of ASTM B 62 bronze.
(9) Resilient Wedge: Molded, synthetic rubber, vulcanized and bonded to cast or ductile iron wedge or attached with 304 stainless steel screws tested to meet or exceed ASTM D 2000; seat against epoxy-coated surface in valve body.
(10) Bolts: AWWA C 509 Section 4.4; 304 or 316 stainless steel only.
(11) Direct bury Valves open counterclockwise.
(12) Coatings: AWWA C-550, Induron 3300 or approved equal, non-toxic, impacts no taste to water, functions as physical, chemical and electrical barrier between base material and surroundings, minimum 10-mil wet thickness, fusion-bonded epoxy. Prior to assembly of valve, apply protective coating to internal and exterior surfaces of body.

b. Gate valves (greater than 16-inch diameter) shall be cast iron body conform to the following: Non-directional, resilient seated (AWWA C 509), 200 psig, bronze mounting, Mechanical Joint ends, and nut-operated unless otherwise specified. Provide resilient seated valves manufactured by Mueller 2361 Series, or approved equal, and meeting the requirements in Section 4a above.

5. Fire Hydrants - Provide fire hydrants manufactured by Mueller Super Centurion 250, or approved equal. Fire hydrants shall conform to AWWA Standard "Dry-Barrel Fire Hydrants" C502, latest revision. Hydrants shall be cast iron, fully bronze mounted and have a working pressure of 150 psi. Fire hydrants shall have a minimum valve opening of 5 1/4 inch. Hydrants shall be furnished with Hydrant Defender with barrel lock. Apply finish coat of Silicone Alkyd Resin Enamel, Acro Products No. 2215, or approved equal meeting SSPC Paint Specification No. 21. Total dry film thickness (DFT): 2 to 3 mils. Exception: Hydrants shall be painted RED with WHITE bonnets.

6. Air and Vacuum Release Valves: Provide combination air valves designed to fulfill functions of air release (permit escape of air accumulated in line at high point of

elevation while line is under pressure) and vacuum relief. Air release and vacuum relief valves 8 inches and smaller in diameter shall be self-contained in one unit. Provide inlet and outlet connections, and orifice as shown on Drawings. Use ARI D-040 Air Release Valve or approved equal.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. PIPE LAYING

1. All water mains shall be installed as specified in plans with a minimum cover of 48 inches from the top of pipe to an established grade. Where pipe is installed beneath State Highways, there shall be a minimum vertical distance of 4 feet from top of pipe to the lowest pavement elevation on the highway, or as per the Highway Department's permit requirements. In special locations, Highway Department may require additional cover. Construction clearance and other requirements to cross under State Highways shall be obtained by Owner. Where pipe is installed beneath drainage or irrigation ditches, there shall be a minimum vertical distance of 3 feet from top of pipe to the flowline of the ditch, or as shown in the design plans or by permit requirements. Where pipe is installed beneath railroad tracks, there shall be a minimum vertical distance of 4 feet-6 inches from the top of pipe casing to top of railroad ties, or as shown in the design plans or by permit requirements. Utility crossing permits to cross under railroad track will be obtained from Railroad Authority by Owner. Any expense associated with permit costs, insurance requirements, construction bracing or supports to tracks during excavation operation beneath trackage shall be considered the responsibility of the Contractor and part of the Contract.

2. For all pipe, the Contractor shall familiarize himself with the TCEQ Chapter 290 and 217 Separation Distance Requirements and verify that all proposed work conforms to these regulations. The Contractor shall immediately notify Utility Owner and the Engineer once the Contractor discovers that field conditions cannot meet the TCEQ Separation Distance Requirements.

3. Inform the Utility Owner if any un-metered connections exist which are not shown on the design plans. Make transfer only after approval by the Utility Owner.

4. Procedure - After the trench is excavated to grade as specified, it shall be backfilled in accordance with the details shown in the design plans. Bedding material shall provide a smooth and uniform pipe bed for the entire length of the water pipe barrel. Trenching and pipe laying shall be uniformly in a straight line and to uniform elevation unless otherwise specified on plans. Pipe, fittings and valves shall be carefully handled to avoid damage. Before placing pipe into the trench, the outside of the spigot and the inside of the bell shall be wiped clean and dry, free from oil and grease. Every precaution shall be taken to prevent foreign material from entering the pipe. During layout operation, no debris, tools, clothing or other material shall be placed into the pipe. After placing a length of pipe in the trench, the spigot end shall be centered in the bell; the pipe forced

home, brought to the correct alignment and covered with an approved backfill material. Detectable warning metallic tape with “Waterline Below” shall be buried above pipe at a depth of 18 inches below finished grade for surface locating purposes. The minimum width of the metallic tape shall be 6-inches wide as manufactured by Presco Detectable Warning Tape or approved equal. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other approved means. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

B. PIPE JOINTING - In laying the water pipe to line and grade, the pipe shall be jointed in accordance with one of the following approved jointing methods. Owner reserves the right, before construction, or while construction is in progress, to change the type of joints if Owner's Engineer so directs.

1. Asbestos Cement Pipe Jointing - The Contractor shall furnish and install asbestos cement pipe in accordance with AWWA Standard "Installation of Asbestos Cement Pressure Pipe" C603-78, latest revision. The machined ends of the pipe to be jointed, coupling grooves and rubber rings shall be cleaned immediately before assembly. Care should be taken not to roll, pinch or reverse the gasket when placed in the bell. Each pipe joint shall be sealed with a coupling consisting of an asbestos cement sleeve and two rubber rings or an equivalent coupling or joint of equivalent strength and performance, as determined by Engineer. The pipe joint shall not be deflected either vertically or horizontally beyond the limits recommended by the manufacturer.

2. Polyvinyl Chloride (PVC) Pipe Jointing - The Contractor shall make certain before jointing polyvinyl chloride pipe that the ring groove in the bell of the pipe is clean, with no dirt or foreign material that could interfere with proper seating of the ring. Make sure pipe end is clean. Wipe with a clean dry cloth around the entire circumference from the end to one inch beyond the reference mark. Lubricate the spigot end of the pipe, using only the lubricant supplied by the manufacturer. Be sure the entire circumference is covered. The coating should be the equivalent of a brush coat of enamel paint. It can be applied by hand, cloth, pad, sponge or glove. Do not lubricate the ring groove in the bell to avoid lubrication causing ring displacement. The level end is then inserted into the bell so that it is in contact with the ring. Brace the bell, while the level end is pushed in under the ring, so that previously completed joints in the line will not be closed. The spigot end is pushed until the reference mark on the spigot end is flush with the end of the bell. DO NOT OVER INSERT BEYOND THE REFERNCE MARK. If undue resistance to inserting of the level end is encountered or the reference mark does not reach the flush position, disassemble the joint and check the position of the ring. If it is twisted or pushed out of its seat, clean the ring, bell and level end and repeat the assembly steps.

   Make curves and bends by deflecting joints or other method as recommended by the pipe manufacturer and approved by the Utility Owner. Contractor may submit details of other methods or providing curves and bends for considerations by the Utility Owner, and if accepted, shall be installed at no additional cost to the Owner. Deflection of pipe joints shall not exceed maximum deflection recommended by pipe manufacturer. If deflection exceeds that specified but is less than 5-percent, repair entire deflected pipe section such

that maximum deflection allowed is not exceeded. If deflection is equal to or exceeds 5-percent from that specified, remove entire portion of deflected pipe section with new pipe. Assessment of pipe deflection will be measured by the Engineer at any location along the pipe. Arithmetical averages or deflection or similar average measurement methods will not be deemed as meeting intent of standard. When rubber gasketed pipe is laid on a curve, join pipe in a straight alignment and then deflect to curved alignment.

C. WET CONNECTIONS - Schedules of existing fittings and proposed new fittings needed to make wet connections to existing waterlines as shown on the plans are estimates only. It is to be recognized that after existing lines and fittings are uncovered, that some discrepancies may occur. Where discrepancies occur, the Contractor shall request a decision by the Owner as to how the connection in question shall be made. Additional fittings shall be included in the costs associated with applicable bid items. Contractor shall plan his work concerning wet connections in such a way that a minimum of inconvenience shall occur to existing water customers due to water service interruptions. Before water service interruptions are made to any customer, Contractor shall notify designated official and cooperate with operating personnel in every way to minimize service interruptions due to wet conditions. In certain locations, other utility lines or conduits will be obstructing the normal path of proposed waterlines. In such instances, gravity lines of all kinds hold priority as to grade over water pressure lines, gas lines, electric conduits, or other obstruction conduits or combinations of conduits, which may be encountered. Contractor shall analyze conditions carefully, while considering TCEQ Chapter 290 separation distance requirements, and then use best judgment in determining proper method of proceeding through obstructed area with waterline construction, and shall notify the Owner forty-eight (48) hours in advance of making such connection after obtaining approval from the Owner's Engineer.

D. APPURTENANCES - Appurtenances to the waterline shall be provided and laid in accordance with the drawings and in the manner as specified herein.

1. Valves. Valves shall be installed with restraining joints and concrete thrust blocks (braced against undisturbed soil) at the locations shown and as specified in the design plans. All valves shall be wrapped in a plastic protector in conformance with AWWA Standard C-105 and ANSI A21.5 "Polyethylene Encasement for Gray and Ductile Cast-Iron piping for Water and Other Liquids." Valve wrapping shall be installed in such a manner as to curtail or prevent corrosion of the metallic valves.

2. Fire Hydrants. All fire hydrants shall be located as shown in the plans, and in a manner to provide complete accessibility, and to minimize the possibility of damage from vehicles or injury to pedestrians. All hydrants shall stand plumb with the pumper nozzle facing the curb (or as shown in the design plans) and the bury line of the hydrant at the finished grade. A 12-inch gravel pocket (in all directions) shall be installed around the drain ports. Do not cover drain ports when placing concrete thrust block. Located nozzle center line a minimum 18-inches above finished grade. Fire hydrants installed near State Highways shall be in accordance with State Department of Highways and Public Transportation requirements. Set fire hydrant plumb and brace at locations and grades as shown on Drawings. When barrel of hydrant passes through concrete slab, place a 1-inch-thick piece of standard sidewalk expansion joint material around section of barrel

passing through concrete. All fire hydrants shall be connected to the main in the manner shown in the design plans. Place 12-inch x 12-inch yellow indicators (plastic, sheet metal, plywood, or other material approved by the Owner) on pumper nozzles of new or relocated fire hydrants installed on new mains not in service. Remove indicators after new main is tested and approved by the Owner. Install Hydrant defenders upon removal of indicators.

3. Services. Set service taps at right angles to proposed meter location and locate taps in upper pipe segment within 0 degrees of pipe springline. Tapped collars of appropriate sizes: Approved in new construction only provided they are set at right angles to proposed meter location. Use tapping machine manufactured for pressure tapping purposes for 2-inch and smaller service taps on pressurized water mains.
Install service lines in open-cut trench in accordance with Section 31 23 23.13 - Excavation and Backfill for Utilities except that service lines under paved roadways, other paved areas and areas indicated on Drawings shall be installed in cased bored hole in accordance with paragraph 3.01G.

   Lay service lines with minimum of 48 inches of cover as measured from top of curb or, in absence of curbs, from centerline elevation of crowned streets or roads. Provide minimum of 18 inches of cover below flow line of ditches to service lines.

   Service lines across existing street (push-unders): Pull service line through prepared hole under paving. Only full lengths of tubing shall be used. Take care not to damage copper tubing when pulling it through hole. A compression-type union is only permitted if Contractor cannot span underneath pavement with a full length of tubing. Contractor is allowed one compression-type union for each full length of tubing, provided it is not under the pavement.

   Maintain service lines free of dirt and foreign matter.

   Set curb stops or angle stops at outer end of service line inside of meter box. Secure opening in curb stop to prevent unwanted material from entering. In close quarters, make an S-curve in the field. Do not flatten tube. In 3/4-inch and 1-inch services, install meter coupling, swivel-nut, or curb stop ahead of meter. Install straight meter coupling on outlet end of meter.

   Install service lines so that top of meter will be 3 to 6 inches below finished grade.

   Locate water meters one foot inside property line, or if this is not feasible, one foot inside street right-of-way. Contact Utility Owner when major landscaping or trees conflict with service line and meter box location.

3.2 TESTING AND STERILIZATION

A. TESTING. All newly laid sections of pipe shall be hydrostatically tested at a gauge pressure of 150 psi. Contractor has the option of running hydrostatic test before or after trench has been completely backfilled. Trenches must be at least partially backfilled before hydrostatic

testing to prevent pipe shift. Hydrostatic tests shall be in accordance with AWWA Standard C600 Section 4 "Hydrostatic Testing" latest revision.

1. Hydrostatic Test Procedure - The Contractor shall provide all necessary equipment, water, safety, and other appurtenances necessary for testing procedures. All waterlines shall be disinfected prior to hydrostatic testing. Allow pipeline to sit a minimum of 24 hours from time it is initially disinfected until testing begins, to allow pipe wall or lining material to absorb water. Periods of up to 7 days may be required for mortar lining to become saturated. All testing procedures shall be conducted in the presence of the Owner. Air pressure testing will not be allowed. For large diameter water mains, test waterlines in lengths between valves or plugs, but no greater than 4,400 feet in length. Small diameter waterlines shall be tested in lengths between valves or plugs of not more than 2,800 feet in length.
2. Furnish, install and operate connections, pump, meter and gauges necessary for hydrostatic testing. The line shall be slowly filled with water to the specified test pressure. The lowest elevation point of the section being tested shall be determined and any corrections necessary shall be corrected to the elevation of the test gauge by means of a hand pump, gasoline or electrically driven test pump connected to the pipe. A blow off or fire hydrant shall be installed at the end of the line under test. Before applying the specified test pressure, all air shall be expelled from the test section including service connections. If hydrants or blow offs are not available at high places, tap at points of highest elevation shall be made before the test is made and brass plugs inserted after the test has been completed. After all air is expelled, apply a minimum hydrostatic pressure of 150 psi. Begin test by 4 p.m., unless otherwise approved by the Owner. Maintain test pressure until 8 a.m. the following morning. If large quantity of water is required to maintain pressure during test, testing shall be discontinued until cause of water loss is identified and corrected. Leakage tests shall be conducted concurrently with pressure tests. Owner will inspect all pipe, fittings, valves and joints under tests. Any faults found to be due to improper workmanship shall be corrected by the Contractor at no expense to Owner. Allowable pressure loss is a maximum of 5-psi leakage over the 16-hour, overnight test period. If this pressure requirement is failed 3 (three) times, use AWWA Standard C600 Section 4 “Hydrostatic Testing” latest revision.

B. STERILIZATION. Pipeline construction shall be in accordance with Section 4 of AWWA Standard C651-01, latest revision. Upon or during completion of the hydrostatic test, the new section of pipe shall be sterilized in accordance with AWWA Standard "Disinfecting Water Mains" C601, latest revision; and the State of Texas Health Standards. Chlorine may be applied by the following methods: Continuous Feed Method and Chlorine Tablet Method. Contractor shall provide all equipment and chemicals necessary for sterilization.

Use required temporary blind flanges, cast-iron sleeves, plugs, and other items needed to facilitate disinfection of new mains prior to connection to the Owner’s water distribution system. Normally, each valve section of water line requires two each 3/4-inch taps. A 2-inch minimum blow-off is required for water lines up to and including 6-inch diameter. Fire hydrants shall be used as blow-offs to flush newly constructed water lines 8-inch diameter and above. Where fire hydrants are not available on water lines, locations and designs for

blow-offs shall be as indicated on Drawings. Install temporary blow-off valves and remove promptly upon successful completion of disinfection and testing.

Slowly fill each section of pipe with water in a manner approved by the Owner. Average water velocity when filling pipeline should be less than one foot per second and shall not, under any circumstance, exceed 2 feet per second. Before beginning disinfection operations, expel air from pipeline.

1. Continuous Feed Method - This method is suitable for general application. Water from the existing distribution system or other approved sources of supply shall be made to flow at a constant, measured rate into the newly laid pipeline. The water shall receive a dose of chlorine, also fed at a constant, measured rate. The two rates shall be proportioned so that the chlorine concentration in the water in the pipe is maintained at a minimum of 50 mg/l available chlorine. During the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the line supplying the water. Chlorine application shall not cease until the entire main to be tested is filled with the chlorine solution. The chlorine water shall be retained in the main for at least 24 hours during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this 24-hour period, the treated water shall contain no less than 25 mg/l chlorine throughout the length of the main.

2. Chlorine Tablet Method - Tablet disinfection is best suited to short extensions (up to 2,500 feet) and smaller diameter mains (up to 8-inch diameters). Because the preliminary flushing step must be eliminated, this method shall be used only when scrupulous cleanliness has been exercised. It shall not be used if trench water or foreign material has entered the main or if the water is below 5°C (41°F). Calcium hypochlorite tablets are placed in each section of pipe and in hydrants, hydrant branches and other appurtenances. They shall be attached by an adhesive, except for the tablets placed in hydrants and in the joints between the pipe sections. All the tablets within the main must be at the top of the main. If the tablets are fastened before the pipe section is placed in the trench, their position should be marked on the section to assure that there will be no rotation. In placing tablets in joints, either crushed or placed on the inside annular space or, if the type of assembly does not permit, they are rubbed like chalk on the butt ends of the sections to coat them with calcium hypochlorite. The adhesive may be Permatex No. 1 or any alternative approved by the Owner. There shall be no adhesive on the tablet except on the broad side next to the surface to which the tablet is attached. If desired, the calcium hypochlorite may be placed in the pipe in granular form at a rate of one (1) cup (4 fl. oz.) per each pipe. When installation has been completed, the main shall be filled with water at a velocity of less than 1-ft./sec. This water shall remain in the pipe for at least 24 hours. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water.

3. Final Flushing - After the applicable retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water leaving the main is no higher than that generally prevailing in the system, or less than 1 mg/1. Chlorine residual determination shall be made to ascertain that the heavily chlorinated water has been removed from the pipeline.

4. Bacteriologic Tests - After final flushing, and before the water main is placed in service, a sample or samples shall be collected from the end of the line and tested for bacteriologic quality and shall show the absence of coliform organisms. If the number and frequency or samples is not prescribed by the public health authority having jurisdiction, at least one sample shall be collected from chlorinated supplies when the chlorine residual is maintained throughout the new main. From unchlorinated supplies, at least two samples shall be collected at least 24 hours apart. In the case of extremely long mains, it is desirable that samples be collected the length of the line as well as at its end. Samples for bacteriologic analysis shall be collected in sterile bottles treated with sodium thiosulfate. No hose or fire hydrant shall be used in collection of samples. A suggested sampling tap consists of a standard corporation cock installed in the main with a copper tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use.

5. Repetition of Procedure. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. The tablet method cannot be used in these subsequent disinfections. When the samples are satisfactory, the main may be placed in service.

END OF SECTION

SECTION 333111

SANITARY SEWER PIPEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Under this section is included the furnishing, laying, jointing and testing of all sewer pipe, including sewer pipe and sewer appurtenances, both in open cut and in tunnels, as shown on the drawings or as directed by the Engineer.

1.2 UNIT PRICES

A. Unit Prices.

1. Payment for normal depth sanitary sewer, up to 8 feet deep, by open-cut or augered with or without casing is on a linear foot basis for each size of pipe. Depth is measured from bottom of the pipe to the proposed natural ground. Separate pay items are used for open-cut and augered installation.

2. Payment for sanitary sewer, greater than 8-foot in depth, by open-cut or augered is on a linear foot basis for each 2-foot increment for depths greater than 8 feet. Depth is measured from bottom of the pipe to the proposed natural ground.

3. Payment for normal depth manholes, up to 8 feet deep, is on a unit price basis for each manhole installed. Depth is measured from proposed top of cover to sewer invert.

4. Payment for manholes, greater than 8-foot in depth, is on a unit price for each manhole installed for each 2-foot increment. Depth is measured from proposed top of cover to sewer invert.

5. Payment for sanitary service connections in on a unit price for each single, double, short and long service connection installed.

6. Payment for force mains installed by open-cut or augered with or without casing is on a linear foot basis for each size of pipe installed. Separate pay items are used for open-cut and augered installation.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Gravity Sewer Pipe

1. Gravity sewer pipe may be of any of the following classifications. Any pipe found defective, not meeting the specifications, or improperly installed shall be rejected and so marked and shall be replaced by pipe approved by the Engineer at no additional cost to Utility Owner.

a. Pipe and fittings shall be manufactured in conformance with the materials and methods described in ASTM Specification D-3034. Joint seals shall be compression type rubber gaskets in compliance with the requirements of ASTM Specification D-1869.

b. Pipe and fittings shall be manufactured in conformance with the materials and methods described in ASTM Specification F-789 and UNI-B-10. Gaskets shall comply with the requirements of ASTM Specification F-477.

2. Manholes

a. Manholes shall be constructed of glass fiber-reinforced isophalic polyester resin containing chemically enhanced sand for use in sanitary sewer applications. They shall be a one-piece unit of one class, fabricated in a composite laminate. Walls shall be of uniform thickness and shall be free from thin spots and voids. Exterior surface shall be free of ridges and sharp protrusions and reinforcement. Interior surface shall also be smooth and free of ridges to allow for self-cleaning. The exterior surface shall be covered with graded sand to facilitate bonding to the concrete base pad, cement stabilized sand backfill and cement grout used to seal around all incoming lines. Manholes shall conform to the following design criteria:

1. ASTM D-3753 "Standard Specification of Glass-Fiber reinforced Polyester Manholes."
2. ASTM C-581 "Practice for determining chemical resistance of chemical thermosetting resins used in glass-fiber reinforced structures intended for liquid Service."
3. ASTM D-2412 "Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading."
4. ASTM D-695 "Test Methods for Compressive Properties of Rigid Plastics."
5. ASTM D-2584 "Test Method for Ignition Loss of Cured Reinforced Resins."
6. AASHO H-20 Axial Loading Nominal inside diameter of the manhole shall be 48".
   Thickness of the manhole shall be 0.50" nominal. Height shall be selected in accordance with project plans.

b. Dimensions: The manhole shall be a circular cylinder, reduced at the top to a circular manway not smaller than 30” inside diameter. Manholes shall be produced in half-foot increments in length +/- 2”. Nominal inside diameters shall be 48”, 60”, and 72“as shown in the design details. Tolerance on the inside diameter shall be +/- 1%.

c. Configuration: The manway reducing cone section shall be centered on the manhole barrel and must provide a bearing surface on which a standard ring and cover may be supported and adjusted to grade. The reducer shall be joined to the barrel section at the factory with resin and glass fiber reinforcement, thus providing required monolithic design to prevent infiltration and/or exfiltration through the manhole.

d. Loading: The manhole shall be manufactured in one class of load rating. This class shall be H-20 wheel load (minimum 16,000 pounds dynamic wheel load).

e. Manufacturer and Certification: The manholes shall be Containment Solutions, Inc. Flowtite Fiberglass Manholes or approved equal that conforms to ASTM D. 3753-81, Standard Specifications for Fiberglass Reinforced Polyester Manholes and all noted applicable documents. The manufacturer shall submit written certification that their product meets the requirements of ASTM D. 3753-81 with test results of specified manholes included.

B. Force Mains

1. Pressure sewer pipe will be the following classification. Any pipe found defective, not meeting the specifications, or improperly installed shall be rejected and so marked and shall be replaced by pipe approved by the Engineer at no additional cost to Utility Owner.

a. Polyvinyl chloride pipe for force mains shall conform to AWWA Standard "Polyvinyl Chloride (PVC) Pressure Pipe" C-900 - 750 Class 100 DR25 latest revision. Fittings for polyvinyl chloride (PVC) pipe shall be Ductile Iron Class 125 "Compact Fittings" short body, tar coated (not cement lined). Transition gaskets shall also be included, unless otherwise noted on the contract bid document or drawings.

b. Polyvinyl chloride pipe for directional bored force mains shall conform to Fusible AWWA C-900 DR-25 PVC.

C. Service Connections

1. Property service connections shall be installed using Polyvinyl Chloride Pipe (PVC). The pipe type shall be specified in the service line detail shown in the design plans.

D. Concrete Surface Coatings

1. All interior manhole concrete surfaces shall be coated with 8mils of Raven 155 epoxy primer and 125 mils of Raven 405 – 100% solids, solvent-free ultra-high build epoxy system manufactured by Raven Lining Systems, Broken Arrow, Oklahoma or Engineer approved equal.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. For all pipe, the Contractor shall familiarize himself with the TCEQ Chapter 217 Separation Distance Requirements and verify that all proposed work conforms to these regulations. The Contractor shall immediately notify Utility Owner and the Engineer once the Contractor discovers that field conditions cannot meet the TCEQ Chapter 217 Separation Distance Requirements.

B. After the trench is excavated to grade as specified, it shall be filled to grade with a minimum 6-inch bank run sand layer, in accordance with 31 06 20.16 - Utility Backfill Materials. This material shall be mechanically tamped to a density minimum of 90%. This material shall provide a smooth and uniform pipe bed for the entire length of the sewer pipe barrel. Trench foundation preparation may require dewatering, gravel bedding, or cement stabilized sand to create a stable foundation for pipe installation. Stable foundation conditions and trench improvements will be at the direction of the Utility Owner Inspector or the Engineer and at no additional costs to the Owner.

C. Trenching and pipe laying shall be uniformly in a straight line and to uniform elevations unless otherwise specified on the plans. Pipe and fittings shall be carefully handled to avoid damage. Before placing pipe into the trench, the outside of the spigot and the inside of the bell shall be wiped clean and dry, free from oil and grease. Every precaution shall be taken to prevent foreign material from entering the pipe. During layout operation, no debris, tools, clothing or other material shall be placed into the pipe. After placing a length of pipe into the trench, the spigot end shall be centered in the bell, the pipe forced home, brought to the correct alignment and covered with an approved backfill material. Detectable warning metallic tape with “Sewer Line Below” shall be buried as directed by the Utility Owner inspector, but no greater than 4' below the finished grade. The width of the metallic tape shall be 6-inches wide or as specified by the manufacturer.

D. Watertight Joint Materials: The contractor must exert every reasonable effort to secure a watertight joint and prevent infiltration of ground water into or exfiltration of sewage out of all pipe sewers and property service connections. Any joint materials found to be defective or not meeting the specifications shall be rejected and replaced by approved joint materials at no additional cost to Utility Owner.

E. Polyvinyl Chloride Pipe (PVC) Jointing: The contractor shall make certain before jointing polyvinyl chloride pipe that the ring groove in the bell of the pipe is clean with no dirt or foreign material that could interfere with proper seating of the ring. Make sure pipe end is clean. Wipe with a clean dry cloth around the entire circumference from the end to one (1) inch beyond the reference mark. Lubricate the spigot end of the pipe, using only the lubricant supplied by the manufacturer. Be sure the entire circumference is covered. The coating shall be the equivalent of a brush coat of enamel paint. It can be applied by hand, cloth, pad, sponge, or glove. Do not lubricate the ring groove in the bell to avoid lubrication causing ring displacement. The level end is then inserted into the bell so that it is in contact with the ring. Brace the bell, while the level end is pushed in under the ring, so that previously completed joints in the line will not be close. The spigot end is pushed until the reference mark on the spigot end is flush with the end of the bell. If undue resistance to insertion of the level end is encountered or the reference mark does not reach the flush position, disassemble the joint and check the position of the ring. If it is twisted or pushed out of its seat, lean the ring, bell and level end and repeat the assembly steps.

   Water stop joints shall be Polyvinyl Chloride (PVC) or other similar approved joint materials.

F. Sewer Appurtenances - Appurtenances to the sewer shall be provided and laid in accordance with the drawings and in the manner as specified herein. Appurtenances in addition to those

required by the drawings or the proposal, as approved or directed by the Engineer, shall be paid for under the appropriate items of the proposal.

G. Service Branches and Fittings - Branches and fittings shall be provided and laid as and where directed. T-branches and Y-branches, placed in the sewer for property service connections, shall be located by the contractor, as directed by the Engineer, at such points in the sewer so as to result in the property service connection having the shortest length possible between the sewer and property line or easement line, unless otherwise indicated on the drawing or directed by the Engineer.

The Contractor shall install all service lines in accordance with TCEQ separation distance and Southern Building Code requirements. Contractor shall notify the Inspector or Engineer prior to the installation of any service that is in question in accordance to the TCEQ separation or Southern Building Code requirements. Where not approved street grade has been established, the depth of the connection shall be based on the assumed future street grade or on the present street or ground surface, as determined by the Engineer. At times when pipe laying is not in process, the open ends of the pipe shall be closed by a watertight plug or other approved means. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

H. Stubs - Stubs for future sewer pipe shall be installed as indicated by the drawings. If the specified length of the stub is exceeded, there will be no additional cost to Utility Owner unless the extra length is ordered by the Engineer. Existing sewer pipe stubs shall be removed as required, but only when directed by the Engineer.

I. Stacks - Stacks shall be constructed as and where directed. The height of the stack shall be as indicated on the drawings, set forth in the proposal, as determined by the Engineer. The stack shall encased in-concrete in accordance with the Design Plans.

J. Drop Inlets - Drop inlets to the manhole shall be constructed as and where indicated by the drawings of either of the types shown on the Design Plans, as directed by the Engineer.

K. Cleanouts - Cleanouts on all service laterals shall be installed at the location shown on the plans and in accordance with the Design Plans.

L. Manholes - Manholes shall be constructed as shown in Design Plans to the elevations shown on the plan-profile sheets, and in accordance with manufacturer's installation instructions.

1. Prepare excavation at manhole location should be at least 12-inches wider than the proposed concrete foundation slab specified and to provide working room around manhole.
2. Verify the depth of manhole is sufficient to allow 12 to 18-inches from the finished grade and the cone support ring, as per design plans.
3. For unstable trench foundation, provide a minimum of 4 to 6-inches of crushed limestone or 2-inch gravel, or until a stable foundation is achieved.
4. Set manhole as per manufacturer's installation instructions. Level and plumb manhole and connect sewer lines to manhole with a seal ring as manufactured by Northtown Pipe

Protection Products or equal (as per ASTM C-923 requirements). A concrete base encasement shall be placed at least 12 inches outside of the diameter of the manhole and shall come over the top of the anti-flotation ring a minimum of 12 inches. All sides of incoming and outgoing sewer lines shall be covered with a minimum of 6-inches of concrete. Manhole levels shall be verified throughout the placement and finishing of concrete base construction.

5. Backfilling is allowed as soon as the concrete base has hardened enough to provide sufficient support for manhole and fill. Native soil (or band run sand, as specified in Section 31 06 20.16 – Utility Backfill Materials, in unstable areas), free of large stones, debris, or concrete chunks may be used for backfill. Backfill should be place evenly around manhole in 12" maximum loose lifts and should thoroughly tamped to 90% standard proctor density. Each layer shall be completely compacted before the next layer is installed to avoid uneven lateral pressure which could move the manhole out of plumb. Backfill material shall be subject to approval by the Engineer.
6. Contractor shall maintain the stability of the excavation during backfilling of the manhole which includes both trench protection and dewatering efforts.
7. To bring the manhole to finished grade and provide support for ring and cover, construct chimney using polyethylene rings by Lad Tech or approved equal.

A. Concrete Coating - All concrete surfaces within the manhole shall be coated with 100% solids, solvent-free ultra-high build epoxy coating system. Surfaces to be coated shall be cleaned by sandblasting or by water-blasting with 10% muriatic acid prior to coating. Coating system shall consist of 125 mils of Raven 405 epoxy coating, applied in accordance with manufacturer's recommendations, alternative coating system approved in advance by Engineer.

B. Stoppers and Bulkheads - Open ends of pipes and branches smaller than 15 inches in diameter shall be sealed with stoppers, plugs, or caps, cemented into place in an acceptable manner using a rubber gasket between the stopper and socket. All openings to the pipeline shall be satisfactorily protected from the entrance of earth, water or other material. If a temporary bulkhead is constructed to prevent sewage from backing into the trench excavation or to prevent foreign material from entering the sewer from the new sewer trench, the contractor shall be responsible for reconstructing, repairing, or replacing those portions of the existing sewers removed or damaged by his operations. Existing bulkheads shall be removed as indicated by the drawings or set forth in the proposal, but not until directed by the Engineer.

3.2 TESTING

A. All sewer lines must be tested in accordance with 30 TAC §217.57. The Owner must retain copies of all test results which must be made available to the executive director upon request. The Owner must certify in writing that all wastewater lines have passed all required testing to the appropriate regional office within 30 days of test completion and prior to use of the new collection system.

1. For a collection system pipe that will transport wastewater by gravity flow, the design must specify an infiltration and exfiltration test or a low-pressure air test in accordance with ASTM F-1417.

- Low Pressure Air Exfiltration Testing: The following materials will be furnished by the contractor and utilized for air testing sewer mains:

- Compressor Air Supply: Any source which will provide at least three hundred (300) cubic feet per minute at one hundred (100) pounds per square inch. The compressor air supply shall be furnished by the contractor.

  Plugs, valves, pressure gauges, air hose, connections and other equipment necessary to conduct the air test shall be furnished by the contractor. The test equipment for air testing will consist of valves, plugs, and pressure gauges used to control the rate at which air flows to the test section and to monitor the air pressure inside the plugs. Test equipment shall be assembled as follows:

  a. hose connection
  b. shut off valve
  c. throttle valve
  d. pressure reduction valve
  e. gauge cock
  f. monitoring pressure gauge

- Test Procedures - The following procedures will be utilized for air testing sewer mains:

- Apply air pressure until the pressure inside the pipe reaches 4 psig.

- Allow the pressure inside the pipe to stabilize, then bleed back to 3.5 psig.

- At 3.5 psig, the time, temperature and pressure will be observed and recorded. A minimum of five (5) readings will be required for each test. If the time in seconds for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than that shown in the following table, the pipe shall be presumed to be free from defect. When these rates are exceeded, pipe breakage, joint leakage, or leaking plugs are indicated and an inspection must be made to determine the cause. The contractor shall affect such repairs as may be required to accomplish a successful air test.

Table 1 Minimum Test Time for Various Pipe Sizes

Nominal Pipe Size, in.	T(time) min/100 ft.	Nominal Pipe Size, in.	T(time) min/100 ft.
3	0.2	21	3.0
4	0.3	24	3.6
6	0.7	27	4.2
8	1.2	30	4.8
10	1.5	33	5.4
12	1.8	36	6.0
15	2.1	39	6.6
18	2.4	42	7.3

- Leakage Test - A leakage test may be requested by the Owner to determine excessive infiltration and to assure that the sewer section is substantially watertight. The Engineer may order the contractor to make leakage tests of as many sections as may be necessary to determine whether the work complies with the criteria for the rate of leakage. A section shall consist of a reach from one manhole to the next manhole provided the manholes are at least 300 feet apart and preferably 400 feet. Leakage tests shall be conducted, and measurements made, for a minimum of one hour. The tests may be conducted over a longer period with no reduction in the rate of leakage.

- Leakage into Sewer - Leakage into the sewer including manholes, shall not exceed a rate of 50 gallons per 24 hours per inch diameter per mile of sewer. There shall be no gushing or spurting streams entering the sewer or manhole and where encountered they shall be repaired regardless of the rate of infiltration at no additional cost to Utility Owner. Where practicable, the tests for leakage into the sewers shall be made at a time when the groundwater level is at a maximum, but it must be at least one foot above the top of the pipe of the highest elevation in the section being tested.

- Leakage out of Sewer - Where the groundwater level is less than one foot above the top of-the pipe and where conditions will permit, the sewers shall be subjected to an internal pressure by plugging the pipe at both ends and then filling the sewer and manholes with clean water to a height above the top of the pipe sufficient to obtain satisfactory measurements to determine the rate of leakage, but no less than 2-feet above the top of the upstream pipe. The rate of

leakage from the sewers will be determined by the amount of water volume lost during the testing period or by the volume of water needed to maintain the original water surface level. Leakage from the sewers under test shall not exceed a rate of 50 gallons per 24 hours per inch diameter per mile of sewer, except that an allowance of an additional 10 percent of gallonage shall be permitted for each additional 2 feet of head over a basic 2-foot minimum internal head.

- Requirements of the Contractor - The contractor shall construct such weirs or other means of measurements as may be required, shall furnish water and shall do all necessary pumping to enable the tests to be properly made. When a leakage test fails, the contractor shall do such other work as may be necessary until the rate of leakage meets the above requirements, as determined by additional leakage tests.

- Deflection Testing for Gravity PVC Sewer Lines

- No sooner than 30 days, nor later than 12 months after the pipe has been installed and backfilling has been completed, tests for deflection will be made. A deflection of more than 5 percent of the inside diameter of the pipe shall be cause for rejection, and the line will be removed and replaced at the contractor's expense. A GO-NO-GO Deflection Testing Mandrel, to be furnished by the contractor, and certified by the Owner and Engineer, shall be used. The testing shall consist of the following:

- Completely flush the line, if required, making sure the pipe is clean of any mud or debris that would hinder the passage of the mandrel.

- During the final flushing of the line, attach a floating block or ball to the end of the mandrel pull rope and float the rope through the line.

- After the rope is threaded through the line, connect the pull rope to the mandrel and place the mandrel in the entrance of the rope.

- Connect a retrieval rope to the back of the mandrel to pull it back if necessary.

- Remove all slack in the pull rope and place a tape marker on the rope at the ends of the pipe where the mandrel will exit, determining the location of the mandrel in the line.

- Using manhole guide pulleys, draw mandrel through the sewer line, if any irregularity of pipe deformation exceeding the allowable 5 percent is encountered in the line, the line shall be uncovered at the point.

- If an obstructed or over-deflected section is found, locate it; uncover pipe; inspect the pipe; if any damaged pipe is found, replace it. Backfill as per design plans.

- Re-test this entire section for deflection.

- Any pipe removed shall be replaced by use of gasketed repair couplings. Every deflection test shall be conducted in the presence of the Owner's or Engineer's representative.

- The Contractor shall furnish all labor and material required to clean and flush and complete all testing required by this specification in accordance with Section f, below. The Owner, at their discretion, may televise the sewer lines. The Contractor shall furnish and install all required traffic control methods, as per TMUTCD, needed for the Owner to conduct the televising of the Work. If there is an insufficient roadway within the project area, the contractor will furnish the equipment necessary to gain full access to the site.

- Manhole Leakage Testing

- After completion of manhole construction, wall sealing, or rehabilitation, but prior to backfilling, test manholes for water tightness using hydrostatic or vacuum testing procedures. Manholes shall be tested after installation with all connections (existing and/or proposed) in place. Final acceptance in accordance with the requirements of this specification will consist of vacuum testing of the completed and installed manhole in place to include manhole/adjustment rings and manhole casting. The Contractor shall furnish all labor and material required to complete all testing required by this specification.

- Vacuum Testing: Vacuum testing shall be performed as follows:

- Plug influent and effluent lines, including service lines, with suitably sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer’s safety and installation recommendations. Place plugs a minimum of 6 inches outside of manhole walls. Brace inverts to prevent lines from being dislodged if lines entering manhole have not been backfilled. Install vacuum tester head assembly at top access point of manhole and adjust proper seal on straight top section of manhole structure. Following manufacturer’s instructions and safety precautions, inflate sealing element to the recommended maximum inflation pressure; do not overinflate.

- Evacuate manhole with vacuum pump to 10 inches mercury (Hg), disconnect pump, and monitor vacuum for two minutes.

- If the vacuum pressure drop exceeds 1-inch Hg over a two-minute time period, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

- MATERIALS - Test equipment shall be assembled as follows:

- Engine
- Vacuum Pump
- Hose
- Test Head Device capable of sealing opening in manhole casting as required.
- Pneumatic test plugs – These plugs shall have a sealing length equal to or greater that the diameter of the connecting pipe to be sealed.
- monitoring pressure gauge (rotameter)

- Hydrostatic Exfiltration Testing: Hydrostatic exfiltration testing shall be performed as follows:

  - Seal wastewater lines coming into the manhole with an internal pipe plug. Then, fill the manhole with water and maintain it full for at least one hour.

  - The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot of manhole diameter per foot of manhole depth per hour.

  - If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

- All testing shall be done by the contractor and witnessed by the Owner. All manholes and structures shall be tested as finished and completed for final acceptance.

  Any defective work or materials shall be corrected or replaced by the contractor and retested. This shall be repeated until all work and materials are acceptable.

- Force Main Hydrostatic Testing

- After the pipe and appurtenance have been installed, test line and drain. Prevent damage to the Work or adjacent areas. Use clean water to perform tests.

- The Owner may direct tests of relatively short sections of completed lines to minimize traffic problems or potential public hazards.

- Test pipe in the presence of the Owner.

- Test pressures shall be at the normal operating pressure of the force main plus 50 psi. Normal operating pressure of the force main shall be the rated total dynamic head with all lift station pumps operating.

- Test pipe at the required pressure for a minimum of 4 hours according to requirements TCEQ Chapter 217.68 requirements.

- Maximum allowable leakage shall be as calculated by the following formula:

$$L = (S)\ (D)\ (P^{0.5}) / 155{,}400$$

Where:
L = Acceptable Leakage (gallons/hour/1,000-feet of pipe, based on a leakage rate of 10 gallons per inch of diameter per mile of pipe per day).
S = Length of pipe (feet).
D = Inside diameter of pipe (inches).
P = Pressure (pounds/square inch).

- Correct defects, cracks, or leakage by replacement of defective items or by repairs as approved by the Utility Owner.

- Plug openings in the force main after testing and flushing. Use cast iron plugs or blind flanges to prevent debris from entering the tested pipeline.

- Sanitary Sewer Television Inspection

The Owner, at their discretion, may televise the sewer lines to determine all sources and conditions of the leakage. The Owner will provide all personnel and televising equipment for the test.

- After construction of the sanitary sewer main and prior to placement of the final course of asphalt, the newly constructed sanitary sewer shall be televised immediately upon cleaning. Any abnormalities such as, but not limited to, misaligned joints, cracked/defected pipe, rolled gaskets, shall be repaired by the contractor at his expense. Sections requiring repair shall be re-televised to verify condition of repair. No additional compensation shall be provided for repair or re-televising.

- If necessary, the Contractor shall perform bypass pumping operations in accordance with all other specification requirements and as outlined below.

- The Contractor shall furnish all labor, supervision, tools, equipment, appliances, and materials to perform all operations in connection with bypass pumping of sewage flow for the purpose of preventing interference with the televising of the sanitary sewer manholes and mainlines as well as providing reliable sewer service to the occupants of the buildings being served.

- The Contractor will be required to provide adequate pumping equipment and force mains in order to maintain reliable sanitary sewer service in all sanitary sewer lines involved in this project. The Contractor shall notify the Owner should a surcharge occur during the televising process which results in overflows of sewage. In case of bypass equipment failure, the Contractor

shall discontinue work and release sewer flows until such time as equipment failure is corrected.

- The location of the pump(s), force main(s), and discharge points shall be approved by the Owner. Under no circumstances shall the flow be interrupted or stopped, such that damage is done to either private or public property, or sewage flows or overflows into a storm sewer or natural waterway.

- The Contractor shall provide bypass pumping of sewage around each segment(s) of pipe that is to be televised and shall be responsible for all required bulkheads, pumps, equipment, piping, and other related appurtenances to accomplish the sequence of pumping. A qualified person shall man the pumps, on-site, at all times during the bypassing procedure.

- All piping, joints, and accessories shall be designed to withstand the maximum bypass system pressure, or a minimum of 50 psi, whichever is greater. During bypass pumping, no sewage shall be leaked, dumped, or spilled into or onto any area outside of the existing sanitary sewer system. When bypass pumping operations are complete, all piping shall be drained into the sanitary sewer prior to disassembly.
- The Contractor shall demonstrate that the pumping system is in good working order and can successfully handle flows during cleaning and televising operations, prior to commencing with the cleaning and televising of the system.
- The Contractor shall be required to have all materials, equipment, and labor necessary to complete the repair or replacement on the jobsite prior to isolating the sewer manhole or line segment and beginning bypass pumping operations.
- The Contractor shall plug off and pump down the sewer manhole and/or line segment in the immediate work area and shall maintain the sanitary sewer system so that surcharging does not occur. The Contractor shall coordinate with all property owners to ensure that no damage will be caused to their property during any and all sewer televising work. The Contractor shall complete the televising as quickly as possible and shall satisfactorily meet all requirements prior to discontinuing bypass pumping operations and returning flow to the sewer manhole or line segment. The Contractor shall ensure that no damage will be caused to private property as a result of bypass pumping operations. Ingress and egress to adjacent properties shall always be maintained. Ramps, steel plates, or other methods shall be employed by the Contractor to facilitate traffic over surface piping.
- If sewage accidentally drains into the drainage system or is spilled within the project, the Contractor shall immediately stop the overflow, notify the

Owner, and take the necessary action to clean up and disinfect the spillage using an HTH, or equal, chemical.

- Traffic management shall be done under the approval of respective City, County, or State Traffic Departments. The Contractor shall not open cut existing streets to accommodate bypass pumping piping unless specific written approval is given.
- Pigging Test
- After completion of hydrostatic testing and prior to final acceptance, test force mains longer than 200 feet by pigging to ensure piping is free of obstructions.
- Pigs: Provide proving pigs manufactured of an open-cell polyurethane foam body, without any coating or abrasives which would scratch or otherwise damage interior pipe wall surface or lining. Pigs shall be able to pass through reductions of up to 65 percent of the nominal cross-sectional area of the pipe. Pigs shall be able to pass through standard fittings such as 45-degree and 90-degree elbows, crosses, tees, wyes, gate valves, or plug valves, as applicable to the force main being tested.
- Test Execution: Pigging test shall be conducted in the presence of the Utility Owner. Provide at least 48-hour notice of scheduled pigging of the force main prior to commencing the test.

END OF SECTION

Item 164
Seeding for Erosion Control

1. DESCRIPTION

Provide and install temporary or permanent seeding for erosion control as shown on the plans or as directed.

2. MATERIALS

2.1. **Seed**. Provide seed from the previous season's crop meeting the requirements of the Texas Seed Law, including the testing and labeling for pure live seed (PLS = Purity × Germination). Furnish seed of the designated species, in labeled unopened bags or containers to the Engineer before planting. Use within 12 mo. from the date of the analysis. When Buffalograss is specified, use seed that is treated with KNO_3 (potassium nitrate) to overcome dormancy.

Use Tables 1–4 to determine the appropriate seed mix and rates as specified on the plans. If a plant species is not available by the producers, the other plant species in the recommended seed mixture will be increased proportionally by the PLS/acre of the missing plant species.

Table 1
Permanent Rural Seed Mix

District and Planting Dates	Clay Soils Species and Rates (lb. PLS/acre)		Sandy Soils Species and Rates (lb. PLS/acre)	
1 (Paris) Feb. 1–May 15	Green Sprangletop Sideoats Grama (Haskell) Bermudagrass Little Bluestem (Native) Illinois Bundleflower	0.3 3.2 1.8 1.7 1.0	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Sand Lovegrass Weeping Lovegrass (Ermelo) Partridge Pea	0.3 1.5 6.0 0.6 0.8 1.0
2 (Ft. Worth) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (Haskell) Texas Grama (Atascosa) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Little Bluestem (OK Select) Purple Prairie Clover (Cuero) Engelmann Daisy (Eldorado) Illinois Bundleflower Awnless Bushsunflower (Plateau)	1.0 1.0 1.0 0.4 0.2 0.8 0.6 0.75 1.3 0.2	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Shortspike Windmillgrass (Welder) Hairy Grama (Chaparral) Slender Grama (Dilley) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Partridge Pea (Comanche) Little Bluestem (OK Select) Englemann Daisy (Eldorado) Purple Prairie Clover	1.0 0.2 0.2 0.4 1.0 0.2 0.2 0.6 0.8 0.75 0.3
3 (Wichita Falls) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (Haskell) Texas Grama (Atascosa) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Little Bluestem (OK Select) Blue Grama (Hachita) Western Wheatgrass (Barton) Galleta Grass (Viva) Engelmann Daisy (Eldorado) Awnless Bushsunflower (Plateau)	0.6 1.0 1.0 0.4 0.2 0.8 0.4 1.2 0.6 0.75 0.2	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Shortspike Windmillgrass (Welder) Hairy Grama (Chaparral) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Partridge Pea (Comanche) Little Bluestem (OK Select) Englemann Daisy (Eldorado) Purple Prairie Clover (Cuero)	1.0 0.2 0.2 0.4 0.2 0.2 0.6 0.8 0.75 0.3
4 (Amarillo) Feb. 15–May 15	Green Sprangletop Sideoats Grama (Haskell) Blue Grama (Hachita) Buffalograss (Texoka) Illinois Bundleflower	0.3 3.6 1.2 1.6 1.0	Green Sprangletop Weeping Lovegrass (Ermelo) Blue Grama (Hachita) Sand Dropseed (Borden Co.) Sand Bluestem Purple Prairie Clover	0.3 0.8 1.0 0.3 1.8 0.5

Table 1 (continued)
Permanent Rural Seed Mix

District and Planting Dates	Clay Soils Species and Rates (lb. PLS/acre)		Sandy Soils Species and Rates (lb. PLS/acre)	
5 (Lubbock) Feb. 15–May 15	Green Sprangletop Sideoats Grama (El Reno) Blue Grama (Hachita) Buffalograss (Texoka) Illinois Bundleflower	0.3 3.6 1.2 1.6 1.0	Green Sprangletop Weeping Lovegrass (Ermelo) Blue Grama (Hachita) Sand Dropseed (Borden Co.) Sand Bluestem Purple Prairie Clover	0.3 0.8 1.0 0.3 1.8 0.5
6 (Odessa) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (South Texas) Blue Grama (Hachita) Galleta Grass (Viva) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Alkali Sacaton (Saltalk) Plains Bristlegrass (Catarina Blend) False Rhodes Grass (Kinney) Whiplash Pappusgrass (Webb) Arizona Cottontop (La Salle)	1.0 1.0 0.4 0.6 0.2 0.6 0.2 0.2 0.1 0.6 0.2	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Blue Grama (Hachita) Hairy Grama (Chaparral) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Indian Ricegrass (Rim Rock) Sand Bluestem (Cottle County) Little Bluestem (Pastura) Purple Prairie Clover (Cuero)	1.0 0.2 0.4 0.4 0.2 0.2 1.6 1.2 0.8 0.3
7 (San Angelo) Feb. 1–May 1	Green Sprangletop (Van Horn) Sideoats Grama (Haskell) Texas Grama (Atascosa) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Little Bluestem (OK Select) Blue Grama (Hachita) Western Wheatgrass (Barton) Galleta Grass (Viva) Engelmann Daisy (Eldorado) Illinois Bundleflower (Sabine)	1.0 1.0 1.0 0.4 0.2 0.4 0.4 1.2 0.6 0.75 1.0	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Shortspike Windmillgrass (Welder) Hairy Grama (Chaparral) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Sand Bluestem (Cottle County) Partridge Pea (Comanche) Little Bluestem (OK Select) Englemann Daisy (Eldorado) Purple Prairie Clover (Cuero)	1.0 0.2 0.2 0.4 0.2 0.2 1.2 0.6 0.8 0.75 0.3
8 (Abilene) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (Haskell) Texas Grama (Atascosa) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Little Bluestem (OK Select) Blue Grama (Hachita) Western Wheatgrass (Barton) Galleta Grass (Viva) Engelmann Daisy (Eldorado) Illinois Bundleflower (Sabine)	1.0 1.0 1.0 0.4 0.2 0.4 0.4 1.2 0.6 0.75 1.0	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Shortspike Windmillgrass (Welder) Hairy Grama (Chaparral) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Sand Bluestem (Cottle County) Partridge Pea (Comanche) Little Bluestem (OK Select) Englemann Daisy (Eldorado) Purple Prairie Clover (Cuero)	1.0 0.2 0.2 0.4 0.2 0.2 1.2 0.6 0.8 0.75 0.3
9 (Waco) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (Haskell) Texas Grama (Atascosa) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Little Bluestem (OK Select) Purple Prairie Clover (Cuero) Engelmann Daisy (Eldorado) Illinois Bundleflower Awnless Bushsunflower (Plateau)	1.0 1.0 1.0 0.4 0.2 0.8 0.6 0.75 1.3 0.2	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Shortspike Windmillgrass (Welder) Hairy Grama (Chaparral) Slender Grama (Dilley) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Partridge Pea (Comanche) Little Bluestem (OK Select) Englemann Daisy (Eldorado) Purple Prairie Clover	1.0 0.2 0.2 0.4 1.0 0.2 0.2 0.6 0.8 0.75 0.3
10 (Tyler) Feb. 1–May 15	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Sideoats Grama (Haskell) Illinois Bundleflower	0.3 1.8 9.0 2.7 1.0	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Weeping Lovegrass (Ermelo) Sand Lovegrass Lance-Leaf Coreopsis	0.3 1.8 9.0 0.5 0.5 1.0
11 (Lufkin) Feb. 1–May 15	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Sideoats Grama (Haskell) Illinois Bundleflower	0.3 1.8 9.0 2.7 1.0	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Sand Lovegrass Lance-Leaf Coreopsis	0.3 2.1 9.0 0.5 1.0

Table 1 (continued)
Permanent Rural Seed Mix

District and Planting Dates	Clay Soils Species and Rates (lb. PLS/acre)		Sandy Soils Species and Rates (lb. PLS/acre)	
12 (Houston) Jan. 15–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell) Little Bluestem (Native) Illinois Bundleflower	0.3 2.1 3.2 1.4 1.0	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Weeping Lovegrass (Ermelo) Lance-Leaf Coreopsis	0.3 2.4 10.5 1.0 1.0
13 (Yoakum) Jan. 15–May 15	Green Sprangletop (Van Horn) Sideoats Grama (South Texas) Texas Grama (Atascosa) Slender Grama (Dilley) Shortspike Windmillgrass (Welder) Halls Panicum (Oso) Plains Bristlegrass (Catarina Blend) Canada Wildrye (Lavaca) Illinois Bundleflower (Sabine) Purple Prairie Clover (Cuero)	1.0 1.0 1.5 1.0 0.3 0.2 0.2 2.0 1.3 0.6	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Slender Grama (Dilley) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Purple Prairie Clover (Cuero) Partridge Pea (Comanche) Englemann Daisy (Eldorado)	1.0 0.4 1.0 0.8 0.2 0.6 0.6 1.0
14 (Austin) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (South Texas) Texas Grama (Atascosa) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Little Bluestem (OK Select) Purple Prairie Clover (Cuero) Engelmann Daisy (Eldorado) Illinois Bundleflower (Sabine) Awnless Bushsunflower (Plateau)	1.0 1.0 1.0 0.4 0.2 0.8 0.6 0.75 1.3 0.2	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Shortspike Windmillgrass (Welder) Hairy Grama (Chaparral) Slender Grama (Dilley) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Partridge Pea (Comanche) Little Bluestem (OK Select) Englemann Daisy (Eldorado) Purple Prairie Clover	1.0 0.2 0.2 0.4 1.0 0.2 0.2 0.6 0.8 0.75 0.3
15 (San Antonio) Feb. 1–May 1	Green Sprangletop (Van Horn) Sideoats Grama (South Texas) Texas Grama (Atascosa) Slender Grama (Dilley) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Halls Panicum (Oso) Plains Bristlegrass (Catarina Blend) False Rhodes Grass (Kinney) Hooded Windmillgrass (Mariah) Arizona Cottontop (La Salle)	1.0 1.0 1.0 1.0 0.2 0.6 0.2 0.2 0.1 0.2 0.2	Green Sprangletop (Van Horn) Slender Grama (Dilley) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Plains Bristlegrass (Catarina Blend) Hooded Windmillgrass (Mariah) Multi-flowered False Rhoades Grass (Hidalgo) Arizona Cottontop (La Salle)	1.0 2.0 0.6 0.4 0.6 0.2 0.3 0.1 0.2
16 (Corpus Christi) Jan. 1–May 1	Green Sprangletop (Van Horn) Sideoats Grama (South Texas) Texas Grama (Atascosa) Slender Grama (Dilley) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Halls Panicum (Oso) Plains Bristlegrass (Catarina Blend) False Rhodes Grass (Kinney) Hooded Windmillgrass (Mariah) Arizona Cottontop (La Salle)	1.0 1.0 1.0 1.0 0.2 0.6 0.2 0.2 0.1 0.2 0.2	Green Sprangletop (Van Horn) Slender Grama (Dilley) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Plains Bristlegrass (Catarina Blend) Hooded Windmillgrass (Mariah) Multi-flowered False Rhodes Grass (Hidalgo) Arizona Cottontop (La Salle)	1.0 2.0 0.6 0.4 0.6 0.2 0.3 0.1 0.2
17 (Bryan) Feb. 1–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell) Little Bluestem (Native) Illinois Bundleflower	0.3 1.5 3.6 1.7 1.0	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Weeping Lovegrass (Ermelo) Sand Lovegrass Lance-Leaf Coreopsis	0.3 1.5 7.5 0.6 0.6 1.0

Table 1 (continued)
Permanent Rural Seed Mix

District and Planting Dates	Clay Soils Species and Rates (lb. PLS/acre)		Sandy Soils Species and Rates (lb. PLS/acre)	
18 (Dallas) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (Haskell) Texas Grama (Atascosa) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Little Bluestem (OK Select) Purple Prairie Clover (Cuero) Engelmann Daisy (Eldorado) Illinois Bundleflower Awnless Bushsunflower (Plateau)	1.0 1.0 1.0 0.4 0.2 0.8 0.6 0.75 1.3 0.2	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Shortspike Windmillgrass (Welder) Hairy Grama (Chaparral) Slender Grama (Dilley) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Partridge Pea (Comanche) Little Bluestem (OK Select) Englemann Daisy (Eldorado) Purple Prairie Clover	1.0 0.2 0.2 0.4 1.0 0.2 0.2 0.6 0.8 0.75 0.3
19 (Atlanta) Feb. 1–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell) Illinois Bundleflower	0.3 2.4 4.5 1.0	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Sand Lovegrass Lance-Leaf Coreopsis	0.3 2.1 7.5 0.6 1.0
20 (Beaumont) Jan. 15–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell) Illinois Bundleflower	0.3 2.7 4.1 1.0	Green Sprangletop Bermudagrass Bahiagrass (Pensacola) Sand Lovegrass Lance-Leaf Coreopsis	0.3 2.1 7.5 0.6 1.0
21 (Pharr) Jan. 15–May 15	Green Sprangletop (Van Horn) Sideoats Grama (South Texas) Texas Grama (Atascosa) Slender Grama (Dilley) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Halls Panicum (Oso) Plains Bristlegrass (Catarina Blend) False Rhodes Grass (Kinney) Hooded Windmillgrass (Mariah) Arizona Cottontop (La Salle)	1.0 1.0 1.0 1.0 0.2 0.6 0.2 0.2 0.1 0.2 0.2	Green Sprangletop (Van Horn) Slender Grama (Dilley) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Plains Bristlegrass (Catarina Blend) Hooded Windmillgrass (Mariah) Multi-flowered False Rhoades Grass (Hidalgo) Arizona Cottontop (La Salle)	1.0 2.0 0.6 0.4 0.6 0.2 0.3 0.1 0.2
22 (Laredo) Jan. 15–May 1	Green Sprangletop (Van Horn) Sideoats Grama (South Texas) Texas Grama (Atascosa) Slender Grama (Dilley) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Halls Panicum (Oso) Plains Bristlegrass (Catarina Blend) False Rhodes Grass (Kinney) Hooded Windmillgrass (Mariah) Arizona Cottontop (La Salle)	1.0 1.0 1.0 1.0 0.2 0.6 0.2 0.2 0.1 0.2 0.2	Green Sprangletop (Van Horn) Slender Grama (Dilley) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Plains Bristlegrass (Catarina Blend) Hooded Windmillgrass (Mariah) Multi-flowered False Rhoades Grass (Hidalgo) Arizona Cottontop (La Salle)	1.0 2.0 0.6 0.4 0.6 0.2 0.3 0.1 0.2
23 (Brownwood) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (Haskell) Texas Grama (Atascosa) Hairy Grama (Chaparral) Shortspike Windmillgrass (Welder) Little Bluestem (OK Select) Blue Grama (Hachita) Western Wheatgrass (Barton) Galleta Grass (Viva) Engelmann Daisy (Eldorado) Awnless Bushsunflower (Plateau)	0.6 1.0 1.0 0.4 0.2 0.8 0.4 1.2 0.6 0.75 0.2	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Shortspike Windmillgrass (Welder) Hairy Grama (Chaparral) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Partridge Pea (Comanche) Little Bluestem (OK Select) Englemann Daisy (Eldorado) Purple Prairie Clover (Cuero)	1.0 0.2 0.2 0.4 0.2 0.2 0.6 0.8 0.75 0.3

Table 1 (continued)
Permanent Rural Seed Mix

District and Planting Dates	Clay Soils Species and Rates (lb. PLS/acre)		Sandy Soils Species and Rates (lb. PLS/acre)	
24 (El Paso) Feb. 1–May 15	Green Sprangletop (Van Horn) Sideoats Grama (South Texas) Blue Grama (Hachita) Galleta Grass (Viva) Shortspike Windmillgrass (Welder) Pink Pappusgrass (Maverick) Alkali Sacaton (Saltalk) Plains Bristlegrass (Catarina Blend) False Rhodes Grass (Kinney) Whiplash Pappusgrass (Webb) Arizona Cottontop (La Salle)	1.0 1.0 0.4 0.6 0.2 0.6 0.2 0.2 0.1 0.6 0.2	Green Sprangletop (Van Horn) Hooded Windmillgrass (Mariah) Blue Grama (Hachita) Hairy Grama (Chaparral) Sand Lovegrass (Mason) Sand Dropseed (Borden County) Indian Ricegrass (Rim Rock) Sand Bluestem (Cottle County) Little Bluestem (Pastura) Purple Prairie Clover (Cuero)	1.0 0.2 0.4 0.4 0.2 0.2 1.6 1.2 0.8 0.3
25 (Childress) Feb. 1–May 15	Green Sprangletop Sideoats Grama (El Reno) Blue Grama (Hachita) Western Wheatgrass Galleta Illinois Bundleflower	0.3 2.7 0.9 2.1 1.6 1.0	Green Sprangletop Weeping Lovegrass (Ermelo) Sand Dropseed (Borden Co.) Sand Lovegrass Purple Prairie Clover	0.3 1.2 0.5 0.8 0.5

Table 2
Permanent Urban Seed Mix

District and Planting Dates	Clay Soils Species and Rates (lb. PLS/acre)		Sandy Soils Species and Rates (lb. PLS/acre)	
1 (Paris) Feb. 1–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell)	0.3 2.4 4.5	Green Sprangletop Bermudagrass	0.3 5.4
2 (Ft. Worth) Feb. 1–May 15	Green Sprangletop Sideoats Grama (El Reno) Bermudagrass Buffalograss (Texoka)	0.3 3.6 2.4 1.6	Green Sprangletop Sideoats Grama (El Reno) Bermudagrass Sand Dropseed (Borden Co.)	0.3 3.6 2.1 0.3
3 (Wichita Falls) Feb. 1–May 15	Green Sprangletop Sideoats Grama (El Reno) Bermudagrass Buffalograss (Texoka)	0.3 4.5 1.8 1.6	Green Sprangletop Sideoats Grama (El Reno) Bermudagrass Sand Dropseed (Borden Co.)	0.3 3.6 1.8 0.4
4 (Amarillo) Feb. 15–May 15	Green Sprangletop Sideoats Grama (El Reno) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 3.6 1.2 1.6	Green Sprangletop Sideoats Grama (El Reno) Blue Grama (Hachita) Sand Dropseed (Borden Co.) Buffalograss (Texoka)	0.3 2.7 0.9 0.4 1.6
5 (Lubbock) Feb. 15–May 15	Green Sprangletop Sideoats Grama (El Reno) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 3.6 1.2 1.6	Green Sprangletop Sideoats Grama (El Reno) Blue Grama (Hachita) Sand Dropseed (Borden Co.) Buffalograss (Texoka)	0.3 2.7 0.9 0.4 1.6
6 (Odessa) Feb. 1–May 15	Green Sprangletop Sideoats Grama (Haskell) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 3.6 1.2 1.6	Green Sprangletop Sideoats Grama (Haskell) Sand Dropseed (Borden Co.) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 2.7 0.4 0.9 1.6
7 (San Angelo) Feb. 1–May 1	Green Sprangletop Sideoats Grama (Haskell) Buffalograss (Texoka)	0.3 7.2 1.6	Green Sprangletop Sideoats Grama (Haskell) Sand Dropseed (Borden Co.) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 3.2 0.3 0.9 1.6
8 (Abilene) Feb. 1–May 15	Green Sprangletop Sideoats Grama (Haskell) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 3.6 1.2 1.6	Green Sprangletop Sand Dropseed (Borden Co.) Sideoats Grama (Haskell) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 0.3 3.6 0.8 1.6

Table 2 (continued)
Permanent Urban Seed Mix

District and Planting Dates	Clay Soils Species and Rates (lb. PLS/acre)		Sandy Soils Species and Rates (lb. PLS/acre)	
9 (Waco) Feb. 1–May 15	Green Sprangletop Bermudagrass Buffalograss (Texoka) Sideoats Grama (Haskell)	0.3 1.8 1.6 4.5	Green Sprangletop Buffalograss (Texoka) Bermudagrass Sand Dropseed (Borden Co.)	0.3 1.6 3.6 0.4
10 (Tyler) Feb. 1–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell)	0.3 2.4 4.5	Green Sprangletop Bermudagrass	0.3 5.4
11 (Lufkin) Feb. 1–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell)	0.3 2.4 4.5	Green Sprangletop Bermudagrass	0.3 5.4
12 (Houston) Jan. 15–May 15	Green Sprangletop Sideoats Grama (Haskell) Bermudagrass	0.3 4.5 2.4	Green Sprangletop Bermudagrass	0.3 5.4
13 (Yoakum) Jan. 15–May 15	Green Sprangletop Sideoats Grama (South Texas) Bermudagrass	0.3 4.5 2.4	Green Sprangletop Bermudagrass	0.3 5.4
14 (Austin) Feb. 1–May 15	Green Sprangletop Bermudagrass Sideoats Grama (South Texas) Buffalograss (Texoka)	0.3 2.4 3.6 1.6	Green Sprangletop Bermudagrass Buffalograss (Texoka)	0.3 4.8 1.6
15 (San Antonio) Feb. 1–May 1	Green Sprangletop Sideoats Grama (South Texas) Bermudagrass Buffalograss (Texoka)	0.3 3.6 2.4 1.6	Green Sprangletop Bermudagrass Buffalograss (Texoka)	0.3 4.8 1.6
16 (Corpus Christi) Jan. 1–May 1	Green Sprangletop Sideoats Grama (South Texas) Bermudagrass Buffalograss (Texoka)	0.3 3.6 2.4 1.6	Green Sprangletop Bermudagrass Buffalograss (Texoka)	0.3 4.8 1.6
17 (Bryan) Feb. 1–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell)	0.3 2.4 4.5	Green Sprangletop Bermudagrass	0.3 5.4
18 (Dallas) Feb. 1–May 15	Green Sprangletop Sideoats Grama (El Reno) Buffalograss (Texoka) Bermudagrass	0.3 3.6 1.6 2.4	Green Sprangletop Buffalograss (Texoka) Bermudagrass Sand Dropseed (Borden Co.)	0.3 1.6 3.6 0.4
19 (Atlanta) Feb. 1–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell)	0.3 2.4 4.5	Green Sprangletop Bermudagrass	0.3 5.4
20 (Beaumont) Jan. 15–May 15	Green Sprangletop Bermudagrass Sideoats Grama (Haskell)	0.3 2.4 4.5	Green Sprangletop Bermudagrass	0.3 5.4
21 (Pharr) Jan. 15–May 15	Green Sprangletop Sideoats Grama (South Texas) Buffalograss (Texoka) Bermudagrass	0.3 3.6 1.6 2.4	Green Sprangletop Buffalograss (Texoka) Bermudagrass Sand Dropseed (Borden Co.)	0.3 1.6 3.6 0.4
22 (Laredo) Jan. 15–May 1	Green Sprangletop Sideoats Grama (South Texas) Buffalograss (Texoka) Bermudagrass	0.3 4.5 1.6 1.8	Green Sprangletop Buffalograss (Texoka) Bermudagrass Sand Dropseed	0.3 1.6 3.6 0.4
23 (Brownwood) Feb. 1–May 15	Green Sprangletop Sideoats Grama (Haskell) Bermudagrass Blue Grama (Hachita)	0.3 3.6 1.2 0.9	Green Sprangletop Buffalograss (Texoka) Bermudagrass Sand Dropseed (Borden Co.)	0.3 1.6 3.6 0.4
24 (El Paso) Feb. 1–May 15	Green Sprangletop Sideoats Grama (South Texas) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 3.6 1.2 1.6	Green Sprangletop Buffalograss (Texoka) Sand Dropseed (Borden Co.) Blue Grama (Hachita)	0.3 1.6 0.4 1.8
25 (Childress) Feb. 1–May 15	Green Sprangletop Sideoats Grama (El Reno) Blue Grama (Hachita) Buffalograss (Texoka)	0.3 3.6 1.2 1.6	Green Sprangletop Sand Dropseed (Borden Co.) Buffalograss (Texoka) Bermudagrass	0.3 0.4 1.6 1.8

Table 3
Temporary Cool Season Seeding

Districts	Dates	Seed Mix and Rates (lb. PLS/acre)	
Paris (1), Amarillo (4), Lubbock (5), Dallas (18)	September 1–November 30	Tall Fescue Western Wheatgrass Wheat (Red, Winter)	4.5 5.6 34
Odessa (6), San Angelo (7), El Paso (24)	September 1–November 30	Western Wheatgrass Wheat (Red, Winter)	8.4 50
Waco (9), Tyler (10), Lufkin (11), Austin (14), San Antonio (15), Bryan (17), Atlanta (19)	September 1–November 30	Tall Fescue Oats Wheat	4.5 24 34
Houston (12), Yoakum (13), Corpus Christi (16), Beaumont (20), Pharr (21), Laredo (22)	September 1–November 30	Oats	72
Ft. Worth (2), Wichita Falls (3), Abilene (8), Brownwood (23), Childress (25)	September 1–November 30	Tall Fescue Western Wheatgrass Cereal Rye	4.5 5.6 34

Table 4
Temporary Warm Season Seeding

Districts	Dates	Seed Mix and Rates (lb. PLS/acre)	
All	May 1–August 31	Foxtail Millet	34

2.2. **Fertilizer**. Use fertilizer in conformance with Article 166.2., “Materials.”

2.3. **Vegetative Watering**. Use water that is clean and free of industrial wastes and other substances harmful to the growth of vegetation.

2.4. **Mulch**.

2.4.1. **Straw or Hay Mulch**. Use straw or hay mulch in conformance with Section 162.2.5., “Mulch.”

2.4.2. **Cellulose Fiber Mulch**. Use only cellulose fiber mulches that are on the Approved Products List, *Erosion Control Approved Products*. (http://www.txdot.gov/business/resources/erosion-control.html) Submit one full set of manufacturer’s literature for the selected material. Keep mulch dry until applied. Do not use molded or rotted material.

2.5. **Tacking Methods**. Use a tacking agent applied in accordance with the manufacturer’s recommendations or a crimping method on all straw or hay mulch operations. Use tacking agents as approved or as specified on the plans.

3. CONSTRUCTION

Cultivate the area to a depth of 4 in. before placing the seed unless otherwise directed. Use approved equipment to vertically track the seedbed as shown on the plans or as directed. Cultivate the seedbed to a depth of 4 in. or mow the area before placement of the permanent seed when performing permanent seeding after an established temporary seeding. Plant the seed specified and mulch, if required, after the area has been completed to lines and grades as shown on the plans.

3.1. **Broadcast Seeding**. Distribute the seed or seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution or hydro-seeding on top of the soil unless otherwise directed. Apply the mixture to the area to be seeded within 30 min. of placement of components in the equipment when seed and water are to be distributed as a slurry during hydro-seeding. Roll the planted area with a light roller or other suitable equipment. Roll sloped areas along the contour of the slopes.

3.2. **Straw or Hay Mulch Seeding**. Plant seed according to Section 164.3.1., "Broadcast Seeding." Apply straw or hay mulch uniformly over the seeded area immediately after planting the seed or seed mixture. Apply straw mulch at 2 to 2.5 tons per acre. Apply hay mulch at 1.5 to 2 tons per acre. Use a tacking method over the mulched area.

3.3. **Cellulose Fiber Mulch Seeding**. Plant seed in accordance with Section 164.3.1., "Broadcast Seeding." Apply cellulose fiber mulch uniformly over the seeded area immediately after planting the seed or seed mixture at the following rates.

- Sandy soils with slopes of 3:1 or less—2,500 lb. per acre.
- Sandy soils with slopes greater than 3:1—3,000 lb. per acre.
- Clay soils with slopes of 3:1 or less—2,000 lb. per acre.
- Clay soils with slopes greater than 3:1—2,300 lb. per acre.

Cellulose fiber mulch rates are based on dry weight of mulch per acre. Mix cellulose fiber mulch and water to make a slurry and apply uniformly over the seeded area using suitable equipment.

3.4. **Drill Seeding**. Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 in. using a pasture or rangeland type drill unless otherwise directed. Plant seed along the contour of the slopes.

3.5. **Straw or Hay Mulching**. Apply straw or hay mulch uniformly over the area as shown on the plans. Apply straw mulch at 2 to 2.5 tons per acre. Apply hay mulch at 1.5 to 2 tons per acre. Use a tacking method over the mulched area.

Apply fertilizer in conformance with Article 166.3., "Construction." Seed and fertilizer may be distributed simultaneously during "Broadcast Seeding" operations, provided each component is applied at the specified rate. Apply half of the required fertilizer during the temporary seeding operation and the other half during the permanent seeding operation when temporary and permanent seeding are both specified for the same area.

Water the seeded areas at the rates and frequencies as shown on the plans or as directed.

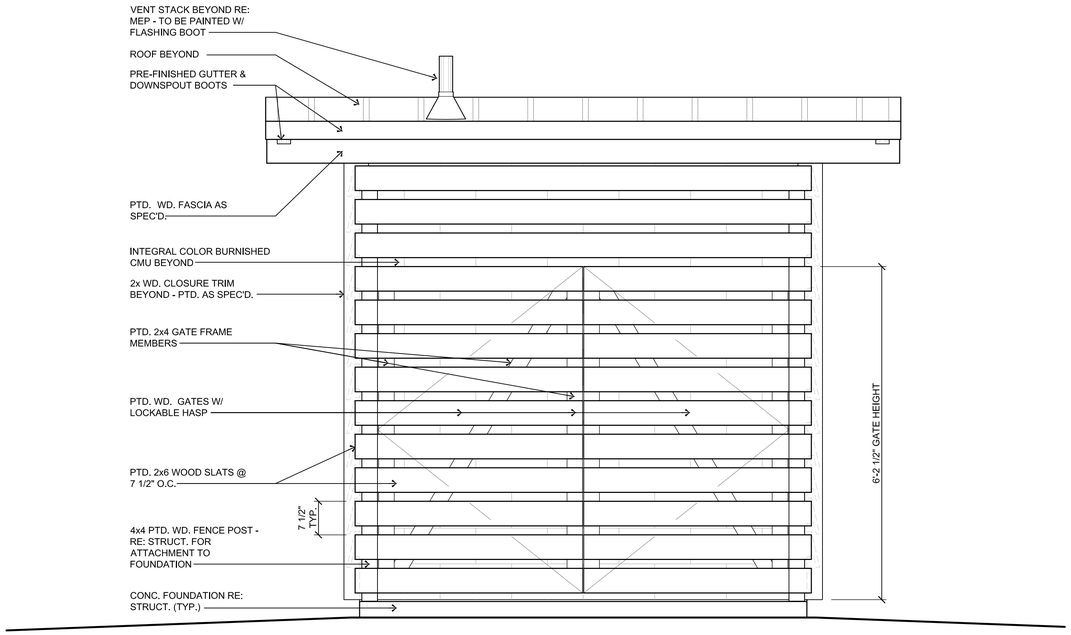
4. MEASUREMENT

This Item will be measured by the square yard or by the acre.

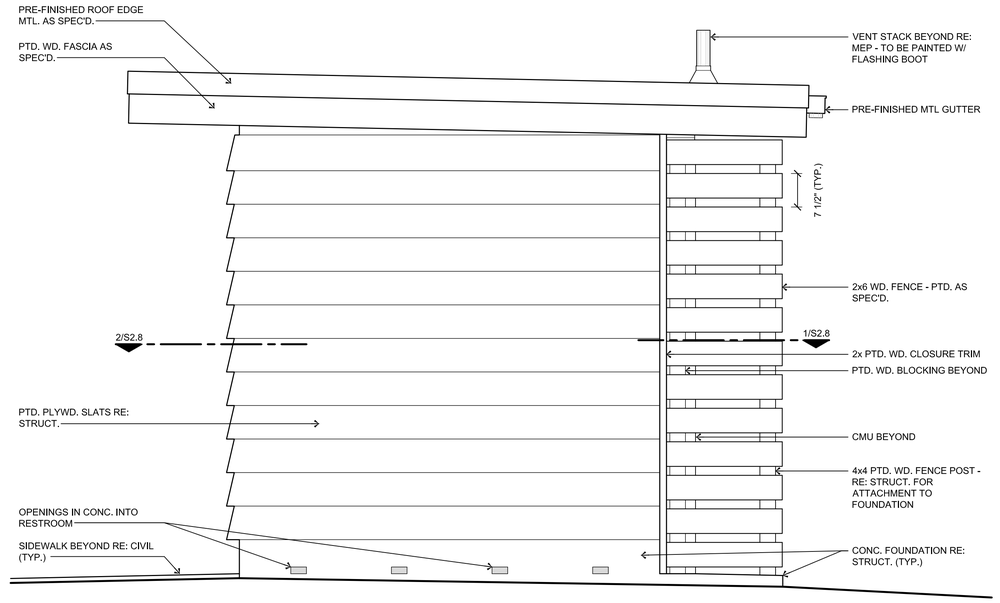
5. PAYMENT

The work performed and the materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Broadcast Seeding (Perm)" of the rural or urban seed mixture and sandy or clay soil specified, "Broadcast Seeding (Temp)" of warm or cool season specified, "Straw or Hay Mulch Seeding (Perm)" of the rural or urban seed mixture and sandy or clay soil specified, "Straw or Hay Mulch Seeding (Temp)" of warm or cool season specified, "Cellulose Fiber Mulch Seeding (Perm)" of the rural or urban seed mixture and sandy or clay soil specified, "Cellulose Fiber Mulch Seeding (Temp)" of warm or cool season specified, "Drill Seeding (Perm)" of the rural or urban seed mixture and sandy or clay soil specified, "Drill Seeding (Temp)" of warm or cool season specified, and "Straw or Hay Mulching." This price is full compensation for furnishing materials, including water for hydro-seeding and hydro-mulching operations, mowing, labor, equipment, tools, supplies, and incidentals. Fertilizer will not be paid for directly but will be subsidiary to this Item. Water for irrigating the seeded area, when specified, will be paid for under Item 168, "Vegetative Watering."

APPENDIX



4 BACK ELEVATION
Scale: 3/4" = 1'-0"



3 SIDE ELEVATION
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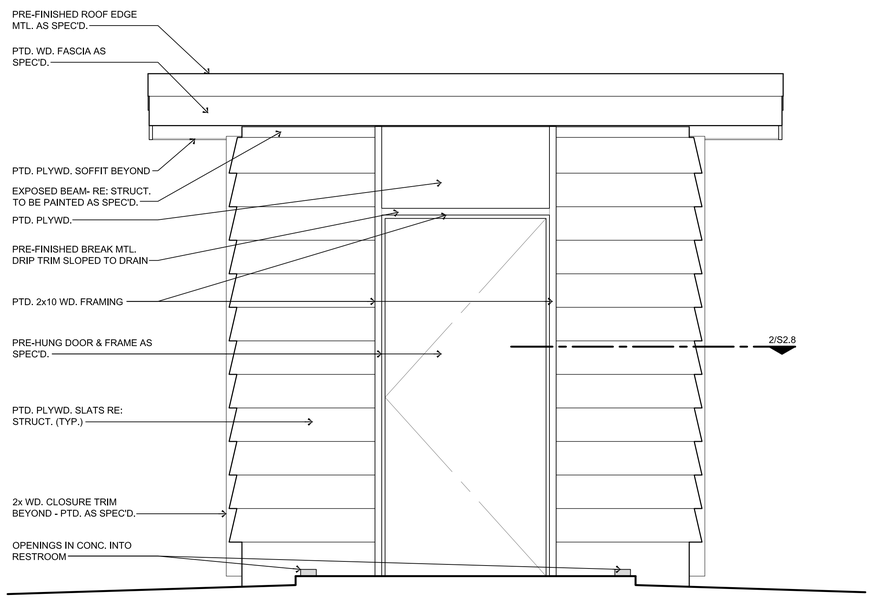

2 FRONT ELEVATION
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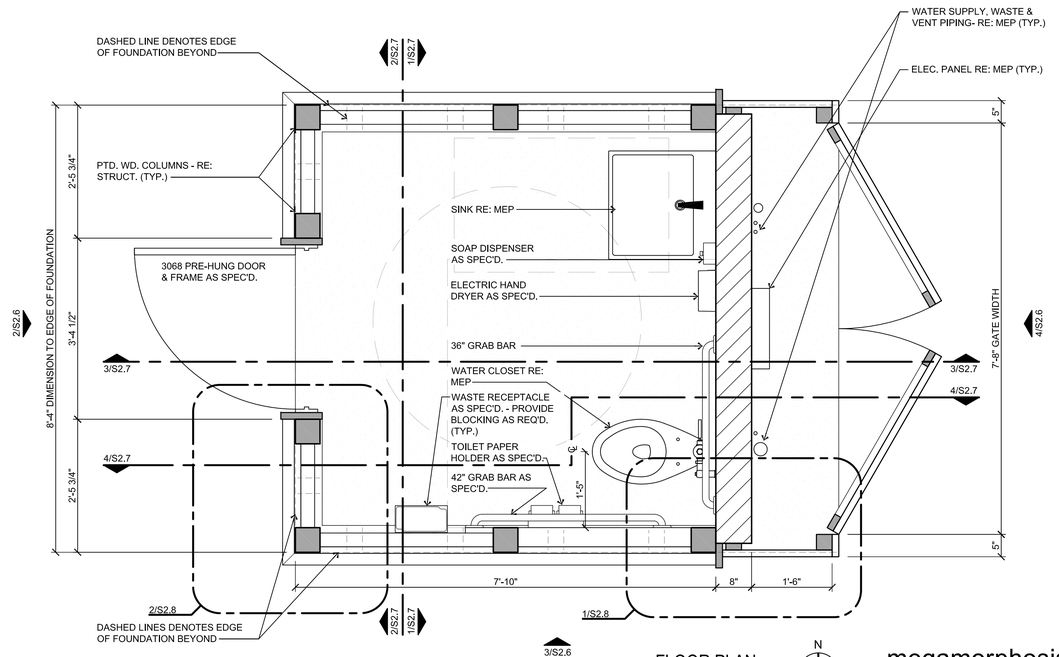

1 FLOOR PLAN
Scale: 3/4" = 1'-0"

N
NORTH

megamorphosis
324 W Van Buren
Harlingen, TX 78550
956.428.1779

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SEAL

STATE OF TEXAS
ROLANDO R. RUBIANO
86369
LICENSED
PROFESSIONAL ENGINEER
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PROJECT

WALKOVER AT WHITE CAP CIRCLE

SOUTH PADRE ISLAND, TEXAS

CLIENT

CITY OF SOUTH PADRE ISLAND

SOUTH PADRE ISLAND, TEXAS
P: 956-761-3044
F: 956-761-3898

MARK	DATE	DESCRIPTION

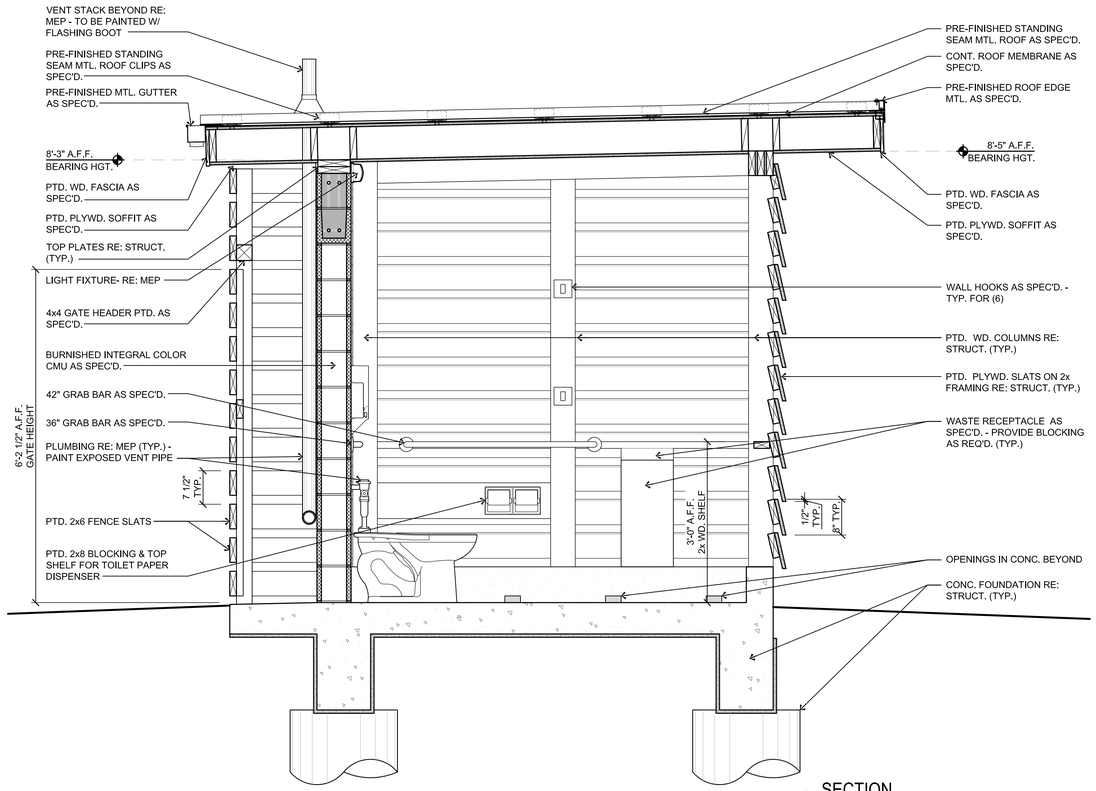
PROJECT NO.	1065-16
DATE	04-22-2022
DRAWN BY	LC
CHECKED BY	BD
SCALE	AS SHOWN

SHEET TITLE

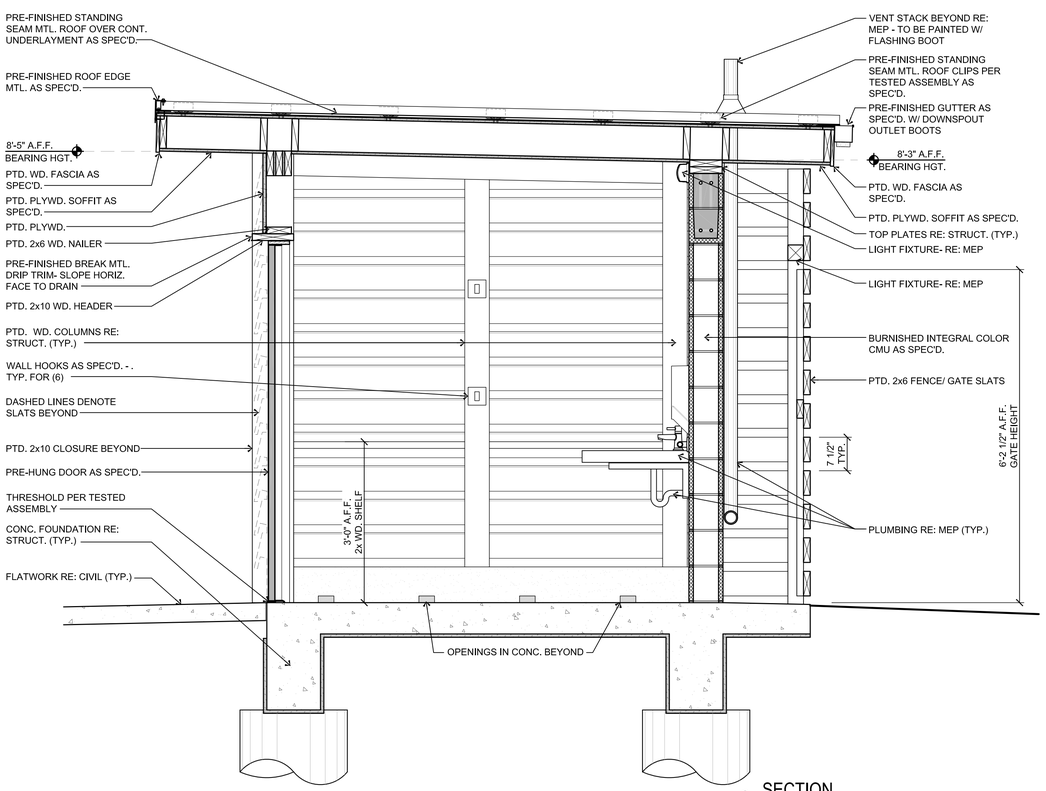
RESTROOM PLAN AND ELEVATIONS

SHEET NO.

S2.6



4 SECTION
Scale: 3/4" = 1'-0"



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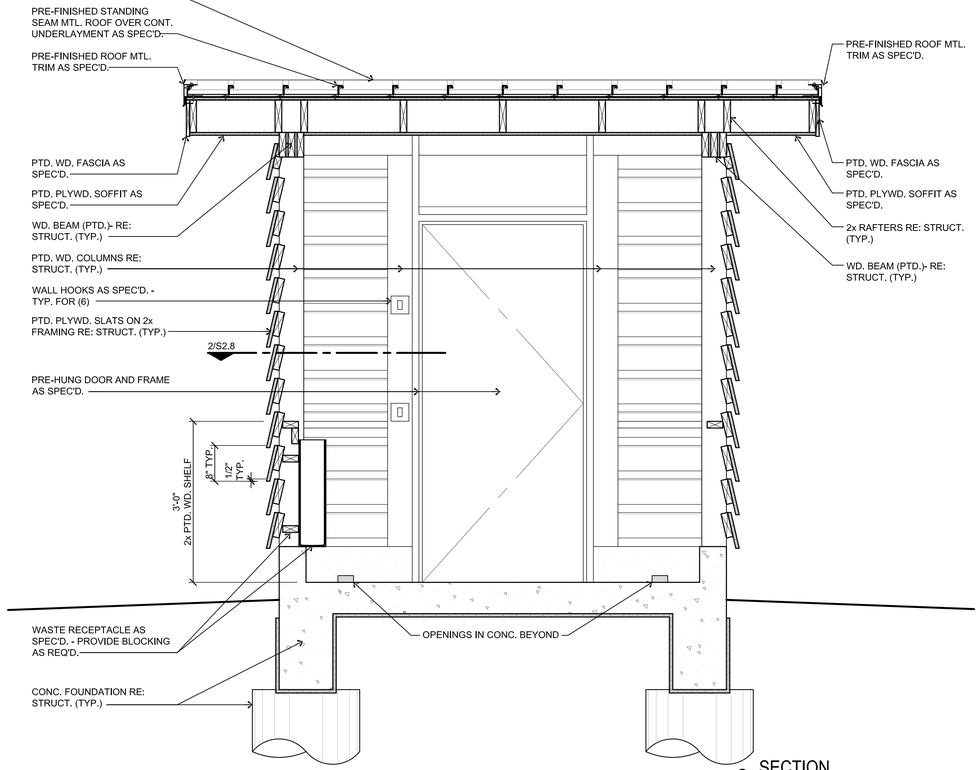

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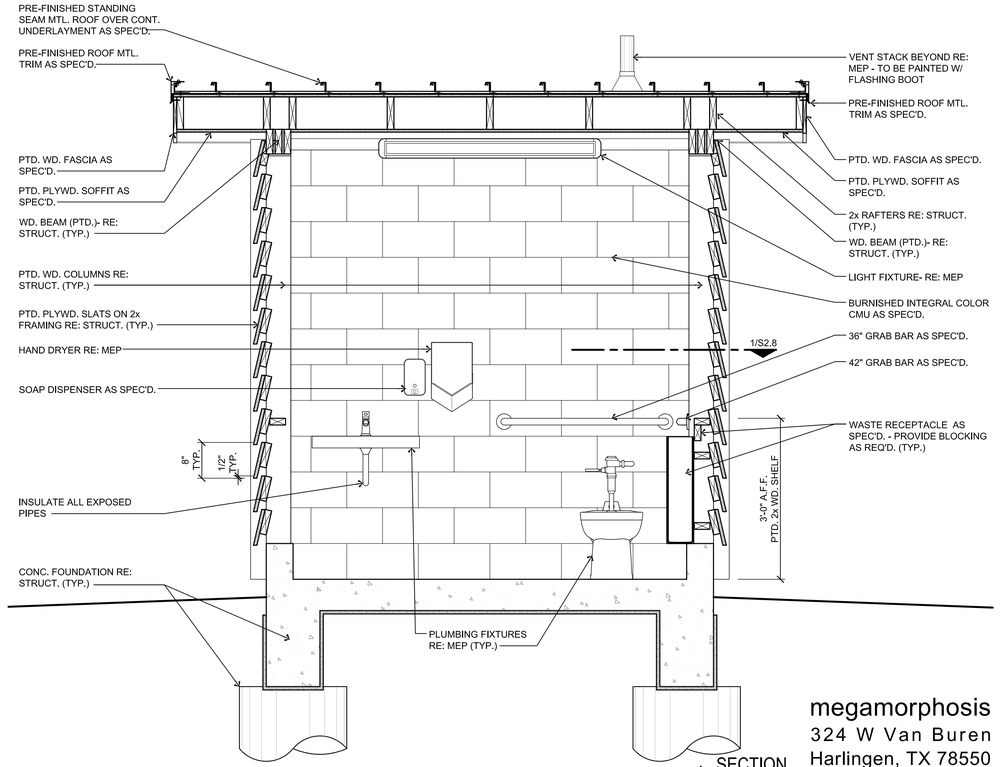

1 SECTION
Scale: 3/4" = 1'-0"

megamorphosis
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SEAL

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PROJECT

WALKOVER AT WHITE CAP CIRCLE

SOUTH PADRE ISLAND, TEXAS

CLIENT

CITY OF SOUTH PADRE ISLAND

SOUTH PADRE ISLAND, TEXAS
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F: 956-761-3898

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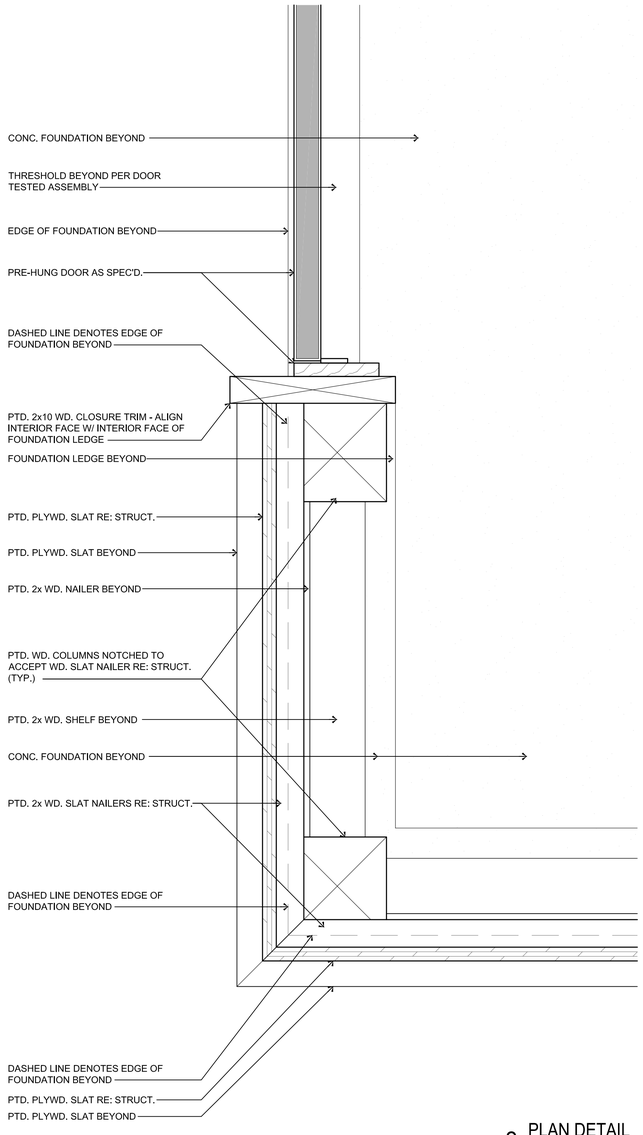
SHEET TITLE

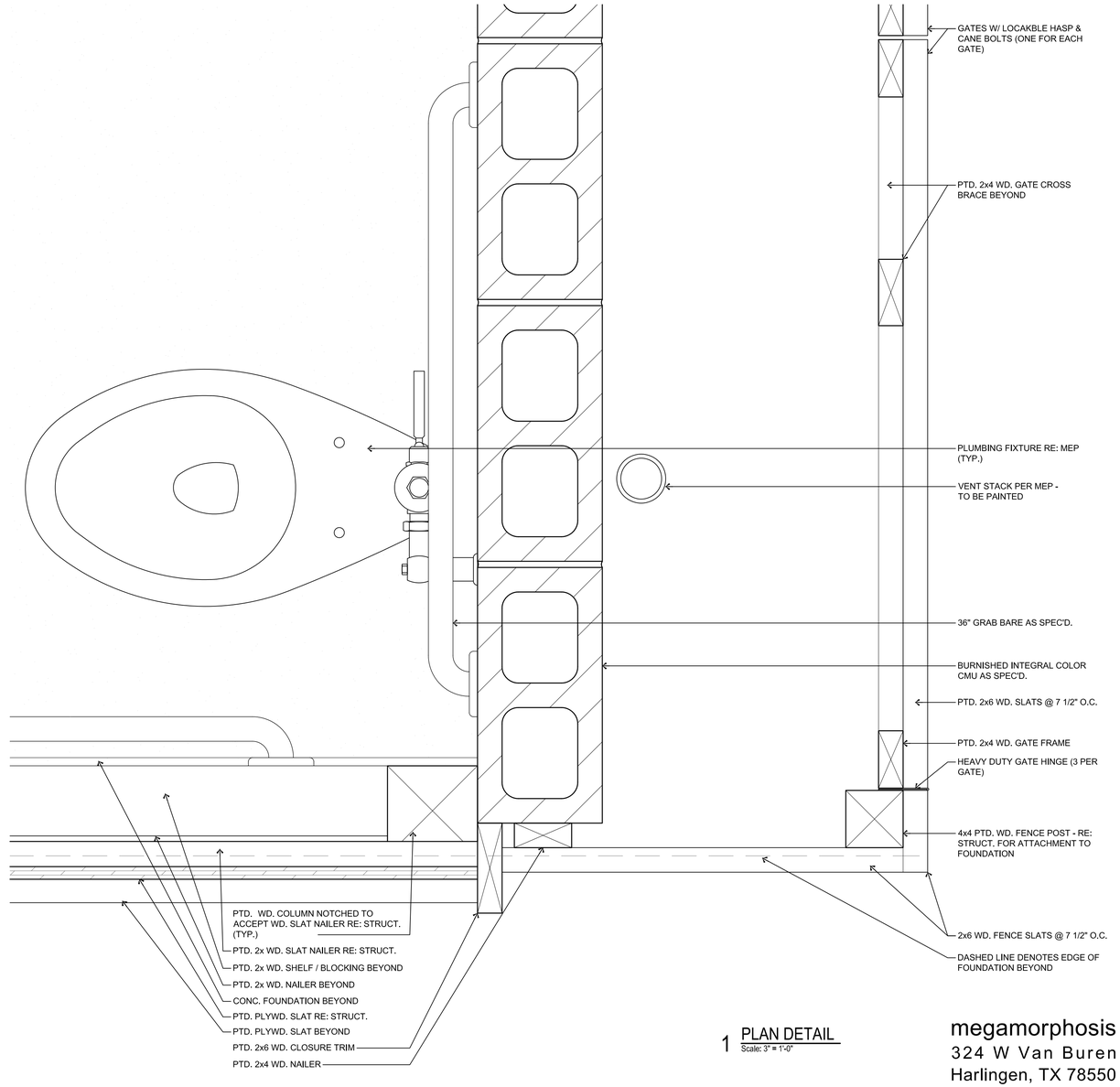
RESTROOM SECTIONS

SHEET NO.

S2.7



2 PLAN DETAIL
Scale: 3" = 1'-0"



1 PLAN DETAIL
Scale: 3" = 1'-0"

megamorphosis
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WALKOVER AT WHITE CAP CIRCLE

SOUTH PADRE ISLAND, TEXAS

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CITY OF SOUTH PADRE ISLAND

SOUTH PADRE ISLAND, TEXAS
P: 956-761-3044
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MARK	DATE	DESCRIPTION

PROJECT NO.	1065-16
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DRAWN BY	LC
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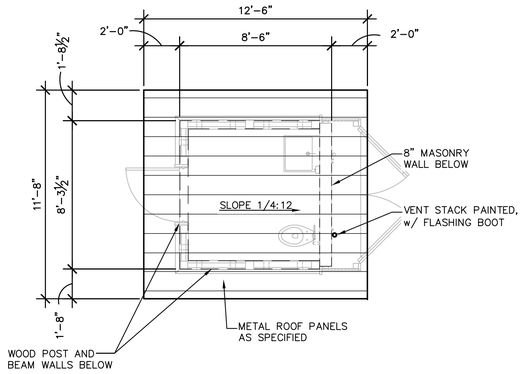
SCALE	AS SHOWN

SHEET TITLE

PLAN DETAILS

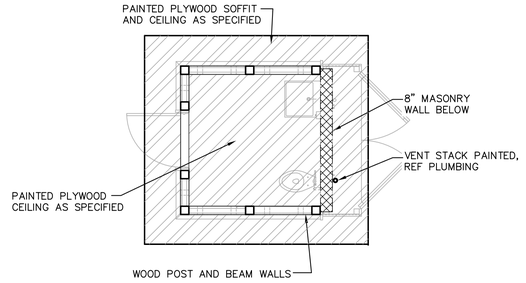
SHEET NO.

S2.8



1 RESTROOM ROOF PLAN

1/4" = 1'-0" — 2 LOCATIONS



2 RESTROOM CEILING AND SOFFIT PLAN

1/4" = 1'-0" — 2 LOCATIONS

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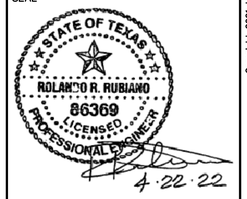
SEAL



PROJECT

WALKOVER AT WHITE CAP CIRCLE

SOUTH PADRE ISLAND, TEXAS

CLIENT

CITY OF SOUTH PADRE ISLAND

SOUTH PADRE ISLAND, TEXAS

P: 956-761-3044
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MARK	DATE	DESCRIPTION

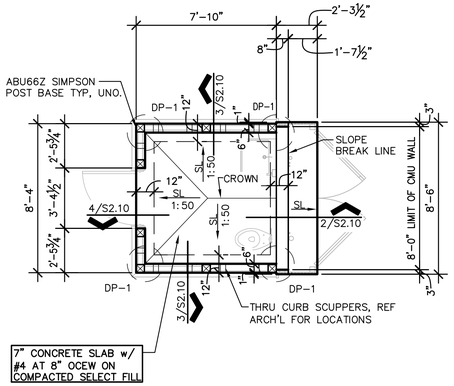
PROJECT NO.	1065-16
DATE	04-22-2022
DRAWN BY	LC
CHECKED BY	BD
SCALE	AS SHOWN

SHEET TITLE

RESTROOM ROOF AND CEILING PLAN

SHEET NO.

S2.9



1 FOUNDATION PLAN

1/4" = 1'-0" 2 LOCATIONS

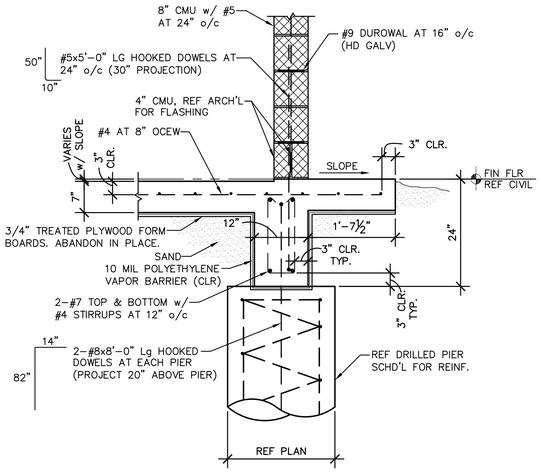
N

PLAN NORTH

NOTES:

1. ALL SLABS & BEAMS ARE SUSPENDED. REFER TO SECTIONAL DETAILS FOR REINFORCEMENT.
2. SPLICE JOINTS FOR TOP BARS FOR REINFORCED CONCRETE SLABS AND BEAMS SHALL BE LOCATED AT MIDDLE THIRD OF THE SPAN OF SLABS OR BEAMS.
3. SPLICE JOINTS FOR BOTTOM BARS FOR REINFORCED CONCRETE SLAB AND BEAMS SHALL BE LOCATED AT SUPPORTS.
4. CONSTRUCTION JOINTS OF CONCRETE BEAMS/SLABS SHALL BE LOCATED WITHIN THE MIDDLE THIRD OF THE SPAN. CONTRACTOR TO SUBMIT PROPOSED LOCATION OF CONSTRUCTION JOINTS TO ARCHITECT/ENGINEER FOR APPROVAL.
5. LAPPING OF SPLICE BARS AT SPLICE JOINTS SHALL BE 62 BAR DIAMETER OR A MINIMUM OF 36" LONG.
6. ALL CONDUIT GREATER THAN 1.1/2" IN DIAMETER (O.D.) SHALL BE RECESSED TO PROVIDE 1.1/2" CLEAR DISTANCE BETWEEN SLAB REBAR & CONDUIT.
7. MAINTAIN 2" MINIMUM CLEAR DISTANCE BETWEEN ALL CONDUIT IN SLAB.
8. A SINGLE CONDUIT (MAX 3" O.D.) MAY BE PLACED WITHIN THE BEAM CAGE. ALL CONDUIT IN BEAM CAGES TO BE TIED TO STIRRUPS MINIMUM OF 4" FROM HORIZONTAL BARS.
9. ☒ INDICATES ABU66Z SIMPSON STAND-OFF POST BASE.
10. ALL MASONRY WALLS SHALL BE BURNISHED INTREGAL COLOR CMU AS SPECIFIED.

DRILLED PIER SCHEDULE			
MARK	SHAFT DIA. (INCHES)	VERTICAL REINFORCING	BEARING DEPTH BELOW MEAN SEA LEVEL (FEET MSL)
DP-1	18"	8-#7	-30.00'



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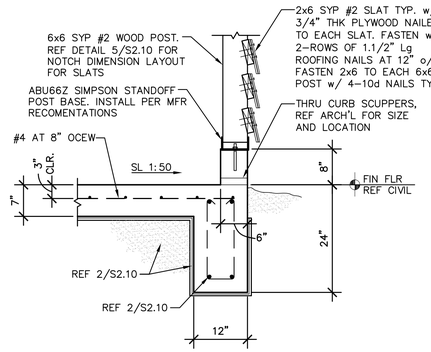

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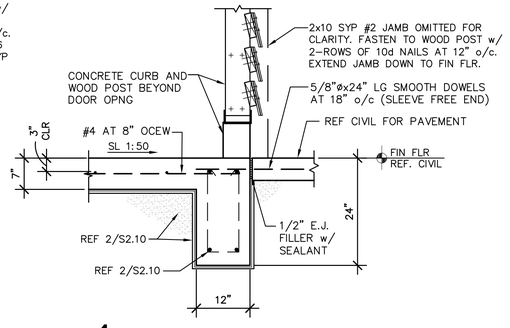

4

5 DRILLED PIER PROFILE

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SEAL

PROJECT

WALKOVER AT WHITE CAP CIRCLE

SOUTH PADRE ISLAND, TEXAS

CLIENT

CITY OF SOUTH PADRE ISLAND

SOUTH PADRE ISLAND, TEXAS

P: 956-761-3044
F: 956-761-3898

MARK	DATE	DESCRIPTION

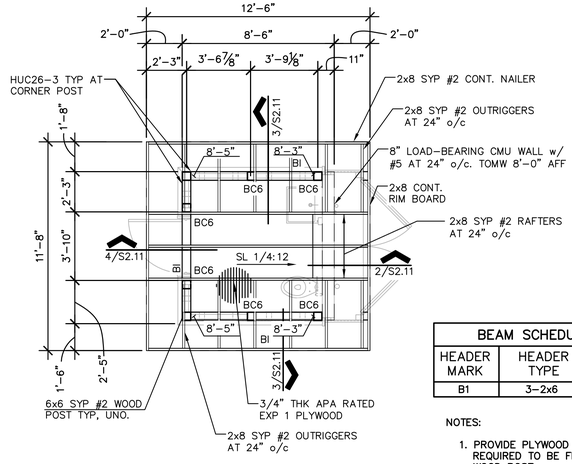
PROJECT NO.	1065-16
DATE	04-22-2022
DRAWN BY	LC
CHECKED BY	BD
SCALE	AS SHOWN

SHEET TITLE

FOUNDATION PLAN/DETAILS

SHEET NO.

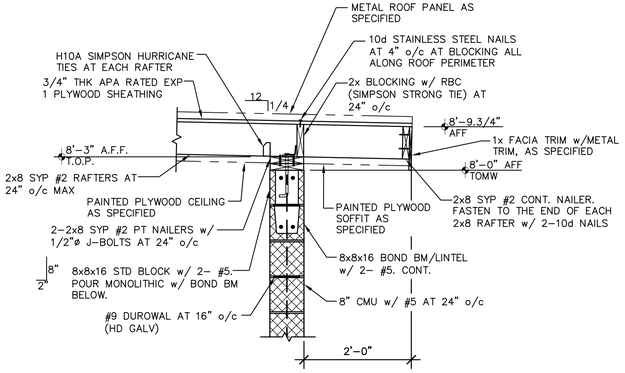
S2.10



BEAM SCHEDULE		
HEADER MARK	HEADER TYPE	POST SIZE
B1	3-2x6	6x6

NOTES:

1. PROVIDE PLYWOOD FILLER AS REQUIRED TO BE FLUSH WITH WOOD POST.



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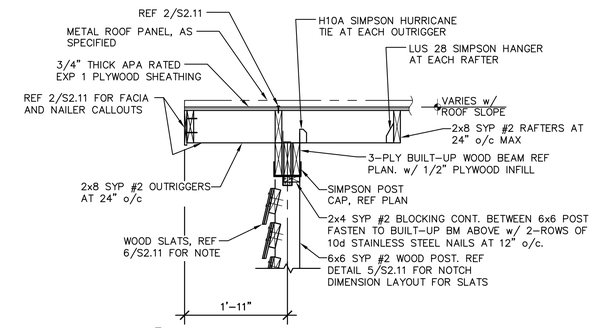


3

1 RESTROOM ROOF FRAMING PLAN

1/4" = 1'-0" — 2 REQUIRED

NOTES:

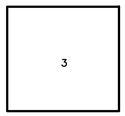
1. ROOF SHEATHING SHALL BE 3/4" APA RATED EXPOSURE 1. SPAN RATED 48/24.
2. REFERENCE ROOF SHEATHING NAILING SCHEDULE FOR PROPER PLYWOOD ATTACHMENT.
3. ALL HURRICANE TIES SHALL BE SIMPSON STRONG-TIE STAINLESS STEEL TYPE 316 OR APPROVED EQUAL. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
4. ALL MASONRY WALLS SHALL BE BURNISHED INTREGAL COLOR CMU AS SPECIFIED.

N

PLAN NORTH

ROOF SHEATHING NAILING SCHEDULE
10d STAINLESS STEEL NAILS AT 4" o/c ALONG EDGE OF SHEET AND 6" o/c AT INTERIOR SUPPORTS

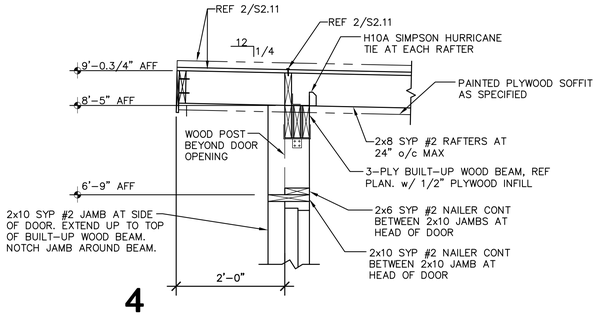
ALL 10d STAINLESS STEEL NAILS TO MEET MINIMUM LENGTH/DIAMETER BELOW
LENGTH 3"
SHANK DIAMETER 0.148"



CITY OF SOUTH PADRE ISLAND
WHITECAP WALKOVER RESTROOM
ROOF DESIGN WIND PRESSURE DIAGRAM (SERVICE)

DESIGN WIND PRESSURE FOR ROOF COMPONENTS & CLADDING	
ZONE	P- (UPLIFT)
3	-89 PSF

DOORS & WINDOWS MAXIMUM DESIGN WIND PRESSURES
P+ = +29 PSF TOWARDS THE SURFACE
P- = -38 PSF AWAY FROM THE SURFACE



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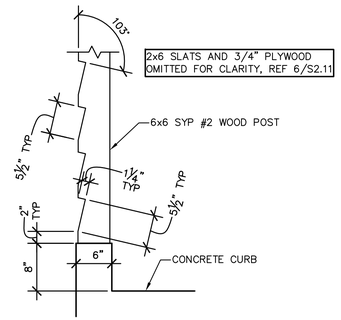
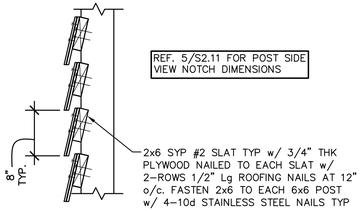


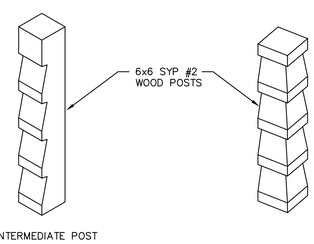
5 POST SIDE VIEW NOTCH DIMENSIONS

1" = 1'-0"



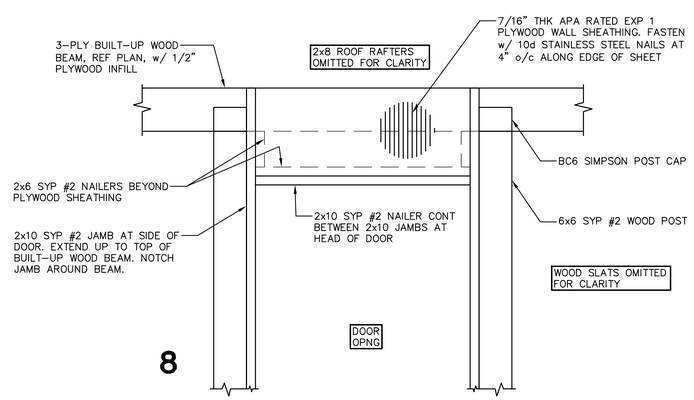
6 SLAT CONNECTION DETAIL

1" = 1'-0"



7 ISOMETRIC VIEWS OF WOOD POST

1" = 1'-0"



8

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SEAL

STATE OF TEXAS
ROLANDO R. RUBIANO
86369
LICENSED
PROFESSIONAL ENGINEER
4-22-22

PROJECT

WALKOVER AT WHITE CAP CIRCLE

SOUTH PADRE ISLAND, TEXAS

CLIENT

CITY OF SOUTH PADRE ISLAND

South Padre

SOUTH PADRE ISLAND, TEXAS
P: 956-761-3044
F: 956-761-3898

MARK	DATE	DESCRIPTION

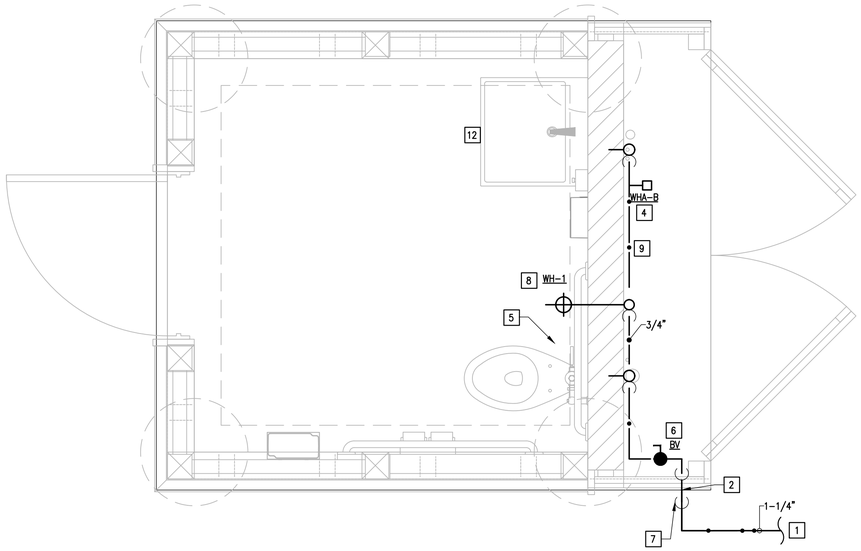
PROJECT NO.	1065-16
DATE	04-22-2022
DRAWN BY	LC
CHECKED BY	BD
SCALE	AS SHOWN

SHEET TITLE

FRAMING PLAN/DETAILS

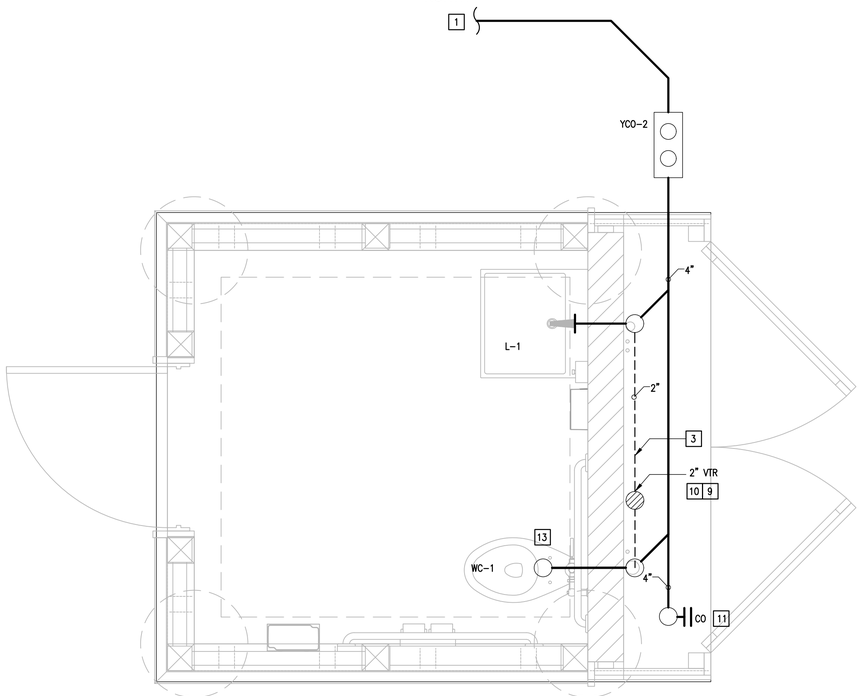
SHEET NO.

S2.11



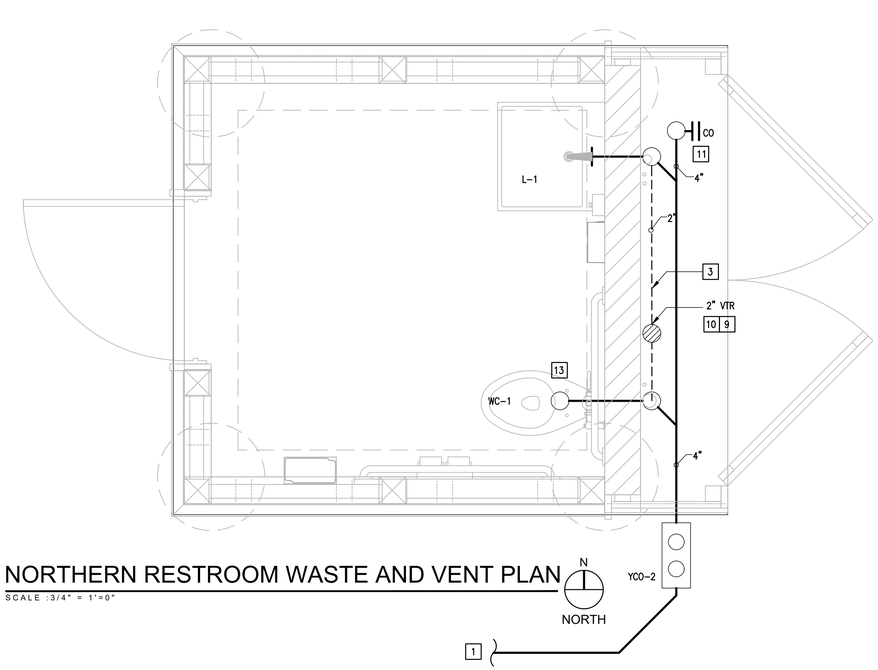
01 TYPICAL RESTROOM PLUMBING PLAN

SCALE :3/4" = 1'=0"



02 SOUTHERN RESTROOM WASTE AND VENT PLAN

SCALE :3/4" = 1'=0"



03 NORTHERN RESTROOM WASTE AND VENT PLAN

SCALE :3/4" = 1'=0"

GENERAL NOTES:

1. HANGERS SHALL BE STAINLESS STEEL. REFER TO SPECIFICATIONS FOR MORE DETAILS.
2. BALL VALVES AND DOMESTIC WATER PIPING SHALL BE SCH. 40 CPVC. REFER TO SPECIFICATIONS FOR MORE DETAILS.

PLUMBING KEYED NOTES:

1. REFER TO MEP SITE PLAN FOR CONTINUATION.
2. SLEEVE ALL GRADE BEAMS, FLOOR SLABS AND MASONRY WALL PENETRATIONS PER DETAIL WHETHER SPECIFICALLY INDICATED ON PLANS OR NOT.
3. MOUNT CPVC DOMESTIC WATER PIPING AND PVC VENT PIPING TO THE MASONRY WALL.
4. PROVIDE WATER HAMMER ARRESTOR (WHA), MIFAB OR APPROVED EQUAL. INDICATED MODEL (A,B,C,D,E,F) AS PER MIFAB SIZING CHART. PROVIDE 12"X12" ACCESS PANEL WHERE INSTALLED IN AN INACCESSIBLE AREA. ACCESS PANEL EQUAL TO ACUDOR MODEL UF5000 WITH CYLINDER LOCK AND KEY AND PAINT TO MATCH THE WALL/CEILING. (TYPICAL)
5. INSTALL WATER CLOSET FLUSH VALVE HANDLE TOWARDS WIDE SIDE OF THE ROOM. COORDINATE WITH GENERAL CONTRACTOR. (TYPICAL)
6. PROVIDE CPVC BALL VALVE IN LINE OF WATER ENTRANCE. SEE ASSOCIATED DETAIL ON DETAIL SHEET.
7. PROVIDE 1" CLOSED-CELL INSULATION WITH METAL JACKET ON EXPOSED PIPING. PENETRATE EXTERIOR WALL AS LOW AS POSSIBLE. TURN DOWN TO UNDERGROUND.
8. PROVIDE WALL HYDRANT AS SCHEDULED. PROVIDE CLOSE COUPLED HYDRANT TO ENSURE PIPE TURNS UP INSIDE BLOCK WALL. COORDINATE WALL THICKNESS WITH WALL HYDRANT MANUFACTURER DATA. (TYPICAL)
9. PAINT ALL EXPOSED PIPING TO MATCH ARCHITECTURAL FINISHES. COORDINATE COLOR WITH ARCHITECT.
10. PROVIDE 2" VENT TO 2" VENT THRU ROOF.
11. INSTALL CLEANOUT WITH PLUG FACING UP.
12. CAP HOT WATER LAVATORY FAUCET LINE. HOT WATER WILL NOT BE SUPPLIED.
13. START ELEVATION OF WATER CLOSET AT 34" TO CLEAR 6" BELOW STRUCTURAL GRADE BEAM. REFER TO GRADE BEAM DETAIL ON DETAILS SHEET.

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SEAL

PROJECT

WALKOVER
AT WHITE CAP CIRCLE

SOUTH PADRE ISLAND, TEXAS

CLIENT

CITY OF
SOUTH PADRE ISLAND

South Padre ISLAND

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P: 956-761-3044
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MARK	DATE	DESCRIPTION

PROJECT NO.	1065-16
DATE	04-22-2022
DRAWN BY	CAR
CHECKED BY	GV
SCALE	AS SHOWN

SHEET TITLE

RESTROOM PLUMBING, WASTE, AND VENT PLAN

SHEET NO.

P2.01

ethos engineering
1126 SOUTH COMMERCE ST.
HARLINGEN, TX
PHONE: 956-230-3435
TEXAS REGISTERED
ENGINEERING FIRM

PLUMBING FIXTURE SCHEDULE

Project: Walkover at White Cap Circle

MARK	MANUFACTURER & MODEL NUMBER	DESCRIPTION	CONNECTIONS					REMARKS
			WASTE	VENT	CW	HW	NOTES	
WC-1	AMERICAN STANDARD 3461.001 5901.100 SEAT (1" THICK) SLOAN ROYAL #111-1.28	16-1/2" FLOOR MOUNTED, ELONGATED BOWL, HIGH EFFICIENCY, LOW CONSUMPTION FLUSH VALVE, WHITE VITREOUS CHINA WATER CLOSET WITH SIPHON JET ACTION BOWL, 1.28 GPF TOP FLUSH VALVE, WHITE OPEN FRONT TOILET SEAT LESS COVER AND BOLT CAPS. ADULT ADA MOUNTING	4"	2"	1"	-	1,2	18" TO TOP OF SEAT
L-1	KOHLER K2314-1 CHICAGO FAUCET #410-T41E2805ABCP 0.5 GPM AERATOR MOUNTING BRACKET K-9583 17 GA. DRAIN AND 17 GA. P-TRAP W/CLEAN OUT TRUEBRO KIT	24" X 24" WALL MOUNTED SQUARE SHALLOW BASIN. 4" SINGLE FAUCET HOLES LAVATORY. SINGLE LEVER,, CHROME PLATED SUPPLY STOPS WITH STAINLESS STEEL FLEXIBLE CONNECTORS, CHROME PLATED DRAIN GRID AND TAILPIECE. DECK MOUNTED, SINGLE LEVER FAUCET WITH SINLGE HOLE MOUNTING ON CENTER WITH THERMOSTATIC MIXING CARTRIDGE, SET AT NO MORE THAN 105 DEGREES FAHRENHEIT AND MOUNTING BRACKET	2"	2"	1/2"	1/2"	3	SEE ARCHITECTURAL
WS-1	ACORN 53 SHOWER HEAD ONLY ACORN -DIV DIVERTER VALVE AMERICAN GRANBY AIHBB50SS HOSE BIBB	OUTDOOR BUILT-IN SHOWER. MARINE GRADE TYPE 316 STAINLESS STEEL EXPOSED PARTS, STAINLESS STEEL DIVERTER VALVE , STAINLESS STEEL NON-USER ADJUSTABLE SHOWER HEAD, STAINLESS STEEL HOSE BIBB			3/4"			MOUNTED WITHIN CUSTOM CEDAR ENCLOSURE. SEE ARCHITECTURAL
WH-1	ZURN # Z1300-SS-34UN	ENCASED ANTI-SIPHON AUTOMATIC DRAINING WALL HYDRANT FOR FLUSH INSTALLATION. COMPLETE WITH NON-FREEZE TYPE INTEGRAL BACKFLOW PREVENTER, BRONZE CASING, ALL BRONZE INTERIOR PARTS, NON-TURNING OPERATING ROD WITH FREE-FLOATING COMPRESSION CLOSURE VALVE, REPLACEABLE BRONZE SEAT AND SEAT WASHER. STAINLESS STEEL BOX AND HINGED COVER WITH OPERATING KEY LOCK AND "WATER" CAST ON COVER.	-	-	3/4"	-	-	

NOTES:

1. INSTALL FLUSH VALVE ON THE WIDE SIDE OF STALL.
2. PROVIDE ADA APPROVED FLUSH VALVE HANDLE FOR ALL ADA PLUMBING FIXTURES.
3. PROVIDE TRUEBRO LAVATORY GUARD MODEL #103 E-Z COLOR WHITE. COVER SHALL BE SECURED WITH SNAP-SLIP FLUSH REUSABLE FASTENERS.

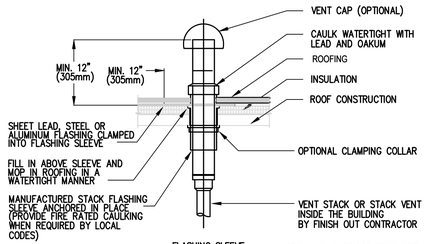
PLUMBING SYMBOLS LEGEND

—•—•—	COLD WATER SUPPLY	WCO |—	WALL CLEANOUT
—••—	HOT WATER SUPPLY	—▷◁—	*GATE VALVE (GV)
----G----G---	GAS LINE		*BALL VALVE (BV)
———	SOIL & WASTE LINE – ENLARGED PLANS		VALVE IN RISER TYPE AS NOTED
- - - - - - - -	VENT LINE – ENLARGED PLANS	WC	WATER CLOSET
——AW——	ACID WASTE LINE – ENLARGED PLANS	UR	URINAL
——AV——	ACID VENT LINE – ENLARGED PLANS	L	LAVATORY
——F——	FIRE SPRINKLER LINE	SK	SINK
FCO —○—	FLOOR CLEANOUT	EDF	ELECTRIC DRINKING FOUNTAIN
FCO–2	FLOOR CLEANOUT – 2 WAY	MSB	MOP SERVICE BASIN
FD FD	FLOOR DRAIN/SINK WITH DEEP SEAL TRAP	EESHR	EMERGENCY EYE/SHOWER
HD	HUB DRAIN WITH DEEP SEAL TRAP	TP	TRAP PRIMER
FS	FLOOR SINK	EWH	ELECTRIC WATER HEATER
YCO —○—	YARD CLEANOUT	VTR	VENT THRU ROOF
YCO–2	YARD CLEANOUT – 2 WAY	CO	CLEANOUT
WH —⊕—	WALL HYDRANT	A.F.F.	ABOVE FINISH FLOOR
	TRAP PRIMER	ADT	ACID DILUTION TANK
	*WATER HAMMER ARRESTOR (WHA)	GT	GREASE TRAP
P.O.C.	POINT OF CONNECTION	S.S.	SANITARY SEWER
	WASHING MACHINE BOX		

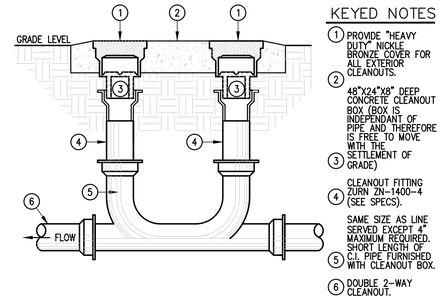
* PROVIDE 12"x12" ACCESS PANEL WHERE INSTALLED IN AN INACCESSIBLE AREA.

GENERAL NOTES: (APPLY TO ALL PLUMBING SHEETS)

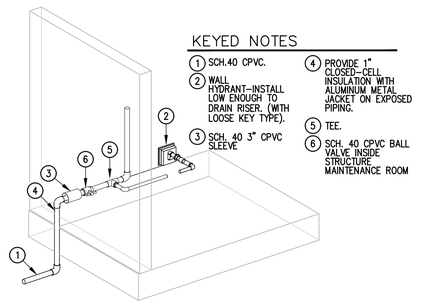
1. ALL PLUMBING WORK SHALL BE IN COMPLIANCE WITH ALL APPLICABLE CODES AS ADAPTED AND AMENDED BY THE INSPECTING AUTHORITIES.
2. DRAWING IS DIAGRAMMATIC ONLY. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF PIPING, DEVICES AND EQUIPMENT WITH BUILDING ELEMENTS AND THE WORK OF OTHER TRADES.
3. ALL PLUMBING WORK SHALL BE INSTALLED SO AS TO AVOID CONFLICT WITH THE WORK OF OTHER TRADES. COORDINATE WITH MECHANICAL, ELECTRICAL AND STRUCTURAL FOR PROPER CLEARANCES.
4. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR PHASING AND SEQUENCE OF CONSTRUCTION WORK.
5. COORDINATE WORK AMONG ALL DISCIPLINES. IT IS NOT THE INTENT OF THESE DOCUMENTS TO DICTATE WHO MUST DO THE WORK. ALL WORK SHOWN IS THE RESPONSIBILITY OF THE PRIME CONTRACTOR.
6. SLEEVE ALL OUTSIDE WALLS, FOUNDATION GRADE BEAMS, INTERIOR WALL PENETRATIONS, AND FIRE SEAL ALL PENETRATION THROUGH FIRE WALLS AND FLOORS WHETHER SHOWN ON PLANS OR NOT.
7. PROVIDE MINIMUM 15' OF SEPARATION BETWEEN HVAC INTAKES AND VENT THRU ROOFS.
8. RECORD INVERT ELEVATIONS OF ALL YARD CLEAN OUT (YCO) ON "AS-BUILT" DRAWINGS.
9. PROVIDE SHUT-OFF VALVES (STOPS) ON ALL ROUGH-INS TO FIXTURES AND EQUIPMENTS.
10. PROVIDE WATER HAMMER ARRESTORS AS INDICATED ON THE DRAWINGS. AIR CHAMBERS NOT AN APPROVED SUBSTITUTE.
11. PROVIDE ANY BACKFLOW PREVENTION DEVICE REQUIRED BY CODE OR LOCAL AUTHORITIES. CONTRACTOR SHALL VERIFY THIS WITH CITY AND LOCAL AGENCIES AND INCLUDE COST IN BID. CONTRACTOR TO HAVE BACK FLOWS CERTIFIED.
12. REFER TO PLUMBING FIXTURE ROUGH-IN SCHEDULE FOR INDIVIDUAL PIPE CONNECTIONS TO FIXTURES.
13. PRIOR TO POURING FOUNDATION AND ERECTING WALLS, COORDINATE INSTALLATION OF PLUMBING FIXTURE CARRIERS WITH GENERAL CONTRACTOR.
14. STUDS AT DRY WALLS SHALL NOT BE CUT THRU HORIZONTAL DIRECTION. COORDINATE WITH DRY WALL CONTRACTOR.
15. CONTRACTOR SHALL NOT CUT ANY EXTERIOR WALL STUD.



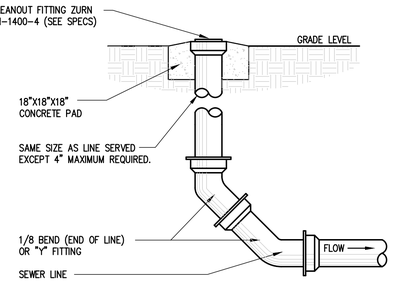
01 VENT THRU ROOF DETAIL
SCALE : NOT TO SCALE



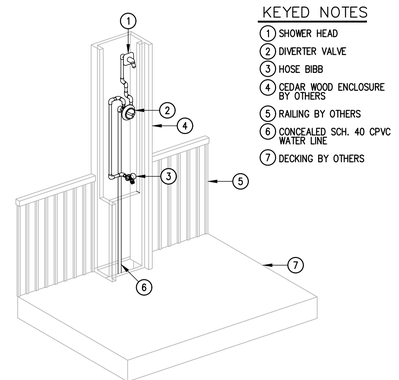
02 2-WAY YARD CLEANOUT DETAIL
SCALE : NOT TO SCALE



03 WATER ENTRANCE DETAIL
SCALE : NOT TO SCALE



YCO-1
04 YARD CLEANOUT DETAIL
SCALE : NOT TO SCALE



05 (WS-1)WASH STATION DETAIL
SCALE : NOT TO SCALE

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TEXAS REGISTERED ENGINEERING FIRM

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SEAL

PROJECT

WALKOVER
AT WHITE CAP CIRCLE

SOUTH PADRE ISLAND, TEXAS

CLIENT

CITY OF
SOUTH PADRE ISLAND

SOUTH PADRE ISLAND, TEXAS
P: 956–761–3044
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MARK	DATE	DESCRIPTION

PROJECT NO.	1065–16
DATE	04–22–2022
DRAWN BY	CAR
CHECKED BY	GV
SCALE	AS SHOWN

SHEET TITLE

PLUMBING SCHEDULE AND DETAILS

SHEET NO.

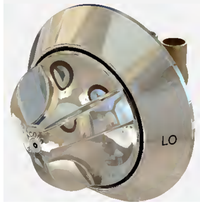
P3.01

01 4420DB OUTDOOR DRINKING FOUNTAIN
SCALE : NOT TO SCALE

02 WC-1
SCALE : NOT TO SCALE

03 L-1
SCALE : NOT TO SCALE

04 WH-1
SCALE : NOT TO SCALE



05 WS-1
SCALE : NOT TO SCALE

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SOUTH PADRE ISLAND, TEXAS

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CITY OF
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PROJECT NO.	1065-16
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SCALE	AS SHOWN

SHEET TITLE

PLUMBING
FIXTURE IMAGES

SHEET NO.

P3.02

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TEXAS REGISTERED
ENGINEERING FIRM

TEXAS GENERAL LAND OFFICE
GEORGE P. BUSH, COMMISSIONER

August 17, 2022

Via Electronic Mail

Erika Hughston
Shoreline Coastal Coordinator
City of South Padre Island
4601 Padre Blvd.
South Padre Island, Texas 78597

Beachfront Construction Certificate & Dune Protection Permit in the City of South Padre Island
Site Address: Sea Island Circle, 2300 Gulf Blvd., South Padre Island
Legal Description: Sea Island Circle
Lot Applicant: City of South Padre Island c/o Erika Hughston
GLO ID No.: BDSPI-22-0321

Dear Ms. Hughston:

The General Land Office (GLO) has reviewed the application materials for a beachfront construction certificate and dune protection permit for the above-referenced location. The City of South Padre Island (City) proposes to construct several public ADA-compliant beach access amenities, including restrooms, rinse stations, sidewalks and changing rooms at Sea Island Circle Beach Access. The proposed construction is located landward of the Historic Building Line. According to the Bureau of Economic Geology, the area is accreting.

Based on the information provided to our office for review, we have the following comments:

Project specific

- Activities presented in this permit application must be performed in accordance with the requirements of these comments, the permit, and state law and must be confirmed as allowable to be paid for with CMP Grant funding.

- The City of South Padre Island will need to temporarily restrict public access to the beach during the construction phase of the proposed improvements. Prior to any beach access closures, the City must request approval from the GLO and provide signage to redirect beach users to other access points during construction. The signage must be conspicuously posted and explain the nature and extent of modified vehicular controls, the location of free parking areas and access points, including access for disabled persons.[1] The GLO recommends minimizing the duration of the public access restriction to the greatest extent possible.

[1] 31 Tex. Admin. Code §15.7(h)(1)(C).

- The City must take measures to avoid adversely impacting dunes and dune vegetation during construction, such as temporarily installing silt fencing adjacent to the critical dune area to prevent construction equipment or materials from being placed in the dune system. [2]

Hydrology and erosion

- The City must ensure that the construction will minimize impacts on natural hydrology and will not cause erosion of critical dune areas. [3]

- The proposed construction activities must not result in the potential for increased flood damage to the proposed construction site or adjacent property, result in runoff or drainage patterns that aggravate erosion, cause significant changes to dune hydrology, adversely affect dune complexes or dune vegetation, or significantly increase the potential for washovers or blowouts to occur. [4]

If you have any questions, please contact me at (512) 463-0413 or at natalie.bell@glo.texas.gov.

Sincerely,

Natalie Bell
Manager, Beach Access & Dune Protection Program
Coastal Resources Division
Texas General Land Office

[2] 31 Tex. Admin. Code § 15.4(f)(1).
[3] 31 Tex. Admin. Code § 15.6(g).
[4] 31 Tex. Admin. Code § 15.4(d).