PROJECT MANUAL

FOR

Parking Lot
@
Mayor Pablo G. Peña City Park

FOR THE

CITY OF WESLACO

2016

City of Weslaco
255 S. Kansas Avenue
Weslaco, Texas 78596
(956) 968-3181

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City of Weslaco
255 S. Kansas Avenue
Weslaco, Texas 78596
(956) 968-3181

Document 00001

TITLE SHEET

PROJECT MANUAL
FOR
CITY OF WESLACO
Parking Lot @ Mayor Pablo G. Peña City Park

FOR

WESLACO, TEXAS

CITY ENGINEER

Signature

Date

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Document 00003

TABLE OF CONTENTS

Document	Title	No. of Pages
	INTRODUCTORY INFORMATION	
00001	Title Sheet	2
00003	Table of Contents	4
00004	List of Drawings	2
00020	Notice to Bidders	4
00030	Advertisement	2
00100	Instruction to Bidders	8
00150	Tax Exempt Organization Certificate	2
	BIDDING REQUIREMENTS	
BID FORMS		
00300	Intent to Respond	2
00310	Form of Proposal	4
SUPPLEMENTS TO BID FORMS		
00405	Schedule of Unit Price Work	2
00411	Bid Bond	2
00420	Statement of Bidders Qualifications	4
00423	Certificate of Bidder's Experience & Qualifications	2
00425	Equipment & Material Suppliers List	4
00429	Non-Bribery Model Form	2
POST-BID PROCEDURES		
00450	Post Bid Procedures	2
00460	Noncollusion Affidavit	2
CONTRACT FORMS		
00500	Agreement	6
00510	Notice of Award	2
00550	Notice to Proceed	2
00610	Performance Bond	2
00620	Payment Bond	2
00625	Affidavit of Insurance	2
00627	State Sales Tax/Separated Contract	2
00630	Forms of Business	2
00631	Resolution of Corporation	2
00632	Contractor's Resolution on Authorized Representative	2
00635	Contractor's Act of Assurance	2
00636	Vendor Compliance with Reciprocity on Non-Resident Bidders	2
00640	Certification Regarding Department Suspension and Other Responsibility Matters	2
	CONDITIONS OF THE CONTRACT	
GENERAL		
00700	General Conditions	44

SUPPLEMENTARY CONDITIONS

00800 Supplementary Conditions 6
00811 Wage Rates 8
00830 Warranty 4

ADDENDA

00900 Addenda (For filing) 4
00910 Modifications 2

(For filing) Documents listed "for filing" are to be provided by the Bidder and are not included in this Project Manual unless indicated for example only. The Document numbers and titles hold places for actual documents to be submitted by the Contractor during the bid, post-bid, or construction phase of the Project.

*1 For newspaper publication; not included as part of Project Manual.

SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

01010 Scope of Work 2
01110 Summary of Work 2
01145 Use of Premises 4
01150 Project Procedural Definitions 2
01151 Request For Information / Requests for Technical Instructions (RFI's/RFTI's) 2
01255 Change Order Procedures 4
01270 Measurement and Payment 2
01292 Schedule of Values 2
01312 Coordination and Meetings 4
01321 Construction Photographs 2
01325 Construction Schedule 2
01326 Construction Schedule (Bar Chart) 2
01330 Submittal Procedures 4
01340 Shop Drawings, Product Data, and Samples 2
01410 TPDES Requirements 4
01422 Reference Standards 4
01450 Contractor's Quality Control 2
01452 Inspection Services 2
01454 Testing Laboratory Services 4
01504 Temporary Facilities and Controls 8
01555 Traffic Control and Regulations 2
01561 Trench Safety System 2
01570 Texas Pollutant Discharge Elimination System 2
01571 Stormwater Pollution Prevention Plan 2
01572 Source Controls for Erosion Control 4
01573 Filter Fabric Fence 2
01575 Stabilized Construction Entrance 4
01576 Waste Material Disposal 2
01578 Control of Groundwater and Surface Water 4
01610 Basic Product Requirements 4
01630 Product Substitution Procedures 2
01720 Project Record Documents 2
01725 Field Surveying 2
01732 Procedure for Water Valve Assistance 2
01740 Restoration of Site Improvements 4
01770 Closeout Procedures 2
01785 Project Record Documents 2

DIVISION 2-3 – TECHNICAL SPECIFICATIONS FOR WATER LINE INSTALLATION

02047	Flexible Base	8
02069	Demolition	2
02100	Site Clearing	2
02200	Earthwork and Site Grading	4
02221	Removing Existing Pavements and Structures	2
02241	Pneumatic Tire Rolling	4
02242	Proof Rolling	2
02270	Soil Erosion and Sediment Control	2
02316	Excavation and Backfill for Structures	8
02317	Excavation and Backfill for Utilities	12
02318	Excavation (Detention)	2
02320	Utility Backfill Materials	8
02321	Cement Stabilized Sand	6
02580	Pavement Markings	2
02711	Chain Link Fence	2
02720	Storm Drainage System	4
02740	Asphalt Overlay and Base Repair	6
02741	Asphaltic Concrete Paving	6
02742	Prime Coat	4
02743	Tack Coat	4
02744	Pavement Repair	2
02752	Concrete Pavement Joints	4
02753	Concrete Pavement Curing	2
02771	Concrete Curb and Gutter and Headers	4
02775	Concrete Sidewalks	2
02911	Topsoil	2
02920	Topsoiling and Finished Grading	2
02922	Hydromulch Seeding	4
03100	Concrete Formwork	10
03210	Reinforcing Steel	8
03250	Joints in Concrete Structures	10
03300	Concrete	16
03310	Structural Concrete	20
03315	Concrete for Utility Construction	14
03345	Concrete Finishing	10
03370	Concrete Curing	4
03600	Structural Grout	4

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Document 00004

LIST OF DRAWINGS

The list of Drawings is provided on the Sheet Index page for Boys and Girls Club – Parking Lot Improvement Project.

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Document 00020

NOTICE TO BIDDERS

Owner/Engineer: City of Weslaco, Texas
255 S. Kansas Avenue
Weslaco, Texas 78596
Phone: (956) 968-3181
Fax: (956) 973-3128

1.00 INVITATION

A. Bidders are invited to submit an offer for performance of a Contract to the City of Weslaco located at the above address, for the following construction Project:

Project: Parking Lot @ Mayor Pablo G. Peña City Park

Located: In the City of Weslaco, Hidalgo County, Texas

B. Work of the Project consists of construction of parking lot with asphalt, curb and gutter and appropriate drainage features.

C. The Contract Documents are identified Parking Lot @ Mayor Pablo G. Peña City Park as listed in the Project Manual, issued by the City of Weslaco/Engineer of Record.

D. The bidder shall bear all costs associated with the preparation and submission of its bid, and the Owner will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

E. When requested, the successful Bidder shall present satisfactory evidence that Bidder has regularly engaged in furnishing products and performing construction work as proposed, and has the capital, labor, equipment, and material to execute the Work required by Contract Documents.

2.00 BID SUBMISSION

A. Bids signed by an officer of the company and dated will be received at the City of Weslaco Purchasing Office, at 255 South Kansas Ave. Weslaco, Texas until 3:00 P.M. local time, on Monday, 25 of April, 2016.

B. Bids submitted after the above time will be returned to the Bidder unopened.

C. Bids shall be submitted in United States Currency and the English language on the Bid Forms and Supplements to Bid Forms provided with this Project Manual.

D. Oral, telephonic, facsimile, or telegraphic bids are invalid and will not receive consideration.

E. Bids will be opened and publicly read in the City of Weslaco Purchasing Conference Room at 255 S. Kansas Ave. Weslaco, Texas, on the same date bids are received.

F. Bids will be irrevocable for **90 days** from the bid date. Bidder may withdraw after 90 days without penalty if no mutual agreement can be reached.

3.00 MODIFICATION OR WITHDRAWAL

A. Bids submitted early may be modified or withdrawn by notice to the City of Weslaco at the place and prior to the time designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder and shall be so worded as not to reveal the amount of the original Bid.

B. Oral, telephonic, facsimile, or telegraphic modification of Bids will not receive consideration.

C. Withdrawn Bids may be resubmitted up to the time designated for receipt of Bids.

4.00 CONTRACT TIME

A. The Work shall be performed within **30 calendar days** from the date established in the Notice to Proceed.

B. Contractor shall pay liquidated damages in the amounts stated in Document 00500 - Agreement for failure to complete the Work within the Contract Time.

C. Contract is for **30 calendar days**. The work is to be performed only during weekdays 8:00 AM to 5:00 PM (Monday to Friday). City recognized holidays are recommended to be avoided. Work performed during weekends (Saturday-Sunday) and holidays will incur a Contractor payment of **$50** per hour to Owner for onsite inspection.

5.00 SECURITY DEPOSIT REQUIREMENTS

A. Bids shall be accompanied by a security deposit as stated in Document 00100 - Instructions to Bidders.

6.00 EXAMINATION

A. Bid Documents are on display on the City of Weslaco website and may be examined at the City of Weslaco- Planning Department.

7.00 AVAILABILITY

A. Bid Documents may be purchased from the Planning Department or are available for printing at http://www.weslacotx.gov/Bids.htm.

B. Bid Documents may be purchased by bidders upon receipt of a cashier's check, certified check, money order, company check, or personal check in the amount established by City of Weslaco Master Fee Schedule. The cost includes the Project Manual w/ Specifications and one full sized set of Drawings. They can also be downloaded at no cost, as specified on 7(A).

C. The cost for the bid documents will not be refunded.

D. Bid Documents are made available only for the purpose of obtaining offers for this Project. Purchase of Bid Documents does not grant a license for other purposes.

E. On receipt of Bid Documents, verify that documents are legible and complete. Compare contents of Project Manual with Table of Contents; see that all drawings listed in the List of Drawings are included. Notify City of Weslaco should the documents be incomplete as issued.

8.00 QUESTIONS AND INTERPRETATIONS

A. Bidder is required to study Bid Documents, the site, and conditions affecting the Work, and submit written questions on interpretation of those documents and conditions, or other factors affecting the Work, to the City of Weslaco.

B. Written questions may be submitted by facsimile or email, addressed to the Engineer. **No questions will be accepted after 5:00 PM, Thursday, April 21, 2016.** All facsimile communications shall be confirmed by mailing the original correspondence to the City of Weslaco Planning Department, if applicable.

C. Immediately notify the Engineer upon finding discrepancies or omissions in the Bid Documents.

9.00 ACCEPTANCE/REJECTION OF BIDS

A. The Owner reserves the right to reject or accept any bids as stated in Document 00100 - Instructions to Bidders.

10.00 PRE-BID CONFERENCE

A. One (1) pre-bid conference will be conducted by the Owner on Wednesday, April 20th, 2015 at 11:00 AM. The pre-bid conference shall be conducted at the City of Weslaco Planning Conference Room: located at 255 S. Kansas Ave. in Weslaco, Texas. **Attendance by prospective Bidders is highly recommended.** Sub-contractors, suppliers, and equipment suppliers may attend.

B. Recognizing that free and open communication will benefit all participants, the Owner does not intend to limit or curtail the exchange of information between the Engineer and the prospective Bidders. However, the pre-bid conference is conducted primarily for the benefit of prospective Bidders. As such, a specific procedure will be followed during the conference:

   a. All attendees will sign-in, indicating their role with the project: contractor, supplier, manufacturer, etc.

   b. Seating priority will be given to Prospective Bidders. Sub-contractors, suppliers, and manufacturer's representatives shall remain behind the contractor area.

   c. The Owner will make introductions of his staff and consultants.

   d. The Owner and consultants will give a brief description of the project.

   e. Only Contracting firms (Prospective Bidders) are permitted to ask questions. Sub-contractors suppliers, and manufacturer's shall deliver their questions to the Contractor they are working with for presentation.

   f. Questions and answers will be recorded and developed into Meeting Minutes. Meeting Minutes will be distributed to meeting attendees. The Owner reserves the right to use electronic recording, or some other method to record the meeting.

C. The meeting will be conducted in English. Translators will not be provided.

D. If necessary, written clarifications or instructions will be issued in the form of an Addendum. Refer to Section 00100 – Instructions to Bidders for specific information concerning Addendums.

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REQUEST FOR BIDS

The City of Weslaco is soliciting sealed Request for Bids; hereinafter referred to as RFB, to be received by the City's Purchasing Office located at 255 S. Kansas Avenue, Weslaco, Texas 78596. City of Weslaco normal business days are Monday through Friday between the hours of 8:00 a.m. to 5:00 p.m. and shall be closed on recognized holidays. A **pre-bid conference** will be conducted by the Owner /Engineer on Wednesday, April 20, 2016 at 11:00 a.m. The pre-bid conference shall be conducted at the City of Weslaco City Hall – Planning Conference Room located at, 255 S. Kansas Avenue, Weslaco, Texas 78596. Attendance by prospective Bidders is recommended for all general contractors submitting bids. Sub-contractors, suppliers, and equipment suppliers may attend.

The City of Weslaco will receive sealed bids for Boys & Girls Club – Parking Lot Improvements until 3:00 p.m. on Monday, April 25, 2016 addressed to the City of Weslaco's Purchasing Office, Weslaco City Hall, 255 S. Kansas Avenue, Weslaco, Texas 78596. The bids will be publicly opened and read aloud as near as practical after 3:00 p.m. on the date of submittal at the Weslaco City Hall. Bids received after closing time will be returned unopened. It is the responsibility of the submitter to see that any BID submitted shall have sufficient time to be received by the City's Purchasing Office prior to the BID opening date and time. The receiving time in the City Secretary's Office will be the governing time for acceptability of the BIDS. BIDS will not be accepted by telephone or facsimile machine. All BIDS must bear original signatures and figures. The BID shall be for:

RFB # 2015-16-10
Parking Lot @ Mayor Pablo G. Peña City Park

Respondents receiving a "NOTICE TO RESPONDENTS" and/or "REQUEST FOR BIDS" notice in the mail or reading same in the newspaper are advised that the Bid Packets may be obtained from the office of City of Weslaco – Planning & Code Enforcement Department, 255 S. Kansas Avenue, Weslaco, Texas 78596, Phone No (956) 447-3403 for the amount established on Weslaco Master Fee Schedule. Additionally, BIDS can be downloaded from the City of Weslaco web page address: www.weslacotx.gov. General and/or Prime Contractors submitting bids and/or proposals to the City of Weslaco shall be non-refundable.

If you have any questions or require additional information regarding this RFB, please contact **Mardoqueo Hinojosa, P.E.**, Planning Director/City Engineer, at (956) 447-3403.

Hand Delivered RFB'S:	Homer Rhodes 255 S. Kansas Avenue C/o Purchasing Office
If using Land Courier (i.e. FedEx, UPS):	City of Weslaco C/o Purchasing Office 255 S. Kansas Avenue Weslaco, Texas 78596
If Mailing Proposals:	City of Weslaco C/o Purchasing Office 255 S. Kansas Avenue Weslaco, Texas 78596

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Document 00100

INSTRUCTIONS TO BIDDERS

1.00 SUMMARY

1.01 DOCUMENT INCLUDES

A. Bid Documents and Contract Documents.

B. Site Assessment.

C. Subcontractors/Suppliers/Others.

D. Bid Submission.

E. Bid Enclosure Requirements.

F. Offer, Acceptance, Rejection.

1.02 RELATED DOCUMENTS

A. Document 00020 - Notice to Bidders: Date, time and place for receipt of bids; Contract Time.

B. Document 00310 - Form of Proposal.

C. Document 00405 - Schedule of Unit Price Work.

D. Document 00450 - Post Bid Procedures.

E. Document 00500 - Agreement.

F. Document 00700 - General Conditions.

G. Document 00800 - Supplementary Conditions.

2.00 BID DOCUMENTS AND CONTRACT DOCUMENTS

2.01 DEFINITIONS

A. Definitions set forth in Document 00700 – General Conditions and in other Contract Documents, are applicable to the Bid Documents.

B. Addenda: Written or graphic instruments issued prior to the opening of Bids, which clarify, modify, correct, or change the Bid Documents.

C. Alternate Bid: The total amount bid for additions to the Work, as described in the Bid Documents. Each Alternate Bid shall include the cost of effects on adjacent or related components, and the Contractor's overhead and profit.

D. Bid Documents: The Project Manual and Drawings, including Addenda, plus Notice to Bidders, Instructions to Bidders, and Supplements to Bid Forms identified in Document 00310 - Form of Proposal.

E. Bidder: A person or entity who submits a Bid.

F. Low Bidder: The apparent successful Bidder who qualifies as a responsible Bidder and who submits the Bid with the lowest Total Bid Price.

G. Bid, Offer, Bidding: The act of submitting a complete and properly signed offer in accordance with these Instructions to Bidders. The Bid will be in the English language.

H. Total Bid Price: The monetary amount for performing the Work as identified by the Bidder in Document 00310 - Form of Proposal, which amount includes Cash Allowances and Alternate Bids, if any. Bid Price(s) will be in United States.

I. Security Deposit: A certified check, cashiers check or bid bond in at least the sum of 5 percent of the Total Bid Price which includes Cash Allowances and Alternate Bids, if any.

2.02 QUESTIONS, INTERPRETATIONS

A. Bidder shall: 1) carefully study the Bid Documents and compare them with each other, 2) examine the site, conditions thereon, and local conditions, and 3) report at once to the Engineer any errors, inconsistencies or ambiguities discovered.

B. Direct questions to City Engineer or Purchasing Agent. Contact with persons other than City's Engineering staff or Purchasing agent are grounds for elimination from the selection process.

C. Verbal discussions and answers are not binding. Requests from Bidders for clarifications and interpretations of content of documents must be in writing (mail or facsimile transmission only), and must be received not less than 3 business days before the date set for receipt of Bids.

D. The reply will be by Addendum.

2.03 ADDENDA

A. Addenda issued to Bidding Requirements are applicable only during the bidding period. Addenda to the Post-Bid Procedures are applicable only through the issuance of the Notice to Proceed. Any Addenda issued to Contract Forms, Conditions of the Contract, Specifications or Drawings become a part of the Contract Documents. Include resultant costs in the Total Bid Price.

B. Addenda will be issued by the Engineer to Bidders of record by facsimile transmission. Addenda will also be mailed to Bidders of record.

C. Each Bidder shall ascertain, prior to submitting a Bid, that the Bidder has received all Addenda issued. The Bidder shall acknowledge their receipt in the place indicated in Document 00310 - Form of Proposal.

2.04 SUBSTITUTIONS OF MATERIALS/EQUIPMENT

A. No substitutions will be considered on this Project during the bidding period.

B. Voluntary substitutions by the Bidder will not be considered.

3.00 SITE ASSESSMENT

A. Bidders shall examine the Project site before submitting a Bid, become familiar with local conditions under which the Work will be performed, conduct appropriate explorations, and correlate personal observations with requirements of the Bid Documents. Work will be performed in public right-of-way and City property. The site may be examined at any time during daylight hours.

B. Bidder shall make site investigations to the extent Bidder deems necessary to ascertain the extent of subsurface conditions and variations thereof.

C. Failure to perform such investigations during the bid period shall not relieve Bidder from responsibility for investigations, interpretations and proper use of available information in preparation of Bidder's proposal.

D. Publications by the United States Department of Agriculture, Soil Conservation Service and others may be helpful to the bidder in his subsurface site investigation.

E. Geotechnical investigation reports for the proposed Boys and Girls Club may also be helpful to the bidder in his subsurface site investigation.

4.00 SUBCONTRACTORS/SUPPLIERS/OTHERS

A. The Owner reserves the right to reject a proposed Subcontractor or Supplier for reasonable cause.

5.00 BID SUBMISSION

5.01 SUBMISSION PROCEDURES

A. Bidders shall be solely responsible for the delivery of their Bids in the manner and time prescribed in Document 00020 - Notice to Bidders.

B. Submit **one copy of the original executed offer** on the bid forms provided, properly signed, with required Security Deposit, and other Supplements to Bid Forms, in a sealed, opaque envelope. On the outside of the envelope, clearly indicate that it is a sealed bid and include the Bidder's name, Project name and Owner name. Bids submitted by mail shall be enclosed in a separate envelope addressed for mailing, and identifying the enclosure as a bid. In addition**, four copies must also be submitted**.

C. Fill in all blanks in the Bid forms. Acknowledge receipt of Addenda. Bid all Alternate Bids required by Bid Documents.

D. A summary of submitted Bids will be made available to Bidders following the Bid opening.

E. All costs and expenses incurred by the Bidder that are associated with preparation of the Bid shall be paid by and be the sole responsibility of the Bidder.

5.02 BID INELIGIBILITY

A. Failure to provide required Security Deposit in the proper amount will be cause to declare the Bid invalid.

B. Improperly completed information may be cause for declaring the Bid invalid.

C. Bids that are unsigned, improperly signed, illegible, obscure, altered, or which contain qualifications or irregularities of any kind, may be declared invalid. Document 00310 - Form of Proposal, Supplements to the Bid Forms identified in the Form of Proposal, or enclosures which are improperly prepared, may be declared invalid.

6.00 BID ENCLOSURE REQUIREMENTS

6.01 SUPPLEMENTS TO BID FORMS

A. Bid submittals shall include any other documents specified in Document 00310 - Form of Proposal.

6.02 SECURITY DEPOSIT

A. Bids shall be accompanied by a Security Deposit.

B. The Security Deposit of the Bidders will be retained until after the Contract is executed.

C. After execution of the Contract, Security Deposits will be returned to the Bidders.

D. If no Contract is awarded, all Security Deposits will be returned to the respective Bidders.

6.03 CERTIFIED CHECK/CASHIER'S CHECK

A. Make certified check or cashier's check (security checks) payable to the Owner.

B. The security checks are submitted on the condition that if the Bidder is named apparent Low Bidder and then fails either to timely execute the Agreement or to timely provide any required bonds, or to do both, then in that event the Owner will cash the security check.

C. The Owner will retain an amount equal to the difference between the Bid of the Bidder providing the security check and the Bid of the Bidder who is finally awarded the Contract and who executes the Agreement and provides the required bonds.

D. Any balance remaining will be reimbursed by the Owner to the Bidder who provided the security check.

6.04 BID BOND

A. The bid bond must be a valid and enforceable bond, executed by a corporate Surety authorized by the Texas State Board of Insurance to conduct insurance business in the State of Texas and shall comply with other requirements set out by law or included in the Bid Documents.

B. Endorse the bid bond in the name of the Owner as obligee, signed by the Contractor as principal and executed, signed and sealed by the Surety.

C. The bid bond must be conditioned such that if the Bidder is named apparent Low Bidder and then fails either to execute the Agreement timely or to provide any required bonds timely, or to do both, then in that event the Surety will be obligated to pay to the Owner an amount equal to the difference between the Bid of the Bidder on whom the bond was written and the Bid of the Bidder who is finally awarded the Contract and who executes the Agreement and provides the required bonds, up to the penal sum of the Bond.

D. In addition, the Owner expressly reserves the right to reject any Bid if the Bid Bond (or Bid Bond rider) conditions the Bid in a way inconsistent with the Bid Documents. Examples include but are not limited to:

1. a condition prohibiting the Owner from making a Claim against the Performance Bond Surety that would be allowable under the Contract and Performance Bond form published in the Bid Documents;

2. a condition that provides that the Performance Bond Surety cannot be held liable for completing the Contract in case of default; or
3. a condition limiting the Performance Bond Surety's liability for damages inconsistent with the Contract and Performance Bond form published in the Bid Documents.

E. On all contracts that will equal to or exceed $100,000, the Performance Bond and the Payment Bond must be provided by a surety that has a rating of “A” from AM BEST, MOODY’S or STANDARD & POORS.

In the event that the total bid amount is $50,000 or less, the successful contractor has the option to enter into a single payment contract with the City of Weslaco in lieu of a Performance Bond, provided that no money shall be paid to the contractor until completion of the work by the contractor and accepted of same by the City of Weslaco. In the event that the total bid amount is $25,000 or less, the successful contractor has the option to enter into a single payment contract with the City of Weslaco in lieu of a Payment and Performance Bond.

6.05 BID FORM SIGNATURE

A. Document 00310 - Form of Proposal shall be signed by the Bidder as follows:

1. Sole Proprietorship: Full name, address, and signature of sole proprietor, signed in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature.

2. Partnership: Name and address of the firm, signature of each partner in the presence of a witness who will also sign. The full name and address of each partner shall be given.

3. Corporation: Signature of duly authorized officer.

4. Joint Venture: Each party of the joint venture shall execute Document 00310 - Form of Proposal under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

6.06 LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

A. The successful bidder, upon failure or refusal to execute and deliver the contract and bonds required within ten (10) days after receipt of notice of acceptance of the bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposit submitted with his bid.

B. Liquidated damages in the amount per day shown in the “Liquidated Damages” of the Agreement Between Owner and Contractor will be assessed against the contractor for each Calendar Day or portion thereof that: (1) the Contractor has not fully and timely completed the specific portion or part of the work to be completed by the end of the current month as provided in the detailed description of work and/or schedule previously submitted by the contractor on the first day of that particular month, after accounting for any agreed-upon change orders, which will entitle the owner to withhold the liquidated damages from payment otherwise owed to the contractor for work completed in that particular month: (2) the Contractor has not substantially completed all work following the expiration of the number of calendar days to complete the work reference under “Liquidated Damages” of the Agreement Between Owner and Contractor after accounting for any agreed upon change orders; or (3) all items listed as incomplete and attached to the Certificate of Substantial Completion are not completed or corrected after expiration of the agreed time allotted for completion and correction, including any approved extensions of time granted. These liquidated damages are cumulative.

C. Any failure on the part of the Owner to request or require payment or withholding of liquidated damages in any particular month shall not constitute a waiver of Contractor's requirement to pay, or the Owner's ability to withhold from payments owed to Contractor, any liquidated damages for work performed or completed in that particular month, in any prior or subsequent month, or at the time the work has been completed.

7.00 DETERMINING LOWEST RESPONSIVE, RESPONSIBLE BIDDER

7.01 BIDDERS QUALIFICATIONS

A. Bids must contain evidence of Bidder's qualifications to do business in the state of Texas. To demonstrate that the Bidder is responsible and able to perform the Work, funding policies dictate each Bidder must submit, as a part of the Bidding Documents, all of the items listed below:

00310 Form of Proposal

00405 Schedule of Unit Price Work

00411 Bid Bond

00420 Statement of Bidder's Qualifications

00423 Certification of Bidder's Qualifications

00425 Equipment & Material Suppliers List

00429 Non-Bribery Model Form

00460 Non-Collusion Affidavit

B. Only the above data/information provided with the Bidding Documents may be used for evaluation and developing the Recommendation to Award by the Engineer. Bidders will not be allowed to substitute any "Key Personnel" other than alternates presented in the bid or examples of previous projects submitted in the bid package. Minor clarifications of submitted materials will be permitted after bid opening. Such request for clarifications will only be initiated by the Engineer in writing and only written responses will be accepted.

C. In determining the lowest responsible, responsive Bidder, in addition to price, the following elements will be considered:

1. The quality, availability, and adaptability of the supplies, materials, equipment, or contractual services, to the particular use required;

2. The ability, capacity and skill of the bidder to perform the contract or to provide the service required;

3. Whether the bidder can perform the contract and provide the service promptly, or within the time required, without delay or interference;

4. The character, responsibility, integrity, reputation, and experience of the bidder;

5. The quality of performance of previous services, or contracts;

6. The previous and existing compliance by the bidder with laws relating to the contract or service;

7. Any previous or existing noncompliance by the bidder with specifications, or requirements relating to time of submission of specified data such as samples, models, drawings, certificates, or other information;

8. The sufficiency of the financial resources and ability of the bidder to perform the contract or to provide the service; and

9. The ability of the bidder to provide competent personnel for the job, as demonstrated by the submitted listing of the names and the skills of experienced personnel, including potential alternates, whom the bidder currently employs and who will be available for performing this work;

10. The experience of the bidder in performing work similar in type, size and complexity to this project, as demonstrated by a listing of projects, with verifiable references (names, addresses, phone numbers, etc.), successfully completed.

11. Bidder shall provide with the Bid an experience statement with pertinent information regarding similar projects and other evidence of qualifications for each such Subcontractor, Supplier, person, or organization.

7.02 BIDDER MUST MEET THE FOLLOWING MINIMUM CRITERIA:

(A) The Bidder must demonstrate **Successful Completion during the last five (5) years of at least one project comparable in nature and scope to this project. The comparable scope shall be at least 1/4 the size of the proposed project.

(B) At least two *Key Personnel, and their potential alternate, employed by the Bidder must have a minimum of five (5) years experience in similar construction projects.

(C) The Bidder must have an employee, to be dedicated to this project, who is experienced in scheduling, with demonstrated ability in employing scheduling techniques similar to those to be used for this project.

(D) Bidder may, at its discretion, include resumes of alternates for Key Personnel, and if in the process of bid evaluation, the Owner rejects any Key Personnel, the Owner will consider the alternates.

* KEY PERSONNEL: Individuals who will be directly assigned to this project. Resumes of Key Personnel must be submitted with the Bid (include in Document 00420) and accepted by the Owner in order for Bidder to receive the Award. At the minimum, the resumes for the following personnel that are to be assigned to this Project are to be submitted.

(a) Owner or Principals of the Bidder

(b) The Project Manager

(c) The Project Superintendent

(d) The Project Scheduler

(e) Minimum of two Foremen

**SUCCESSFUL COMPLETION: Defined as completion of a project on time, no more than thirty (30) days later than the original contract time, and within budget, within 5% of the original contract price. If there is any project submitted by the Bidder as qualifying, but which does not meet these requirements, in order to be fully responsible, the Bidder is required to submit detailed information on that project demonstrating what caused the increases to cost or time. The name and telephone

numbers of the Design Engineer and the Client are to be provided for evaluation as to whether the project may be considered "successful". For any project where liquidated damages were assessed, the Bidder will not be considered to have been on time.

7.03 BIDDERS ARE REQUIRED TO SUBMIT WITH THEIR BID:

00310 Form of Proposal

00405 Schedule of Unit Price Work

00411 Bid Bond

00420 Statement of Bidder's Qualifications

00423 Certification of Bidder's Qualifications

00425 Equipment & Material Suppliers List

00429 Non-Bribery Model Form

00460 Non-Collusion Affidavit

(A) Failure to submit these items with the bid will result in a finding that the bid is non-responsive and the bid will be disqualified.

7.04 The Owner will evaluate and compare only the bids determined to be responsive in accordance with the following:

(a) Is the bid complete (all Bidding Documents submitted);

(b) Have documents been properly signed;

(c) Are the required bid securities part of the bid package; and

(d) Are there any computational errors present?

7.05 The Owner reserves the right to accept or reject any variation, deviation, or alternative offer which is not submitted in accordance with the bidding documents. Variations, deviations, alternative offers, and other factors that are in excess of the requirements of the bidding documents or which otherwise result in unsolicited benefits for the Owner, shall not be taken into account in bid evaluation.

7.06 In evaluating the bids, the Owner will determine for each bid, the evaluated bid price by adjusting the bid price as follows:

A. Making any correction for errors;

B. Excluding provisional sums and the provision, if any, for contingencies in the price schedules;

C. Taking an appropriate adjustment for any other quantifiable acceptable non-material variations, deviations or alternative offers; and

D. Making appropriate adjustments to reflect additional factors in the manner and to the extent indicated in the Bidding Documents.

7.07 The Owner will award the contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the lowest evaluated bid price provided that such bidder has been determined to be qualified to perform the contract satisfactorily in accordance with the provisions of the Bidding Documents.

8.00 OFFER ACCEPTANCE, REJECTION

8.01 ACCEPTANCE

A. The Owner will give notice of intent to award the Contract to the Low Bidder. Acceptance by the Owner is conditioned upon Bidder's submission of information for establishing satisfactory qualifications, if required; and execution of submittals required in Document 00450 - Post-Bid Procedures.

B. The Bid shall remain open to acceptance and shall be irrevocable for the Period for Bid Acceptance stated in Document 00020 – Notice to Bidders.

C. Additional time taken by Contractor to fulfill requirements for submittals, including review and re-submittal, shall be added to the acceptance period.

8.02 REJECTION

A. The Owner reserves the right to reject any and all Bids or to accept any Bid deemed advantageous to it.

8.03 BID TABULATION

A. The Engineer will tabulate, record, and evaluate the Bids of all responsible Bidders after the Bid opening.

B. In tabulating Bids, the amount written for a unit price governs over the total amount calculated. Therefore, the Engineer may correct any mathematical errors in the extension of the total amount based on the unit price given by a Bidder and adjust their Total Bid Price.

9.00 APPROVAL BY THE FUNDING AGENCIES

A. All addenda, contracts, work directives, change orders, time extensions, and other matters specified in the Contract Documents are not valid until the Weslaco City Commission approves them.

END OF DOCUMENT

SECTION 00150

TAX EXEMPT ORGANIZATION CERTIFICATE

PART 1 - GENERAL

1.1 DEFINITION

A. This Contract is to be performed for an exempt organization as defined by Title 2; Subtitle E; Chapter 150 of the Texas Limited Sales, Excise and Use Tax Act and Section 151.311 of the State Statutes. The Owner will furnish the Contractor proof or Certificate of Exemption upon award of contract.

B. Proposer shall not include sales tax in their Proposal.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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Document 00300

CONTRACTOR NOTICE OF INTENT TO RESPOND

Firms interested in submitting a bid on the project as outlined in the specifications, should indicate their intention by signing, dating and returning the form to the address below prior to April 19, 2016, so that they may receive any addendums to the specifications should the need arise.

Owner:
City of Weslaco
Attn**:** Homer Rhodes
255 S. Kansas Avenue
Weslaco, Texas 78596
Phone: (956) 968-3181
hrhodes@weslacotx.gov

Engineer:
City of Weslaco
Attn: Mardoqueo Hinojosa, PE
255 S. Kansas Avenue
Weslaco, Texas 78596
Phone: (956) 447-3403
Martha.hernandez@weslacotx.gov

Bidder: _____
[Please print or type the full name of your proprietorship, partnership, corporation, or joint venture.*)

Contact Name:_____
[Please print or type name] [Title]

Address:_____
[Mailing]

_____
[Street, if different]

Telephone:_____
[Print or type telephone number]

Fax:_____
[Print or type telephone number]

Email:_____
[Print or type telephone number]

END OF DOCUMENT

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Document 00310

FORM OF PROPOSAL

To: CITY OF WESLACO

Project No.: 2015-16-10

Project: Parking Lot @ Mayor Pablo G. Peña City Park

Bidder: _____
[Print or type full name of proprietorship, partnership, corporation, or joint venture]

1.0 OFFER

Having examined the place of the Work and all matters referred to in the Bid Documents, and the Contract Documents prepared by or approved by the Engineer for the named Project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Total Bid Price of:

_____(Dollars)
[Print or type in words, Bidder's Total Bid Price]

($_____)
[Print or type in figures, Bidder's Total Bid Price]

Unit Price or Combination Stipulated Price and Unit Price Contract. If the Bid is for a Unit Price Contract or a combination of Stipulated Price and Unit Price Contract, the Total Bid Price, including Cash Allowances, if any, is tabulated in: Document 00405 - Schedule of Unit Price Work for a Project with no Alternate Bids, or Document 00407 - Schedule of Alternates for a Project with Alternate Bids.

Cash Allowances. All Cash Allowances, totaled in either Document 00405 - Schedule of Unit Price Work, as applicable, and described in the Bid Documents are included in the Total Bid Price.

Changes in Contract Price Due to Variations in Actual Quantities. For items quoted in Document 00405 - Schedule of Unit Price Work, the Total Bid Price is based in whole or in part on the Unit Price multiplied by the quantity for each of the items listed. The Contract Price is subject to change due to variation in the actual quantities of each item in the completed Work in accordance with the Contract Documents.

Alternate Bids. Alternate Bid work, as described in the Bid Documents, will be performed for an amount added or deducted to the Total Bid Price for each Alternate Bid that is accepted by the Owner. The Owner may accept or reject any or all Alternate Bids.

Security Deposit. Included herewith is a Security Deposit in the amount of 5 percent of the greatest amount of the Total Bid Price, or Total Alternate Bid Price(s).

Period for Bid Acceptance. This offer shall be open to acceptance and is irrevocable for 90 days from the Bid date. That period may be extended by mutual written agreement of the Owner and the Bidder. After 90 days, the Bidder may withdraw without penalty if no mutual agreement can be reached.

2.0 CONTRACT TIME

If this offer is accepted, Substantial Completion of the Work will be achieved within the time stated in Document 00020 - Notice to Bidders. The Date of Commencement will be established by the Notice to Proceed.

3.0 ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs relating thereto are included in the Bid Price:

Addendum No._____, dated _____

Addendum No._____, dated _____

Addendum No._____, dated _____

Addendum No._____, dated _____

Addendum No._____, dated _____

Addendum No._____, dated _____

4.0 SUPPLEMENTS TO THIS BID:

The following Supplements are attached as an integral part of this Bid:

[ ] Document 00405 - Schedule of Unit Price Work, if applicable
[ ] Document 00411 – Bid Bond (*Form supplied by Bidder*)
[ ] Document 00420 – Statement of Bidder's Qualifications
[ ] Document 00423 – Certification to Bidder's Experience & Qualifications
[ ] Document 00425 – Equipment & Material Suppliers List

5.0 SIGNATURES:

Bidder: _____
[Please print or type the full name of your proprietorship, partnership, corporation, or joint venture.*)

By:_____
[Signature]** [Date]

Name:_____
[Please print or type name] [Title]

Address:_____
[Mailing]

_____
[Street, if different]

Telephone:_____
[Print or type telephone number]

* *If the Bid is a joint venture, add additional Bid form signature sheets for each member of the joint venture.*

** *The undersigned, as bidder, certifies that the only person or parties interested in this proposal as principals are those named herein; that the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the Contract for the Project.*

Note: This document constitutes a government record, as defined by § 37.01 of the Texas Penal Code. Submission of a false government record is punishable as provided In § 37.10 of the Texas Penal Code.

END OF DOCUMENT

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Document 00405

SCHEDULE OF UNIT PRICE WORK

This Document, constitutes a Supplement to Document 00310 - Form of Proposal.
When a Contract is awarded, this Document becomes a supplement to Document 00500 - Form of Agreement Between Owner and Contractor.

Base Bid					
SPEC NO.	DESCRIPTION	QTY	UNIT	UNIT PRICE (in figures)	UNIT TOTAL (in figures)
02316-1	EXCAVATION (ROADWAY)	3424	CY	$	$
02318	EXCAVATION (DETENTION)	1186	CY	$	$
02221-1	REMOVE ASPHALT PAVEMENT	369	SY	$	$
02221-2	REMOVE CONCRETE SIDEWALK	15	SY	$	$
02221-3	REMOVE CONCRETE CURB & GUTTER	477	LF	$	$
02100	SITE CLEARING	1	LS	$	$
01573-1	TEMPORARY SEDIMENT CONTROL FENCE	630	LF	$	$
01575	CONSTRUCTION ENTRANCE	78	SY	$	$
01573-2	INLET PROTECTION FILTER FABRIC	2	EA	$	$
	LIME TRT (EXIST MATL) (2% BY WEIGHT)	3611	SY	$	$
	FLEXIBLE BASE	3611	SY	$	$
02741	D-GR HMA TY-D (2IN THK)	3337	SY	$	$
02744	CUT & RESTORE PAVEMENT	220	SY	$	$
02771-1	CONCRETE CURB & GUTTER (18IN)	760	LF	$	$
02771-2	CONCRETE CURB (6IN)	1587	LF	$	$
02771-3	CONCRETE VALLEY GUTTER (3FT)	440	LF	$	$
02775	CONCRETE SIDEWALK (5FT)	585	LF	$	$
02771-4	CONCRETE FLUME (2FT)	30	LF	$	$
01561	TRENCH EXCAVATION PROTECTION	316	LF	$	$
02720-1	12IN HDPE PIPE	46	LF	$	$
02720-2	18IN HDPE PIPE	125	LF	$	$
02720-3	24IN HDPE PIPE	396	LF	$	$
03532-1	RIP-RAP (4IN)	5	CY	$	$
03532-2	CONCRETE SLOPED-END SECTION	3	EA	$	$
02720-4	GRATE INLET (2FTx2FT)	1	EA	$	$
02720-5	GRATE INLET (4FTx4FT)	1	EA	$	$
	GALVANIZED PLATE (5FTX1FT)	1	EA	$	$
	CONCRETE WHEEL STOPS	23	EA	$	$
02580-1	REFL PAV MRK TY I (W) 4IN (SLD)	1521	LF	$	$
02580-2	REFL PAV MRK TY I (W) 24IN (SLD)	32	LF	$	$
02580-3	REFL PAV MRK TY I (W) (ARROW)	3	EA	$	$
02580-4	REFL PAV MRK TY I (W) (DBL ARROW)	1	EA	$	$
02580-5	REFL PAV MRK TY I (W) (SYMBOL)	4	EA	$	$

	MISCELLANEOUS SIGNS & HARDWARE	21	EA	$	$
	ELECTRICAL CONDUIT	160	LF	$	$
	CONCRETE BOLLARDS	4	EA	$	$
	CONCRETE DUMPSTER PAD	8	CY	$	$
02711	WOOD FENCE (8FT)	30	LF	$	$
01725	FIELD SURVEYING	1	LS	$	$
				Base Bid Total	$
In case of DISCREPANCIES, Unit Price RULES OVER Unit Total and Total Amounts.					

TOTAL BID PRICE (Total Unit Prices)

$_____

Notes:

(1) United States Dollars. In the event of a discrepancy, this column shall govern.

Project:_____

Project No._____ Bidder's Signature:_____

Company:_____ Name: _____

Date:_____ Title:_____

END OF DOCUMENT

Document 00411

BID BOND

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section describes the standardized bid bond form to be submitted with the bid on the project.

1.02 REFERENCES – Not Used

1.03 DEFINTIONS – Section 0700

1.04 BID BOND FORMS

Bidder is to inset an original bid bond or a copy of cashiers check provided for bid bond Purposes. Original check is to be submitted along with bid.

PART 2 - PRODUCT – Not Used

PART 3 - EXECUTION

STANDARIZED FORMS FOLLOW

BID BOND

KNOW ALL MEN BY THESE PRESENTS:
That we the undersigned _____ as Principal, and _____ as Surety, are hereby held and firmly bound unto **City of Weslaco** as OWNER in the penal sum of *(amount)* or 5% of the bid for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

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

The Condition of the above obligation is such that whereas the Principal has submitted to **City of Weslaco** a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing for the **Boys & Girls Club – Parking Lot Improvements**.

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

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

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

_____
Principal (SEAL)
ATTEST:

_____
Title

_____
Surety

_____
By: Attorney-in-Fact

IMPORTANT - Surety companies executing BONDS must be authorized to transact business in the State where the project is located.

END OF SECTION

DOCUMENT 00420

STATEMENT OF BIDDER'S QUALIFICATIONS

BIDDER: **PROJECT NAME:**

1. ORGANIZATION

1.1 How many years has your organization been in business as a Contractor? _____

1.2 How many years has your organization been in business under its present business name?

_____

1.2.1 Under what other or former names has your organization operated?

_____

1.3 If your organization is a corporation, answer the following:

1.3.1 Date of incorporation: _____

1.3.2 State of incorporation: _____

1.3.3 President's name: _____

1.3.4 Vice-president's name(s): _____

_____

1.3.5 Secretary's name: _____

1.3.6 Treasurer's name: _____

1.4 If your organization is a partnership, answer the following:

1.4.1 Date of organization: _____

1.4.2 Type of partnership (if applicable): _____

1.4.3 Name(s) of general partner(s): _____

1.5 If your organization is individually owned, answer the following:

1.5.1 Date of organization: _____

1.5.2 Name of owner: _____

1.6 If the form of your organization is other than those listed above, describe it and name the principals:

_____

_____

2. LICENSING

2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable. Indicate name, license number and expiration date for Master Plumber or other trade required under the Instructions to Bidders section of this Bid, if applicable.

_____

_____

2.2 List jurisdictions in which your organization's partnership or trade name is filed.

_____

_____

3. EXPERIENCE

3.1 List the categories of work that your organization normally performs with its own forces.

_____

_____

3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)

3.2.1 Has your organization ever failed to complete any work awarded to it? _____

3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers? _____

3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years? _____

3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.) _____

3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

3.4.1 State total worth of work in progress and under contract: _____

3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

3.5.1 State annual amount of construction work performed each year during the past five years:

Year	Amount

3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization. Submit resumes of Key Personnel (as defined in the Instructions to Bidders. Bidder hereby certifies that the Resident Superintendent has the authority to act on behalf of the Contractor at all times. No substitution shall be made without the written authorization of the Owner and the Engineer based upon acceptance of the qualifications of the proposed substitute.

3.7 Provide form 00423 "Certification of Bidder's Qualifications" as evidence that the Bidder meets the minimum criteria called out in the Instructions to Bidders.

4. REFERENCES

4.1 On a separate sheet, list three (3) Trade References and two (2) Bank References :

4.2 Surety:

Name and telephone number of Bonding Company: _____

_____

Name, telephone and address of Agent: _____

_____

_____

_____

5. FINANCING

5.1 Financial Statement **(Not Applicable to this Request for Bid Proposals)**

6. SIGNATURE

6.1 To be executed by a Principal of the firm authorized to certify the foregoing information:

_____, being duly sworn, deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

6.2 Dated at _____ this _____ day of _____, 201___.

Name of Organization: _____

By: _____

Printed Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00423

CERTIFICATE OF BIDDER'S EXPERIENCE & QUALIFICATIONS

The undersigned bidder certifies that he is, at the time of bidding, and shall be, throughout the period of the contract, licensed by the State of Texas to do the type of work required under terms of the contract documents. Bidder further certifies that he is skilled and regularly engaged in the general class and type of work called for in the contract documents.

The bidder represents that he is competent, knowledgeable and has special skills on the nature, extent and inherent conditions of the work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the particular facilities which may create, during the construction program, unusual or peculiar unsafe conditions hazardous to persons and property. Bidder expressly acknowledges that he is aware of such peculiar risks and that he has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the construction work with respect to such hazards.

Signed this _____ day of _____, 20____.

_____
Name of Bidder

_____
Contractor's License No. and State

_____
Signature of Bidder

_____
Title of Signatory

END OF SECTION

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DOCUMENT 00425

EQUIPMENT & MATERIAL SUPPLIERS LIST

PURPOSE: To assist the Owner in determining the ability of each Bidder to properly fulfill the requirements of this proposed contract, the Bidder shall complete the following items. All questions must be answered and the data given must be clear and comprehensive. If necessary, questions may be answered on separate attached sheets as specified by 00420 Statement of Bidder's Qualifications. If, in the course of evaluating the bids, the Owner discovers that answers to these questions are false or misleading then the Owner reserves the right to reject the bid based on non-responsiveness. **This statement must be notarized.**

The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement of Bidder's Qualifications.

A. EQUIPMENT AVAILABLE FOR THIS CONTRACT: The Bidder shall provide below a list of equipment available for use on this contract:

EQUIPMENT	OWN	RENT/LEASE (Supplier & Phone #)

B. MATERIALS AND MAJOR EQUIPMENT: The Bidder shall provide below a list of manufacturers and suppliers of major equipment and materials proposed on this contract:

ITEM	MANUFACTURER OR SUPPLIER

BIDDER

Executed this: _____ Day of : _____ 20. _____

By: _____

BIDDER

Title: _____

NOTARY PUBLIC

State of Texas

County of:

Subscribed and sworn to before me this: _____

_____

NOTARY PUBLIC

END OF SECTION

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DOCUMENT 00429

CITY OF WESLACO NON-BRIBERY MODEL FORM

[*Bidder's letterhead*]

[*Date*]

[*Name and address*]

Dear [*Name of Owner*] :

The undersigned party certifies that [*Name of bidding company*] complies with the following criteria:

1. They have not engaged and will not engage in bribery of officials related to potential or active City of Weslaco projects.

2. They have corporate policies that clearly prohibit the use of any bribery in a corporate activity.

3. They have neither been convicted of (nor found by a civil judgment to have committed) bribery of domestic officials, fraud, embezzlement, theft, forgery, destruction of records, making false statements to government officials, receiving stolen property, or any other offense indicating a lack of business integrity or business honesty, within five years of the date of this certification.

_____
Printed name

_____
Signature

_____
Position in bidding company

_____
Date

END OF SECTION

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Document 00450

POST-BID PROCEDURES

1.0 DOCUMENT INCLUDES

A. Notice of Intent to Award.

B. Agreement.

C. Requirements of Bidder.

D. Failure of Bidder to comply with requirements.

E. Notice to Proceed.

F. Pre-construction Conference.

G. Starting the Project.

2.0 NOTICE OF INTENT TO AWARD

A. Owner will provide written Notice of Intent to Award (the Contract) to the Low Bidder, stating that upon compliance with the conditions listed herein within 14 days after receipt of the notice, and on approval by Owner, Owner will execute and deliver the Agreement.

3.0 FORM OF AGREEMENT

A. The Agreement shall be Document 00500 - Agreement between the Owner and Contractor, together with Supplements enumerated in and attached thereto.

4.0 REQUIREMENTS OF BIDDER

A. Within 14 days of receipt of the Notice of Intent to Award, the Low Bidder shall execute and deliver to the Engineer for the Owner's approval those documents indicated by an "X" below:

[X] Document 00500 - Agreement Between the Owner and Contractor

[X] Document 00610 - Performance Bond (100% of the Contract Amount)

[X] Document 00620 - Payment Bond (100% of the Contract Amount)

[X] Document 00625 - Affidavit of Insurance *(with Certificate of Insurance attached)*

5.0 FAILURE OF BIDDER TO COMPLY WITH REQUIREMENTS

A. Should the Bidder on receipt of the Notice of Intent to Award fail to comply with requirements of this Document 00450 within the stated time, the Owner may declare the award in default and require forfeiture of the Security Deposit.

B. After Owner's written notice of default to the Bidder, Owner may award the Contract to the responsible Bidder whose offer is the next lowest bid, and the Security Deposit of the Bidder in default shall be forfeited to the Owner in accordance with the provisions of Document 00100 - Instructions to Bidders.

6.0 NOTICE TO PROCEED

A. Upon Owner's execution of the Agreement and delivery to Contractor, the Engineer shall give the Contractor Notice to Proceed within 30 days after the Effective Date of the Agreement, which notice shall establish the Date of Commencement of the Work.

7.0 PRE-CONSTRUCTION CONFERENCE

A. Not later than 10 days after the date of Notice to Proceed, but before Contractor starts work at the site, Owner will convene a Pre-construction Conference as specified in Section 01312 - Coordination and Meetings.

8.0 STARTING THE PROJECT

A. Contractor shall start performance of the Work at the site on the Date of the Commencement of the Work, but no Work shall be done at the site prior to that date.

B. As Contractor, verify that you and all Subcontractors pay the Prevailing Wage.

END OF DOCUMENT

SECTION 00460

NONCOLLUSION AFFIDAVIT

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section describes the standardized forms for use in Bidder and Contractor representations and certifications for the project.

1.02 REFERENCES – Not Used

1.03 DEFINTIONS – Section 0700

1.04 REPRESENTATIONS AND CERTIFICATIONS

A. Affidavit of Non-collusion

B. Historically Underutilized Business (HUB) Certification (Bidder to insert appropriate certification notice at the end of this Section).

PART 2 - PRODUCT – Not Used

PART 3 - EXECUTION – Not Used

STANDARIZED FORMS FOLLOW

NONCOLLUSION AFFIDAVIT OF PRIME BIDDER

STATE OF TEXAS
COUNTY OF HIDALGO

_____, being first duly sworn, deposes and says that:
(Name)

(1) He is President of _____, the Bidder that has submitted the attached Bid;
(Company)

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

(3) Such Bid is genuine and is not a collusive or sham Bid.

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

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including affiant.

Sign _____

Title _____

Subscribed and sworn to me this_____ day of _____, 20____.

By:

Notary Public
My commission expires

END OF SECTION

Document 00500

AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS AGREEMENT is by and between The City of Weslaco, Texas

(hereinafter called OWNER) and_____

(hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 – WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Water Distribution.

ARTICLE 2 – THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Parking Lot @ Mayor Pablo G. Peña City Park

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by City of Weslaco who is herein after called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01 TIME OF THE ESSENCE

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 DAYS TO ACHIEVE SUBSTANTIAL COMPLETION AND FINAL PAYMENT

A. The Work will be substantially completed within the time stated in Document 00020 – Notice to Bidders.

4.03 LIQUIDATED DAMAGES

A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not

completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER for each day that expires after the time specified in paragraph 4.02 for Substantial Completion until the Work is substantially complete, as shown on table below. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER $ 1,000.00 for each day that expires after the time specified in paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.

Amount of Contract Range	Cost per Day
$5000.00 to $25,000.00	$100.00
$25,000.01 to $100,000.00	$200.00
$100,000.01 to $500,000.00	$350.00
$500,000.01 and over	$500.00

*City inspection cost not included in this price.

ARTICLE 5 – CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amount determined pursuant to paragraph 5.01. A below:

A. For all Work, at the prices stated in CONTRACTOR's Bid, attached hereto as an exhibit.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 SUBMITTAL AND PROCESSING OF PAYMENTS

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 PROGRESS PAYMENTS; RETAINAGE

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on or about the 25th day of each month during performance of the Work as provided in paragraphs 6.02. A. 1 below, unless agreed otherwise with City Engineer. All such payments will be measured by the schedule of values established in paragraph 2.07. A. of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER may determine or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions:

   a. 90% of Work completed (with the balance being retainage).

   b. 90% of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

6.03 FINAL PAYMENT

A. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07 and upon approval by the Weslaco City Commission. All closing documents must be received by Owner's representative before a recommendation for final payment is given to the Weslaco City Commission.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the prevailing money market rate.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce OWNER to enter this Agreement, CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.

E. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

F. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

G. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, and all examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

H. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolutions thereof by ENGINEER is acceptable to CONTRACTOR.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 CONTENTS

A. The Contract Documents consist of the documents listed in the table of contents of the Project Manual and the drawings listed on the Sheet Index in the Drawings. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

1. Written Amendments;
2. Work Change Directives;
3. Change Order(s).

B. The documents listed in paragraph 9.01. A. are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.04 of the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 TERMS

A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

10.02 ASSIGNMENT OF CONTRACT

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 SUCCESSORS AND ASSIGNS

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

10.04 SEVERABILITY

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEROF, OWNER and CONTRACTOR have signed this Agreement in duplicate. One counterpart each has been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or on their behalf.

This Agreement will be effective on _____, 20____ (which is the Effective Date of the Agreement).

OWNER:

City of Weslaco, Texas

By:_____
David Suarez, Mayor

Attest_____
Elizabeth M. Walker, City Secretary

As to Form:_____
Juan Gonzalez, City Attorney

Address for giving notices:

255 S. Kansas Avenue

Weslaco, Texas 78596

Designated Representative:

Name: Mike R. Perez

Title: City Manager

Address: 255 S. Kansas Avenue

Weslaco, Texas, 78596

Phone: 956-968-3181

Facsimile: _____

CONTRACTOR:

_____

By:_____

[CORPORATE SEAL]

Attest_____

Address for giving notices:

_____

_____

_____

License No._____
(Where Applicable)

Agent for service of process:_____

_____

(If CONTRACTOR is a corporation or a partnership, attach evidence of authority to sign.)

Designated Representative:

Name:_____

Title:_____

Address:_____

_____

Phone:_____

Facsimile:_____

END OF DOCUMENT

SECTION 00510

NOTICE OF AWARD

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section describes the standardized Notice of Award form for use in the project.

1.02 REFERENCES – Not Used

1.03 DEFINTIONS – Section 0700

PART 2 - PRODUCT – Not Used

PART 3 - EXECUTION (FORMS ON FOLLOWING PAGES)

STANDARIZED FORM FOLLOWS

NOTICE OF AWARD

TO:

PROJECT DESCRIPTION:

The OWNER has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids and Information for Bidders.

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

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND, and Certificates of Insurance within ten (10) calendar days from the date of this Notice to you, and ONE YEAR GUARANTEE on all workmanship and materials on this Project.

If you fail to execute said Agreement and to furnish said Certificates within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

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

Dated this _____ day of _____2016.

OWNER: City of Weslaco

BY: _____

TITLE: City Manager

ENGINEER: City of Weslaco

BY: _____

TITLE: City Engineer

ACCEPTANCE OF NOTICE BY BIDDER

Receipt of the above NOTICE OF AWARD is hereby acknowledged by _____, this the _____ day of _____, 20___.

BY: _____

TITLE: _____

END OF SECTION

SECTION 00550

NOTICE TO PROCEED

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section describes the standardized Notice to Proceed form for use in the project.

1.02 REFERENCES – Not Used

1.03 DEFINTIONS – Section 0700

PART 2 - PRODUCT – Not Used

PART 3 - EXECUTION

TO BE ISSUED BY ENGINEER

NOTICE TO PROCEED

Date:

To:

Project No.: 2015-16-10
Project: Parking Lot @ Mayor Pablo G. Peña City Park

You are notified that the Contract Time under the above contract will commence to run on _____. By this date you are to start performing your obligations under the Contract Documents.

In accordance with the Agreement the date of Substantial Completion is _____ and Final Completion is _____, respectively.

Before you may start any Work at the site, the General Conditions and Contract Documents provides that you and Owner must each deliver to the other (with copies to ENGINEER) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also before you may start any work at the site you must
1. Notify the City 48 hours prior to beginning construction.
2. Setup construction barricades.
3. Setup erosion control measures.
4. Provide Traffic Control Plan.
5. _____

Copy to ENGINEER:

City of Weslaco

By_____
Mardoqueo Hinojosa, PE

Planning Director/ City Engineer
Title

OWNER: City of Weslaco

By_____
Mike R. Perez

City Manager_____
Title

ACCEPTANCE OF NOTICE BY BIDDER

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____, this the _____ day of _____, 20____. (Contractor)

BY: _____

TITLE: _____

END OF SECTION

P E R F O R M A N C E B O N D

STATUTORY PAYMENT BOND PURSUANT TO ARTICLE 5160
OF THE REVISED CIVIL STATUTES OF TEXAS AS
ACTS OF THE 56TH LEGISLATURE, REGULAR SESSION 1959

****

KNOW ALL MEN BY THESE PRESENTS, that _____

_____

_____

_____(hereinafter

called the Principal (s), as Principal (s) , and _____

_____

_____ (hereinafter called the

Surety (s), as Surety (s), are held and firmly bond unto _____

_____ (hereinafter called the

Obligee), in the amount of _____

_____ Dollars ($_____)

for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____ day of _____, 2006, for the _____

_____ which contract is hereby referred to and made a part hereof as fully and to the same extent as if copies at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform the work in accordance with plans, specifications and contract documents, then the obligation shall be void; otherwise to remain in full force and affect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Article 5160 of the Revised Civil Statutes of Texas as amended by the Acts of the 56th Legislature, Regular Session, 1959, and provisions of said Article to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, this instrument is executed in four counterparts, each one of which shall be deemed an original, this the _____ day of _____, A.D., 2006.

	_____
ATTEST:	Principal
_____	By: _____
(Principal) Secretary (SEAL)	Signature
_____	_____
Witness as to Principal	(Print/ Type Name)
_____	_____
(Address)	(Address)
	_____
	Surety
ATTEST:	
_____	By: _____
(Surety) Secretary (SEAL)	Attorney-in-Fact (Signature)
_____	_____
Witness as to Surety	(Print/Type Name)
_____	_____
(Address)	(Address)

NOTE: Date of Bond must not be prior to date of Contract (1) Correct name of Contractor; (2) A Corporation, a Partnership or an Individual, as case may be; (3) Correct name of Surety; (4) Correct name of Owner; (5) County or Parish and State; (6) Owner; (7)If Contractor is Partnership, all partners should execute bond.

P A Y M E N T B O N D

STATUTORY PAYMENT BOND PURSUANT TO ARTICLE 5160
OF THE REVISED CIVIL STATUTES OF TEXAS AS
AMENDED BY
ACTS OF THE 56TH LEGISLATURE, REGULAR SESSION 1959

****

KNOW ALL MEN BY THESE PRESENTS, that _____

_____

_____

_____(hereinafter

called the Principal (s), as Principal (s) _____

_____

_____ (hereinafter called the

Surety (s), as Surety (s), are held and firmly bond unto _____

_____ (hereinafter called the

Obligee), in the amount of _____

_____ Dollars ($_____)

for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____ day of _____, 2006, for the _____

_____ which contract is hereby referred to and made a part hereof as fully and to the same extent as if copies at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall pay all claimants supplying labor and material to him or a subcontractor in the prosecution of the work provided for in said contract, then the obligation shall be void; otherwise to remain in full force and affect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Article 5160 of the Revised Civil Statutes of Texas as amended by the Acts of the 56th Legislature, Regular Session, 1959, and provisions of said Article to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, this instrument is executed in four counterparts, each one of which shall be deemed an original, this the _____ day of _____, A.D., 2006.

	_____
ATTEST:	Principal
_____	By: _____
(Principal) Secretary (SEAL)	Signature
_____	_____
Witness as to Principal	(Print/ Type Name)
_____	_____
(Address)	(Address)
	_____
	Surety
ATTEST:	
_____	By: _____
(Surety) Secretary (SEAL)	Attorney-in-Fact (Signature)
_____	_____
Witness as to Surety	(Print/Type Name)
_____	_____
(Address)	(Address)

NOTE: Date of Bond must not be prior to date of Contract (1) Correct name of Contractor; (2) A Corporation, a Partnership or an Individual, as case may be; (3) Correct name of Surety; (4) Correct name of Owner; (5) County or Parish and State; (6) Owner; (7)If Contractor is Partnership, all partners should execute bond.

Document 00625

AFFIDAVIT OF INSURANCE

THE STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS:
THE COUNTY OF _____

BEFORE ME, the undersigned authority, on this day personally appeared

_____, who
[Affiant]

being by me duly sworn on his oath stated that he is_____, of
[Title]

_____
[Contractor's Company Name]

the Contractor named and referred to within the Contract Documents; that he is fully competent and authorized to give this affidavit and that the attached original insurance certificate truly and accurately reflects the insurance coverage that is now available and will be available during the term of the Agreement.

_____
[Affiant's Signature]

SWORN AND SUBSCRIBED before me on _____.
[Date]

_____
Notary Public in and for the State of TEXAS

_____
[Print or type Notary Public name]

[Notary Seal] My Commission Expires:_____
[Expiration Date]

END OF DOCUMENT

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Document 00627

STATE SALES TAX / SEPARATED CONTRACT

DATE:_____

PROJECT: Parking Lot @ Mayor Pablo G. Peña City Park

PROJECT ID: 2015-16-10

TO: City of Weslaco

SUMMARY SEPARATION OF MATERIALS AND LABOR:

The total amount bid shall be separated into Materials Costs and Services Charges, which result in a "Separated Contract". The Bidder is expected to comply with all the requirements of the State Sales Tax Law, plus separate the total Contract amount, for the total amount bid listed in the Proposal into material costs and services charges as provided below.

Materials which are incorporated into or becomes part of the project are exempt from sales tax. The Contractor is expected to execute a resale certificate instead of paying the sales tax at the time of purchase. The City will issue an exemption certificate for the materials as long as they are a part of the finished project

If the Contractor does not issue a resale certificate, then the amount of sales tax must be included in the prices quoted. No additional compensation, beyond the prices quoted, is due the Contractor for sales tax.

MATERIALS…….$_____

SERVICES…….....$_____

TOTAL AMOUNT BID…….$_____

_____ (_____)_____
PRINCIPAL TELEPHONE NUMBER

_____
SIGNATURE

_____
NAME & TITLE

END OF DOCUMENT

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Document 00630

FORM OF BUSINESS

Please, fill in the appropriate area describing your firm's form of business and include the relevant attachments.

Corporation:

Corporate Name:_____
State of Incorporation:_____
Mailing Address:_____

- Certificate of Assumed Name, if operating under a name different than that on the corporate charter (the Certificate must have been issued within the past ten years to be valid)
- Certificate of Good Standing*
- Certificate of Existence (if non-Texas corporation, Certificate of Authority) *

Partnership/Joint Venture:

Partnership/Joint Venture Name:_____
Mailing Address:_____

- Copy of the Partnership or Joint Venture Agreement, or Affidavit with the name of the partnership or joint venture, the names of the individual partners or participants in the joint venture, and a statement that the partnership or joint venture is in existence
- Certificate of Assumed Name, (the Certificate must have been issued within the past ten years to be valid)
- If firm is a limited partnership, the Certificate of Limited Partnership
- If any partner or joint venturer is a corporation, the above information relating to corporation must be included as to each sum partner or joint venturer.

Sole Proprietorship

Name:_____
Mailing Address:_____

- Certificate of Assumed Name, if operating under a name different than that of the sole proprietor (the Certificate must have been issued within the past ten years to be valid)

* *Must be furnished upon request of the Owner and must be less than 90 days old*.

_____
[Typed Name and Title of Authorized Representative]

_____ _____
[Signature of Authorized Representative] [Typed Date]

END OF DOCUMENT

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Document 00631

RESOLUTION OF CORPORATION

I hereby certify that it was RESOLVED by a quorum of the directors of

_____
[Name of Corporation / Contractor]

meeting on this_____day of_____, 20___, that_____,
[Corporate Representative]

be, and hereby is, authorized to act on behalf of the Corporation, as its representative, in all business transactions conducted in the State of Texas, and that the above resolution was unanimously ratified by the Board of Directors at said meeting and that the resolution has not been rescinded or amended and is now in full force and effect; and in authentication of the adoption of this resolution, I subscribe my name and affix the seal of the Corporation on this

_____day of, _____, 20___.

_____
Secretary/Assistant Secretary

_____
[Seal]

END OF DOCUMENT

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CONTRACTOR'S RESOLUTION
ON
AUTHORIZED REPRESENTATIVE (ED-104)

_____
Name or Names

I hereby certify that it was RESOLVED by a quorum of the directors of the

_____, meeting
name of corporation

on the day of _____, 20__, that _____, _____,

_____, and _____, be, and hereby is,

authorized to act on behalf of _____, as its
name of corporation

representative, in all business transactions conducted in the State of Texas, and;

That all above resolution was unanimously ratified by the Board of Directors at said

meeting and that the resolution has not been rescinded or amended and is now in full forces

and effect; and;

In authentication of the adoption of this resolution, I subscribe my name and

affix the seal of the corporation this _____ day of _____, 20__.

_____
Secretary

(seal)

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Document 00635

CONTRACTOR'S ACT OF ASSURANCE

THE STATE OF TEXAS

KNOW ALL MEN BY THESE PRESENTS:

THE COUNTY OF _____

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas,

on this day personally appeared_____, Affiant,
[Affiant]

who being by me duly sworn on his oath stated that he is_____, of
[Title]

the_____, Contractor, that he is authorized to represent Contractor
[Contractor]

pursuant to provisions of a resolution adopted on this_____day of_____,20____. A duly certified copy of such resolution is attached to and is hereby made a part of this document.

Affiant, in such capacity declares and assures the City of Weslaco that Contractor will construct the Project in accordance with sound construction practice and all laws of the State of Texas.

_____
[Affiant]

SWORN AND SUBSCRIBED before me on this_____day of_____, 20____.

_____
Notary Public in and for the State of TEXAS

_____
[Print or Type Notary Public Name]

_____ My Commission Expires:_____
[Seal] [Expiration Date]

END OF DOCUMENT

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VENDOR COMPLIANCE WITH RECIPROCITY ON NON-RESIDENT BIDDERS

Government Code 2252.002 provides that, in order to be awarded a contract as low bidder, a non-resident bidder must bid projects for construction, improvements, supplies or services in Texas at an amount lower than the lowest Texas resident bidder by the same amount that a Texas resident bidder would be required to underbid a non-resident bidder in order to obtain a comparable contract in the state in which the non-resident's principal place of business is located. A non-resident bidder is a contractor whose corporate offices or principal place of business is outside of the state of Texas. This requirement does not apply to a contract involving Federal funds. The appropriate blanks in Section A must be filled out by all out-of-state or non-resident bidders in order for your bid to meet specifications. The failure of out-of-state or non-resident contractors to do so will automatically disqualify that bidder. Resident bidders must check the blank in Section B.

A. Non-resident vendors in _____(give state), our principal place of business, are required to be _____ percent lower than resident bidders by state law. A copy of the statute is attached.

Non-resident vendors in _____(give state), our principal place of business, are not required to underbid resident bidders.

B. Our principal place of business or corporate offices are in the State of Texas:_____

BIDDER:

_____
Company

_____
City **State** **Zip**

_____
By: (please print)

_____
Signature

_____
Title: (please print)

THIS FORM MUST BE RETURNED WITH THE BID

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Document 00640

CERTIFICATION REGARDING DEPARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

The prospective participant certifies to the best of its knowledge and belief that it and its principals:

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

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

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

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

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Section 1001, a false statement may result in a fine of up to $10,000 or imprisonment for up to 5 years, or both.

_____
[Typed Name of Company:]

_____
[Typed Name & Title of Authorized Representative]

_____ _____
[Signature of Authorized Representative] [Date]

If unable certify the above statements, explanation is attached.

END OF DOCUMENT

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Document 00641

AFFIDAVIT AND WAIVER OF LIEN
PRIME CONTRACTOR

THE STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS:
THE COUNTY OF _____

Personally appeared before me, the undersigned Notary Public for said County and State _____(Name of Individual), _____ (Title) of _____ (Prime Contractor), who being duly sworn by me states on oath that all product suppliers and Subcontractors, payrolls, sales tax, privilege tax or license, old age benefits tax, state and federal unemployment insurance, and other liabilities incurred in the performance of _____ (Type of Contract) Contract for the construction of improvements at **Project No. #_____ Project Title _____(Name of Project**), have been paid in full and that the above named Prime Contractor waives any claims and released _____ (Owner) from any rights or claims (including lien rights) for debts due and owing by virtue of the furnishing of any labor, products, and supplies furnished for such improvements.

The above named Prime Contractor agrees to indemnify the Owner and save him harmless on account of any loss he may sustain in reliance upon this Affidavit and Waiver of Lien including the amount of any lien he may be compelled to pay all costs relating thereto and a reasonable attorney's fee.

_____
[Prime Contractor's Signature]

SWORN AND SUBSCRIBED before me on _____.
[Date]

_____
Notary Public in and for the State of TEXAS

_____
[Print or type Notary Public name]

[Notary Seal] My Commission Expires:_____
[Expiration Date]

END OF DOCUMENT

Page Intentionally Blank

Document 00642

RELEASE AND WAIVER OF CLAIMS BY SUBCONTRACTORS AND PRODUCT VENDORS

THE STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS:
THE COUNTY OF _____

Personally appeared before me the undersigned authority in and for said County and State (Name of Individual), _____ (Title) of _____ (Company), who, being duly sworn by me states on oath that all bills for labor and products, sales tax, privilege tax or license, old age benefits tax, state and federal unemployment insurance and other liability have been paid in full, or that funds are in hand to discharge such liabilities when due, incurred in the performance of its Subcontract for furnishing labor or products in the construction of improvements at **Project No. #_____ Project Title _____ _____ (Name of Project & Location),** upon receipt of check in the amount $_____, the undersigned company waives any claims and releases (Owner) _____ (Contractor) from any rights or claims for debts due and owing by virtue of the furnishing of any labor or products and any lien therefore.

_____
[NAME OF COMPANY]

SWORN AND SUBSCRIBED before me on _____.
[Date]

_____
Notary Public in and for the State of TEXAS

_____
[Print or type Notary Public name]

[Notary Seal] My Commission Expires:_____
[Expiration Date]

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Document 00643

CONTRACTOR'S AFFIDAVIT
AS TO STATUS OF LIENS

THE STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS:
THE COUNTY OF _____

Personally appeared before me, the undersigned Notary Public for said County and State, _____(Name of Individual), _____ (Title), of _____ (Prime Contractor), who being duly sworn by me states on oath that to the best of his knowledge and belief, except as listed below, the Releases and Waivers of Claim attached hereto include all Subcontractors and all suppliers of labor, products, and equipment provided by all persons who may have lien against the property of _____ (Owner), **Project No. #__ Project Title _____,** located at _____(Location of Project), arising out of the construction of improvements thereon.

Exceptions: (If none, write "NONE." Any exception listed shall be bonded by the Contractor to indemnify the Owner, and a copy of each such bond shall be attached hereto.)

1.

2.

3.

4.

_____
[NAME OF COMPANY]

SWORN AND SUBSCRIBED before me on _____.
[Date]

_____
Notary Public in and for the State of TEXAS

_____
[Print or type Notary Public name]

[Notary Seal] My Commission Expires:_____
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Engineers Joint Documents Committee
Design and Construction Related Documents
Instructions and License Agreement

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This Agreement shall be governed by the laws of the State of Virginia. Should you have any questions concerning this Agreement, you may contact EJCDC by writing to:

Arthur Schwartz, Esq.
General Counsel
National Society of Professional Engineers
1420 King Street
Alexandria, VA 22314

Phone: (703) 684-2845
Fax: (703) 836-4875
e-mail: aschwartz@nspe.org

You acknowledge that you have read this agreement, understand it and agree to be bound by its terms and conditions. You further agree that it is the complete and exclusive statement of the agreement between us which supersedes any proposal or prior agreement, oral or written, and any other communications between us relating to the subject matter of this agreement.

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

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American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

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TABLE OF CONTENTS

Page

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY 6
1.01 *Defined Terms* 6
1.02 *Terminology* 8
ARTICLE 2 - PRELIMINARY MATTERS 9
2.01 *Delivery of Bonds and Evidence of Insurance* 9
2.02 *Copies of Documents* 9
2.03 *Commencement of Contract Times; Notice to Proceed* 9
2.04 *Starting the Work* 9
2.05 *Before Starting Construction* 9
2.06 *Preconstruction Conference* 9
2.07 *Initial Acceptance of Schedules* 9
ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE 10
3.01 *Intent* 10
3.02 *Reference Standards* 10
3.03 *Reporting and Resolving Discrepancies* 10
3.04 *Amending and Supplementing Contract Documents* 11
3.05 *Reuse of Documents* 11
3.06 *Electronic Data* 11
ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS 11
4.01 *Availability of Lands* 11
4.02 *Subsurface and Physical Conditions* 12
4.03 *Differing Subsurface or Physical Conditions* 12
4.04 *Underground Facilities* 13
4.05 *Reference Points* 13
4.06 *Hazardous Environmental Condition at Site* 13
ARTICLE 5 - BONDS AND INSURANCE 14
5.01 *Performance, Payment, and Other Bonds* 14
5.02 *Licensed Sureties and Insurers* 15
5.03 *Certificates of Insurance* 15
5.04 *Contractor's Liability Insurance* 15
5.05 *Owner's Liability Insurance* 16
5.06 *Property Insurance* 16
5.07 *Waiver of Rights* 17
5.08 *Receipt and Application of Insurance Proceeds* 17
5.09 *Acceptance of Bonds and Insurance; Option to Replace* 17
5.10 *Partial Utilization, Acknowledgment of Property Insurer* 18
ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES 18
6.01 *Supervision and Superintendence* 18
6.02 *Labor; Working Hours* 18
6.03 *Services, Materials, and Equipment* 18
6.04 *Progress Schedule* 18
6.05 *Substitutes and "Or-Equals"* 19
6.06 *Concerning Subcontractors, Suppliers, and Others* 20
6.07 *Patent Fees and Royalties* 21
6.08 *Permits* 21
6.09 *Laws and Regulations* 21
6.10 *Taxes* 22
6.11 *Use of Site and Other Areas* 22
6.12 *Record Documents* 22
6.13 *Safety and Protection* 22
6.14 *Safety Representative* 23
6.15 *Hazard Communication Programs* 23

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6.16 *Emergencies* ... 23
6.17 *Shop Drawings and Samples* ... 23
6.18 *Continuing the Work* ... 24
6.19 *Contractor's General Warranty and Guarantee* ... 24
6.20 *Indemnification* ... 24
6.21 *Delegation of Professional Design Services* ... 25
ARTICLE 7 - OTHER WORK AT THE SITE ... 25
7.01 *Related Work at Site* ... 25
7.02 *Coordination* ... 26
7.03 *Legal Relationships* ... 26
ARTICLE 8 - OWNER'S RESPONSIBILITIES ... 26
8.01 *Communications to Contractor* ... 26
8.02 *Replacement of Engineer* ... 26
8.03 *Furnish Data* ... 26
8.04 *Pay When Due* ... 26
8.05 *Lands and Easements; Reports and Tests* ... 26
8.06 *Insurance* ... 26
8.07 *Change Orders* ... 26
8.08 *Inspections, Tests, and Approvals* ... 26
8.09 *Limitations on Owner's Responsibilities* ... 27
8.10 *Undisclosed Hazardous Environmental Condition* ... 27
8.11 *Evidence of Financial Arrangements* ... 27
ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION ... 27
9.01 *Owner's Representative* ... 27
9.02 *Visits to Site* ... 27
9.03 *Project Representative* ... 27
9.04 *Authorized Variations in Work* ... 27
9.05 *Rejecting Defective Work* ... 27
9.06 *Shop Drawings, Change Orders and Payments* ... 28
9.07 *Determinations for Unit Price Work* ... 28
9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work* ... 28
9.09 *Limitations on Engineer's Authority and Responsibilities* ... 28
ARTICLE 10 - CHANGES IN THE WORK; CLAIMS ... 28
10.01 *Authorized Changes in the Work* ... 28
10.02 *Unauthorized Changes in the Work* ... 29
10.03 *Execution of Change Orders* ... 29
10.04 *Notification to Surety* ... 29
10.05 *Claims* ... 29
ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK ... 30
11.01 *Cost of the Work* ... 30
11.02 *Allowances* ... 31
11.03 *Unit Price Work* ... 31
ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES ... 32
12.01 *Change of Contract Price* ... 32
12.02 *Change of Contract Times* ... 33
12.03 *Delays* ... 33
ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK ... 33
13.01 *Notice of Defects* ... 33
13.02 *Access to Work* ... 33
13.03 *Tests and Inspections* ... 33
13.04 *Uncovering Work* ... 34
13.05 *Owner May Stop the Work* ... 34
13.06 *Correction or Removal of Defective Work* ... 34
13.07 *Correction Period* ... 34
13.08 *Acceptance of Defective Work* ... 35
13.09 *Owner May Correct Defective Work* ... 35
ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION ... 36
14.01 *Schedule of Values* ... 36
14.02 *Progress Payments* ... 36
14.03 *Contractor's Warranty of Title* ... 37
14.04 *Substantial Completion* ... 37

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14.05 *Partial Utilization* 38
14.06 *Final Inspection* 38
14.07 *Final Payment* 38
14.08 *Final Completion Delayed* 39
14.09 *Waiver of Claims* 39
ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION 39
15.01 *Owner May Suspend Work* 39
15.02 *Owner May Terminate for Cause* 39
15.03 *Owner May Terminate For Convenience* 40
15.04 *Contractor May Stop Work or Terminate* 40
ARTICLE 16 - DISPUTE RESOLUTION 41
16.01 *Methods and Procedures* 41
ARTICLE 17 - MISCELLANEOUS 41
17.01 *Giving Notice* 41
17.02 *Computation of Times* 41
17.03 *Cumulative Remedies* 41
17.04 *Survival of Obligations* 41
17.05 *Controlling Law* 41
17.06 *Headings* 41

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*--The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

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

6. *Bidder*--The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

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20. *Field Order*--A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *Site*--Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain

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administrative requirements and procedural matters applicable thereto.

44. *Subcontractor*--An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

45. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

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

51. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered", "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents, or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or

c. has been damaged prior to Engineer's - recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

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E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review**:**

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

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1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work

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(unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party..

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

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4.02 *Subsurface and Physical Conditions*

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

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

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c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

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1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified

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in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

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

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

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

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

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3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any

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deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order .

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract

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Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

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

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

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1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

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c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified , and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued . No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual

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or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

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

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer,, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

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6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

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

6.13 *Safety and Protection*

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

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Draw-

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ings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

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

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:* Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals , any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents

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with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or

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arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 - OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and

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properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

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

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

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8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment , a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

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9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall

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promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A.Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

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

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

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F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

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

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

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

5. Supplemental costs including the following:

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

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

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have

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resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

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

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

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation , overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

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B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted

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by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times , or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to

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be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

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

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

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B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications .

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress

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payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent

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inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, , Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

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

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial

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Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

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

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. Application for Payment

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations

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under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

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3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be

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governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

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Document 00800

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (C-700, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

SC-2.03.A Delete the last sentence of paragraph 2.03.A.

SC-5.04 Add the following new paragraph immediately after paragraph 5.04.B:

C. The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation and related coverage's under paragraphs 5.04.A.1 and A.2 of the General Conditions.

a.	State:	Statutory
b.	Applicable Federal (e.g., Longshoreman's):	Statutory
c.	Employer's Liability	$ 100,000 for each accident $ 100,000 for disease – each employee $ 500,000 disease – policy limit

2. Contractor's General Liability under paragraph's 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

a.	General Aggregate	$ 1,000,000
b.	Products – Completed Operations Aggregate	$ 1,000,000
c.	Personal and Advertising Injury	$ 600,000
d.	Each Occurrence (Bodily Injury and Property Damage)	$ 600,000

e. Property Damage liability insurance will provide Explosion, Collapse and Underground coverages where applicable.

f. Excess or Umbrella Liability

1) General Aggregate $ 1,000,000

2) Each Occurrence $ 1,000,000

3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions:

a. Bodily Injury:
Each Person $ 250,000
Each Accident $ 500,000

b. Property Damage:
Each Accident $ 100,000

4. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:

a. Bodily Injury:
Each Accident $ 600,000
Annual Aggregate $ 1,000,000

b. Property Damage:
Each Accident $ 600,000
Annual Aggregate $ 1,000,000

5. Additional named insureds:
Owner, Engineer

SC-5.06.A. Delete paragraph 5.06.A in its entirety and insert the following in its place:

A. CONTRACTOR shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof.
This insurance shall:

1. Include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. Be written on a Builder's Risk "all – risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

3. Include expense incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. Cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that

such materials and equipment have been included in an Application for Payment recommended by ENGINEER; and

5. Allow for partial utilization of the Work by OWNER;

6. Include testing and startup; and

7. Be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

CONTRACTOR shall be responsible for any deductible or self – insured retention.

The policies of insurance required to be purchased and maintained by CONTRACTOR in accordance with this paragraph SC-5.06 shall comply with the requirements of paragraph 5.06C. of the General Conditions.

SC-5.06.E. Delete paragraph 5.06.E in it's entirety.

SC-6.01.C Add the following new paragraph immediately after paragraph 6.01.B:

C. At all times during the progress of the Work, CONTRACTOR shall be responsible for the security of all completed work, all materials stored but not yet incorporated into the Work, and material assets used to perform the Work.

SC-6.02.C Add the following paragraphs immediately after paragraph 6.02.B:

C. Regular working hours are as established in General Conditions paragraph 6.02.B. If, at CONTRACTOR'S request and for his benefit, the OWNER consents to performance of work by CONTRACTOR outside of normal working hours, CONTRACTOR shall reimburse the OWNER for all reasonable costs associated with maintaining Resident Project Representative, Testing Laboratory, and Engineer functions during that or those overtime work period(s). Reasonable costs, in this instance, shall be taken to mean:

1. Payroll costs for full-time employees required to perform the Resident Project Representative and Engineer functions. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay application thereto. The expenses of performing overtime work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by OWNER.

2. Supplemental costs including:

   a. The proportion of necessary transportation, travel, and subsistence expenses of Resident Project Representative staff, and Engineer staff incurred in discharge of duties connected with the overtime work.

   b. Cost, including transportation and maintenance, of all materials, supplies, equipment, which are consumed in the performance of the overtime work.

   c. Rentals of equipment and machinery, and the parts thereof in accordance with rental agreements and the costs of transportation, loading, unloading, assembly, dismantling and removal thereof. All such costs shall be in accordance with the terms

of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the overtime work.

d. Sales, consumer, use, and other similar tax related to the overtime work as imposed by Laws and Regulations.

e. The cost of additional fuel.

f. Minor expenses such as telegrams, long distance telephone calls, expressage, and similar petty cash items in connection with the overtime work.

g. Testing Laboratory overtime charges.

SC-6.04.A. Add the following sentence to the end of paragraph 6.04.A;

Updated progress schedule shall be submitted at least monthly.

SC-6.08.B Add the following new paragraph immediately after paragraph 6.08.A:

B. Work sites and easements; and permits for construction inside highway right-of-way; and licenses agreements for crossing railroads; as required to construct the Work if required will be acquired by the Owner. Acquisition of any other special licenses and permits required will be the responsibility of the Contractor. The lands involved will be assumed to encompass at least the minimum areas needed to complete the Work, but this does not necessarily mean that all trenches or other excavations can be back-sloped without bracing or shoring. Copies of all such deeds, easements, permits, etc., shall be made available to the Contractor.

1. Construction and access to the Work within State right-of-way shall conform to the requirements of the Texas Department of Transportation. Copies of permits, if any are included in the pages following Section 00800.

2. Construction within the right-of-way of the Border Pacific Railroad shall conform to the requirements of the Border Pacific Railroad. Railroad Permits, if any are included in the pages following Section 00800.

3. Construction and access to the Work within Hidalgo County right-of-way shall conform to the requirements of Hidalgo County. Copies of permits, if any are included in the pages following Section 00800.

SC-6.12.B Add the following new paragraphs; immediately after paragraph 6.12.A:

B. OWNER reserves the right to stop work for CONTRACTOR'S failure to maintain Record Drawings as described herein. CONTRACTOR shall make no claim for damages as a result of OWNER stopping work for CONTRACTOR'S failure to maintain Record Drawings.

C. CONTRACTOR'S failure to maintain Record Drawings as described herein will result in the suspension of Progress Payment(s) until such time as the Record Drawings are made current to the OWNER'S satisfaction. CONTRACTOR shall make no claim for damages as a result of the suspension of Progress Payment(s) due to CONTRACTOR'S failure to maintain Record Drawings.

SC-9.10 Add the following paragraphs immediately after paragraph 9.09:

9.10 Resident Project Representative

A. The authority and duties of the Resident Project Representative is limited to examining the material furnished and observing the work done, and to report findings to the OWNER and ENGINEER. The OWNER does not underwrite, guarantee or insure the work done by the Contractors, and since it is the Contractor's responsibility to perform the work in accordance with the Contract Documents, the OWNER is not responsible or liable for the Contractor's failure to do so. Failure by any Resident Project Representative or other personnel engaged in on-the-site observation to discover defects or deficiencies in the work of the Contractors shall never relieve the Contractors for liability thereof or subject the OWNER to any liability for any such defect or deficiencies.

B. Neither Resident Project Representative's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Resident Project Representative in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Resident Project Representative shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Resident Project Representative to CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

D. Resident Project Representative will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

E. Resident Project Representative's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

F. The limitations upon authority and responsibility set forth in this paragraph 9.10 shall also apply to Resident Project Representative's assistants.

SC-11.03.D Delete paragraph 11.03.C. in its entirety and insert the following in its place:

D. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

1. If the total cost of a particular item of Unit Price Work amounts to 10% or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25% from the estimated quantity of such item indicated in the Agreement;

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

3. If CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof; or if OWNER believes that the quantity variation entitles OWNER to an

adjustment in the unit price, either OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

SC-14.02.A.1 Revise the submittal date to the 25th of each month.

SC-14.02.A.4 Add the following new paragraph immediately after paragraph 14.02.A.3;

4. The anticipated amount of the next progress payment shall be submitted with each application for payment

SC-14.02.C.1 At the beginning of paragraph 14.02.C.1 Delete “Ten” and put in its place “Twenty”.

SC-17.07 Add the following paragraph immediately after paragraph 17.06:

17.07 *Contractor Claims and Third – Party Beneficiaries*

A. Contractors, subcontractors and equipment and materials suppliers on the PROJECT, or their sureties, shall maintain no direct action against the ENGINEER, its officers, employees, and subcontractors, for any claim arising out of, in connection with, or resulting from the engineering services performed. Only the OWNER will be the beneficiary of any undertaking by the ENGINEER.

END OF DOCUMENT

Document 00811

FEDERAL WAGE RATE DECISION

1.01 In accordance with the Davis-Bacon Act (Public Law No. 403, 7th Congress), the public body awarding this Contract does hereby specify the following to be assigned minimum wage rates which will be paid by the Contractor and all Subcontractors for this Project.

1.02 This prevailing wage rate does not prohibit the payment of more than the rates stated.

1.03 The wage scale for building construction is to be applied to work on a building including an area within 5 feet of the exterior wall.

1.04 The wage scale for engineering construction is to be applied to all site work greater than 5 feet from an exterior wall of new building under construction or from an exterior wall of an existing building.

1.05 The minimum wage rates for this project are duplicated following.

GENERAL DECISION: TX20100006 03/12/2010 TX6

Date: March 12, 2010
General Decision Number: TX20100006 03/12/2010

Superseded General Decision Number: TX20080006

State: Texas

Construction Types: Building and Residential

Counties: Cameron and Hidalgo Counties in Texas.

BUILDING AND RESIDENTIAL CONSTRUCTION PROJECTS (including single family homes and garden apartments up to and including 4 stories).

Modification Number	Publication Date
0	03/12/2010

** SUTX1990-013 05/01/1990*

	Rates	Fringes
BOILERMAKER		
RESIDENTIAL CONSTRUCTION ONLY.....	$ 16.35	2.315
BRICKLAYER		
RESIDENTIAL CONSTRUCTION ONLY.....	$ 7.25	
CARPENTER (Including Drywall Hanging and Acoustical Ceiling Installation)		
BUILDING CONSTRUCTION ONLY Excluding Batt Insulation..	$ 7.25	
CARPENTER		
RESIDENTIAL CONSTRUCTION ONLY.....	$ 7.25	
CEMENT MASON/CONCRETE FINISHER (Excluding Form Setting)		
BUILDING CONSTRUCTION ONLY..	$ 7.25	
CEMENT MASON/CONCRETE FINISHER		
RESIDENTIAL CONSTRUCTION ONLY.....	$ 7.25	
ELECTRICIAN		
BUILDING CONSTRUCTION ONLY..	$ 8.30	

Electricians: (Residential)
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

FLOOR LAYER: CARPET (SOFT) FLOOR
BUILDING CONSTRUCTION ONLY..$ 7.25
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

Insulation Installer
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

IRONWORKER, REINFORCING
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

Laborer, common
BUILDING CONSTRUCTION ONLY..$ 7.25

LABORER
RESIDENTIAL CONSTRUCTION ONLY
Pipelayer.....$ 7.25
Unskilled.....$ 7.25

PAINTER (Including Drywall Finishing, Taping, and Bedding)
BUILDING CONSTRUCTION ONLY..$ 7.25

PAINTER
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

PIPEFITTER (Including HVAC Work)
BUILDING CONSTRUCTION ONLY..$ 7.28 .12

Plasterer tender
BUILDING CONSTRUCTION ONLY..$ 7.25

PLASTERER
BUILDING CONSTRUCTION ONLY..$ 8.41
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

PLUMBER (Excluding HVAC Work)
BUILDING CONSTRUCTION ONLY..$ 7.50 .48

Plumbers and Pipefitters
RESIDENTIAL CONSTRUCTION ONLY.....$ 8.20

Power equipment operators:
BUILDING CONSTRUCTION ONLY
Backhoe.....$ 7.25 .48
RESIDENTIAL CONSTRUCTION ONLY
Backhoe.....$ 7.25
Grader.....$ 7.25
Loader.....$ 7.25

ROOFER, Including Built Up, Composition and Single Ply Roofs
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

Sheet metal worker
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

Sheet Rock Installer
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

SHEETMETAL WORKER (Including HVAC duct Work)
BUILDING CONSTRUCTION ONLY..$ 7.25

TILE SETTER
BUILDING CONSTRUCTION ONLY..$ 7.25
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

TRUCK DRIVER
BUILDING CONSTRUCTION ONLY..$ 7.25
RESIDENTIAL CONSTRUCTION ONLY.....$ 7.25

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
==========

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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

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

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

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

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

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

==========

END OF GENERAL DECISION

GENERAL DECISION: TX20100104 03/12/2010 TX104

Date: March 12, 2010
General Decision Number: TX20100104 03/12/2010

Superseded General Decision Number: TX20080104

State: Texas

Construction Type: Heavy Tunnel

Counties: Bell, Bexar, Bowie, Brazoria, Brazos, Cameron, Collin, Comal, Coryell, Dallas, Denton, Ector, El Paso, Ellis, Fort Bend, Galveston, Grayson, Gregg, Guadalupe, Hardin, Harris, Harrison, Hays, Hidalgo, Jefferson, Johnson, Kaufman, Liberty, Lubbock, McLennan, Midland, Montgomery, Nueces, Orange, Parker, Potter, Randall, Rockwall, San Patricio, Smith, Tarrant, Taylor, Tom Green, Travis, Victoria, Waller, Webb, Wichita and Williamson Counties in Texas.

TUNNEL CONSTRUCTION PROJECTS (BORED, 48" IN DIAMETER OR MORE)

Modification Number	Publication Date
0	03/12/2010

** SUTX1992-010 01/15/1992*

	Rates	Fringes
CARPENTER (Including Form Setting - Wood Forms ONLY).....	$ 10.67	.92
ELECTRICIAN.....	$ 12.21	.92
IRONWORKER, REINFORCING (Shaft Collar & Surface ONLY)....	$ 12.03	4.09
Laborers:		
Miner.....	$ 11.77	1.28
Surface.....	$ 7.53	
Tunnel.....	$ 9.24	
MECHANIC (Maintenance and repair on trucks and power equipment).....	$ 11.77	.92
Oiler (Services trucks and power equipment).....	$ 9.69	1.50
Power equipment operators:		
Backhoe Operator (1 1/2 CY or more).....	$ 11.40	1.50
Backhoe Operator (Less than 1 1/2 CY).....	$ 10.68	

Bulldozer.....$ 13.00
Crane (1 1/2 CY or more)....$ 12.82 1.50
Crane (Less than 1 1/2 CY)..$ 11.89
Front End Loader (2 1/2 CY or more).....$ 12.17
Front End Loader (less than 2 1/2 CY).....$ 10.16
Locomotive Operator.....$ 9.00 1.50
Road Head Operator.....$ 14.12 1.21
Tunnel/Boring Machine Operator.....$ 13.61

Truck drivers:
Semi.....$ 7.25 1.05
Single Axle, Light.....$ 7.55

WELDER.....$ 11.58

LABORER CLASSIFICATIONS

SURFACE - Air Tool Operator (Surface Only), Batch Plant Laborer, Changehouseman, Dumpman (Outside, Tool Man).

TUNNEL - Air Tool Operator (Tunnel Only), Bull Gang (Muckers/Trackmen), Cabletender, Concrete Crew (Rodders/Spreaders), Concrete Finisher in Tunnel, Concrete Screed Man, Conveyor Operator, Headerman, High Pressure Nozzleman, Hoist Operator, Jumbo Man, Loading/Unloading Agitator Cars, Nipper, Nozzleman-Slice Line, Pot Tender, Primer Man, Reboundman, Shaft/Raise Work (Below Ground), Shotcrete Man, Slusher Operator, Steel Form Raisers/Setters, (metal forms only) Swamper (Brakeman/Switchman), Timberman, Troweling/Grout Machine Operator, Tugger, Vibratorman, Jack Hammer, Pneumatic Tools (Except Driller), Vibratorman, Pavement Breakers.

MINER - Drill Doctor, Bit Sharpener, Bit Grinder, Rebar (Tunnel Only), Jack Leg Miner, Shaft Drill Operator

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

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

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

WAGE DETERMINATION APPEALS PROCESS

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

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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

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

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

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

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

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

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END OF GENERAL DECISION

SECTION 00830

WARRANTY

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section describes the warranty. The conditions contained in this Section are specific administrative and policy requirements in addition to the general conditions and other requirements listed in the contract documents.

1.02 REFERENCES – Not Used

1.03 DEFINITIONS – Section 0700

1.04 CONTRACTOR'S WARRANTY OF TITLE

CONTRACTOR warrants and guarantees that all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

1.05 SUBSTANTIAL COMPLETION

A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefore. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefore. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct

items on the tentative list.

1.06 PARTIAL UTILIZATION

A. Use by OWNER at OWNER's option of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which OWNER, ENGINEER, and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

B. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefore. If ENGINEER considers that part of the Work to be substantially complete, the above provisions will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirement of regarding property insurance.

1.07 FINAL INSPECTION

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

1.08 FINAL PAYMENT

A. Application for Payment

1. After CONTRACTOR has, in the opinion of ENGINEER, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien

rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified above and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

B. Review of Application and Acceptance

If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the above provisions. Otherwise, ENGINEER will return the Application for Payment to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

Thirty days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

D. Final Completion Delayed

If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required above, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

1.09 WAIVER OF CLAIMS

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to the above, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

END OF SECTION

Document 00900

ADDENDUM NO._____
(Sample Form)

Date of Addendum:_____
[Enter date]

PROJECT NAME: Parking Lot @ Mayor Pablo G. Peña City Park

PROJECT NO: 2015-16-10

BID DATE: April 22, 2016. (There is no change to the Bid Date.)

FROM: City of Weslaco
255 S. Kansas Avenue
Weslaco, Texas 78596
Phone: (956) 447-3403

TO: **Prospective Bidders**

This Addendum forms a part of the Bidding Documents and will be incorporated into Contract Documents, as applicable. Insofar as the original Project Manual and Drawings are inconsistent, this Addendum governs. Acknowledge receipt of the Addendum by inserting its number in Document 00310 - Form of Proposal. **FAILURE TO DO SO MAY SUBJECT BIDDER TO DISQUALIFICATION.**

****
Use the following heading and select the appropriate wording for postponement of the Bid Date. Delete the statement beside Bid Date above which indicates that the Bid Date is unchanged. If change in Bid Date, issue as separate addendum. Delete this section entirely if there is no change in Bid Date.
****

CHANGE IN BID DATE

The bid date for this Project has been changed from_____to_____
[Date] [Date]
[Time of day and place for submittal of bid remains the same]. [Time of submittal has been changed from_____to_____. The place for submittal remains the same].
[Time] [Time]

[OR]

The bid date for this project has been indefinitely postponed. Another Addendum will be issued to reset the bid date or to cancel bidding on this Project.

****
Delete the following paragraph if the sole purpose of the Addendum is to postpone the Bid Date.
****

This Addendum uses the change page method: remove and replace or add pages, or Drawing sheets, as directed in the change instructions below. Change bars (|) are provided in the right margins of pages from the Project Manual to indicate where changes have been made; no change bars are provided in added Sections. Reissued Drawing Sheets show the Addendum number above the title block and changes in the Drawing are noted by a revision mark.

****
Number each item of the Addendum beginning with 1 through the total number of change items in the Addendum. Sample entries are provided in brackets.
****

CHANGES TO PREVIOUS ADDENDA

****
Reference Addendum Number and item number to correct clarifications or make minor corrections of changes issued by previous Addenda.
****

ADDENDUM NO._____

[1. Item 5. Change to read as follows:]

CHANGES TO PROJECT MANUAL

****
Follow this format to sequence changes to the Project Manual.
****

BIDDING REQUIREMENTS

****
Give the individual change instructions for each item of change by Document number and title. List changes in order of Document number.
****

[2. Document 00020 - Notice to Bidders. Replace page 00020-2.]

CONTRACT FORMS

[3. Document 00610 - Replace revised Performance Bond, page 00610-1.]

CONDITIONS OF THE CONTRACT

[4. Document 00800 - Supplementary Conditions. Replace page 00800-4 and add page 00800-5.]

SPECIFICATIONS

[5. Section 02050 - Demolition. Add section including pages 02050-1 through 02050-3.]

CHANGES TO DRAWINGS

[6. Delete Sheet S-9, Beam Schedule, and replace with Sheet S-9-A.]

CLARIFICATIONS

[7. Document 00100 - Instructions to Bidders states that no substitutions will be considered during the bidding phase. Substitutions will be considered during the first 15 percent of the Contract Time or first 90 days of the Contract, whichever is less, as stated in Document 00700 - General Conditions.]

MINUTES OF PRE-BID CONFERENCE

Minutes of the Pre-Bid Conference held on_____, _____, 20____ , are
[Day] [Date]
attached as a record and for the Bidders information.

END OF ADDENDUM NO._____

_____ DATED:_____
Name, P.E.

END OF DOCUMENT

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DOCUMENT 00910

MODIFICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section contains information pertaining to modifications and changes for the Contract Documents for the Project.

1.02 REFERENCES – Not Used

1.03 DEFINTIONS - Section 0700

1.04 MODIFICATIONS OF CONTRACT DOCUMENTS

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) Engineer's approval of a Shop Drawing or Sample; or (iii) Engineer's written interpretation or clarification.

C. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with Owner: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adoption by Engineer. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

PART 2 - PRODUCT – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

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SECTION 01010

SCOPE OF WORK

This Scope of Work and any accompanying drawings are intended as a guide to the Contractor in identifying the work to be accomplished in completing this project. This Scope of Work may not be all inclusive and the Contractor shall be responsible for providing all supervision, labor, materials, equipment, direction, and coordination necessary to perform and totally complete the work in conformance with the drawings and specifications. If an "or equal" substitution is made for any of the recommended items shown in the specifications or drawings, the Contractor shall be responsible for providing all the necessary physical modifications to fully accommodate the substitution at no change in contract price.

PART 1. GENERAL

1.01 CIVIL

A. Provide all civil work per specifications and drawings

1.02 PIPING

A. Provide all civil work per specifications and drawings.

1.03 CONSTRUCTION RECORD DRAWINGS

A. The Contractor shall maintain a complete master set of construction "red-line" drawings to document any field changes to the "Issued for Construction" drawing set which shall accurately depict the "As-Built" construction of the plans. Following completion, this drawing set shall be turned over to the Engineer for updating the Record "As-Built" drawings.

B. Any drawings and documentation which are to be supplied by the Contractor, shall be updated to accurately depict the "As-Built" construction of the plans and turned over to the Engineer following Substantial Completion of the project. These items shall be certified by the Contractor's Project Manager as accurate and complete.

1.04 SUBCONTRACTOR COORDINATION

The Contractor shall be responsible for coordination of the work between his various subcontractors to prevent conflicts and schedule interruptions.

1.05 SAFETY REQUIREMENTS

A. The Contractor shall provide all safety equipment required by his employees to meet Occupational Safety and Health Administration (OSHA) safety requirements.

END OF SECTION 01010

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Section 01110

SUMMARY OF WORK

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Summary of the Work including work by Owner, Owner furnished products, Work sequence, future Work, Contractor use of Premises, and Owner occupancy.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of the contract is for the construction of Parking Lot @ Mayor Pablo G. Peña City Park including, but not limited to, Paving, Storm Drainage, Stripping and utility adjustments.

1.03 CASH ALLOWANCES

A. Include the Cash Allowances shown in the Proposal, if any.

1.04 ALTERNATES

A. Include the Alternates shown in the Proposal, if any.

1.05 OWNER FURNISHED PRODUCTS

A. The Owner will furnish no products.

1.06 OWNER FURNISHED UTILITIES

A. The Owner will furnish no utilities.

1.07 WORK SEQUENCE

A. Work sequence will be the responsibility of the Contractor using good construction practices.

B. Coordination of the Work: Refer to Section 01312 – Coordination and Meetings.

1.08 CONTRACTOR USE OF PREMISES

A. Comply with procedures for access to the site and Contractor's use of rights-of-way as specified in Section 01145 - Use of Premises.

B. Construction Operations: Limited to Owner's rights-of-way provided by Owner.

C. Utility Outages and Shutdown: Provide notification to the Owner and private utility companies (when applicable) a minimum of 48 hours, excluding weekends and holidays, in advance of required utility shutdown. Coordinate all work as required.

1.09 WARRANTY

A. Comply with warranty requirements in accordance with Document 00700 - General Conditions.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01145

USE OF PREMISES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Section includes general use of the site including properties inside and outside of rights-of-way, work affecting road, ramps, streets and driveways and notification to adjacent occupants.

B. Contractor is responsible to document existing conditions prior to commencement of the specified work.

1.02 RIGHTS-OF-WAY

A. Confine access and operations and storage areas to rights-of-way provided by Owner as stipulated in Document 00700 - General Conditions; trespassing on abutting lands or other lands in the area is not allowed.

B. Contractor may make arrangements, at Contractor's cost, for temporary use of private properties, in which case Contractor and Contractor's surety shall indemnify and hold harmless the Owner against claims or demands arising from such use of properties outside of rights-of-way.

C. Restrict total length which materials may be distributed along the route of the construction at any one time to 1,000 linear feet unless otherwise approved in writing by City Engineer.

1.03 PROPERTIES OUTSIDE OF RIGHTS-OF-WAY

A. Altering the condition of properties adjacent to and along rights-of-way will not be permitted.

B. Means, methods, techniques, sequences, or procedures which will result in damage to properties or improvements in the vicinity outside of rights-of-way will not be permitted.

C. Any damage to properties outside of rights-of-ways shall be repaired or replaced to the satisfaction of the Resident Project Representative and at no cost to the Owner.

1.04 USE OF SITE

A. Obtain approvals of governing authorities prior to impeding or closing public roads or streets. Do not close more than two consecutive intersections at one time.

B. Notify Resident Project Representative at least 48 hours prior to closing a street for a street crossing. Permission for street closures is required in advance and is the responsibility of the Contractor.

C. Maintain access for emergency vehicles including access to fire hydrants.

D. Avoid obstructing drainage ditches or inlets; when obstruction is unavoidable due to requirements of the Work, provide grading and temporary drainage structures to maintain unimpeded flow.

E. Locate and protect private lawn sprinkler systems which may exist on rights-of-ways within the site. Repair or replace damaged systems to condition equal to or better than that existing at start of Work at no separate payment.

F. Perform daily clean-up of dirt outside the construction zone, and debris, scrap materials, and other disposable items. Keep streets, driveways, and sidewalks clean of dirt, debris and scrap materials. Do not leave building, roads, streets or other construction areas unclean overnight.

1.05 NOTIFICATION TO ADJACENT OCCUPANTS

A. Notify individual occupants in areas to be effected by the Work of the proposed construction and time schedule. Notification shall be not less than 72 hours or more than 2 weeks prior to work being performed within 200 feet of the homes or businesses.

B. Include in notification names and telephone numbers of two company representatives for resident contact, who will be available on 24-hour call. Include precautions which will be taken to protect private property and identify potential access or utility inconvenience or disruption.

C. Consideration shall be given to the ethnicity of the neighborhood where English is not the dominant language. Notice shall be in an understandable language.

1.06 PUBLIC, TEMPORARY, AND CONSTRUCTION ROADS AND RAMPS

A. Construct and maintain temporary detours, ramps, and roads to provide for normal public traffic flow when use of public roads or streets is closed by necessities of the Work.

B. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment or large or heavy trucks or equipment.

1.07 EXCAVATION IN STREETS AND DRIVEWAYS

A. Avoid needless hindering or inconveniencing public travel on a street or any intersecting alley or street for more than two blocks at any one time.

B. Remove surplus materials and debris and open each block for public use as work in that block is complete.

C. Acceptance of any portion of the Work will not be based on return of street to public use.

D. Avoid obstructing driveways or entrances to private property.

E. Provide temporary crossing or complete the excavation and backfill in one continuous operation to minimize the duration of obstruction when excavation is required across drives or entrances.

1.08 TRAFFIC CONTROL

A. Traffic Control Plan must be prepared by a Licensed Professional Engineer. Any deviation from approved plan must be submitted in the form of an RFI and with a proposed change to the TCP and sealed by a Professional Engineer. Provide traffic control, flagmen, signals, control devices, lights, traffic signals, barricades and signs in accordance with the State of Texas Manual on Uniform Traffic Control Devices, as required.

1.09 SURFACE RESTORATION

A. Restore site to condition existing before construction to satisfaction of Resident Project Representative.

B. Repair paved area per the requirements of Section 02744 - Pavement Repair and Resurfacing.

C. Repair turf areas which become damaged, level with bank run sand conforming to Section 02317 - Excavation and Backfill for Utilities, or topsoil conforming to Section 02911 - Topsoil, as approved by the Resident Project Representative and re-sod in accordance with Section 02922 - Sodding. Water and level newly sodded areas with adjoining turf using steel wheel rollers appropriate for sodding. Do not use spot sodding or sprigging.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

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SECTION 01150

PROJECT PROCEDURAL DEFINITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section defines and explains certain terms in order to minimize potential misunderstandings between the Owner, the Owner's Resident Project Representative, Contractor, and Engineer.

1.02 TERMS, DEFINITIONS, AND EXPLANATIONS

A. Drawing/Plan Clarification: An answer from the Resident Project Representative or Engineer, in response to an inquiry from the Contractor, intended to make some requirement(s) of the Drawings or Plans clearly understood. Drawing/Plan clarifications may be sketches, drawings, or in narrative form and will not change any requirements of the Drawings or Plans. Responses to Contractor inquires shall be outlined in Section 01151.

B. Notice of Defects: A notice issued by the Engineer documenting that the work or some portion thereof has not been performed in accordance with the requirements of the Contract Documents. Payment shall not be made on any portion of the work for which a Notice of Defect has been issued and the work not corrected to the satisfaction of the Engineer. Upon receipt of a Notice of Defect, the Contractor shall provide a written Response to Notice of Defect within ten (10) working days after receipt of the Notice. The Contractor's response shall be in accordance with Article 13 of the General Conditions.

If the Contractor disputes issuance of the Notice of Defect, the Resident Project Representative has ten (10) working days in which to respond by either:

1. withdrawing the Notice of Defect, or

2. Directing the Contractor to correct the work. Such determination by the Resident Project Representative shall be final and conclusive of the matter.

If directed to correct the work, the Contractor shall do so within ten (10) working days after receipt of such direction from the Resident Project Representative, or such other time as may be agreed to with the Resident Project Representative.

C. Project Communications: Routine written communications between the Owner, Engineer, and the Contractor shall be in letter or field memo format. Such communications shall not be identified as Requests for Information or Request for Technical Instructions nor shall they substitute for any other written requirement pursuant to the provisions of these Contract Documents.

D. Request for Information/Request for Technical Instructions: A request from the Contractor, to the Resident Project Representative or Engineer, seeking an interpretation or a clarification of some requirement of the Contract Documents. The Contractor shall clearly and concisely set forth the issue for which it seeks clarification or interpretation and why a response is needed from the Resident Project Representative or Engineer. The Contractor shall, in the written request, set forth its interpretation or understanding of the Contract's requirements along with reasons why it has reached such an understanding. Responses from the Resident Project Representative or Engineer will not change any requirements of the Contract Documents.

Responses to Contractor inquiries shall be as outlined in Section 01151.

E. Substitution/Or-Equal Submittals: A written request from the Contractor to substitute a material, article, device, product, fixture, form, type of construction, or process called for in the Contract Documents with another item that shall be substantially equal in all respects to that so indicated or supplied.

F. Schedule Submittals: When required, the Contractor shall submit schedules, schedule updates, schedule revisions, time impact analysis, etc., for review and acceptance.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 01151

REQUESTS FOR INFORMATION / REQUESTS FOR TECHNICAL INSTRUCTIONS (RFI'S/RFTI'S)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section includes mandatory procedures and sets forth policies to be followed in requesting technical information or clarification.

1.02 PROCEDURES AND POLICIES

A. In the event that the Contractor or Subcontractor, at any tier, determines that some portions of the Drawings, Specifications, or other Contract Documents require clarification or interpretation by the Owner or Engineer, the Contractor shall submit a Request for Information or a Request for Technical Instructions in writing to the Resident Project Representative. RFI's/RFTI's may only be submitted by the Contractor. The Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed. In the RFI/RFTI, the Contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.

B. The Owner acknowledges that this is a complex project and its successful completion will be a cooperative effort between all parties. The Owner does not intend to limit or restrict communications between any of the parties.

C. The Resident Project Representative will review all RFI's/RFTI's to determine whether they are Requests for Information or Request for Technical Instructions within the meaning of this term. If the Resident Project Representative determines that the document is not an RFI/RFTI, it will be returned to the Contractor, unreviewed as to content, for resubmittal in the proper manner.

D. Responses to Requests for Information/Request for Technical Instructions shall be issued within ten (10) working days of receipt of the request from the Contractor unless the Resident Project Representative or Engineer determines that a longer time is necessary to provide an adequate response. If a longer time is determined necessary by the Resident Project Representative or Engineer, they will, within ten (10) working days of the receipt of the request, notify the Contractor of the anticipated response time. If the Contractor submits a Request for Information /Request for Technical Instructions on an activity within ten (10) working days or less of float on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Resident Project Representative or Engineer to respond to the request provided that the Resident Project Representative or Engineer responds within ten (10) working days set forth above.

E. Responses from the Resident Project Representative or Engineer will not change any requirement of the Contract Documents. In the event the Contractor believes that a response to a Request for Information / Request for Technical Instructions will cause a change to the requirements of the Contract Document, the Contractor shall immediately give written notice to the Engineer stating that the Contractor considers that the response warrants a Change Order. Failure to give such written notice within ten (10) working days shall waive the Contractor's right to seek additional time or cost under the General Conditions.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

Section 01255

CHANGE ORDER PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Procedures for processing Change Orders, including:

1. Assignment of a responsible individual for approval and communication of changes in the Work;

2. Documentation of change in Contract Price and Contract Time;

3. Change procedures, using proposals and construction contract modifications, work change directive, stipulated price change order, unit price change order, time and materials change order;

4. Execution of Change Orders;

5. Correlation of Contractor submittals.

1.02 REFERENCES

A. Rental Rate Blue Book for Construction Equipment (Data Quest Blue Book). Rental Rate is defined as the full, unadjusted base rental rate for the appropriate item of construction equipment.

1.03 RESPONSIBLE INDIVIDUAL

A. Contractor shall provide a letter indicating the name and address of the individual authorized to execute change documents, and who shall also be responsible for informing others in Contractor's employ and Subcontractors of changes to the Work. The information shall be provided at the Pre-construction Conference.

1.04 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Contractor shall maintain detailed records of changes in the Work. Provide full information required for identification and evaluation of proposed changes, and to substantiate costs of changes in the Work.

B. Contractor shall document each proposal for a change in cost or time with sufficient data to allow evaluation of the proposal.

C. Proposals shall include, as a minimum, the following information as applicable:

1. Quantities of items in the original Document 00405 - Schedule of Unit Price Work with additions, reductions, deletions, and substitutions.

2. When Work items were not included in the Schedule of Unit Price Work, Contractor shall provide unit prices for the new items, with supporting information as required by the Engineer.

3. Justification for any change in Contract Time.

4. Additional data upon request.

D. For changes in the Work performed on a time-and-material basis, the following additional information may be required:

1. Quantities and description of products and equipment.

2. Taxes, insurance and bonds.

3. Overhead and profit.

4. Dates and times work was performed, and by whom.

5. Time records and certified copies of applicable payrolls.

6. Invoices and receipts for products, rented equipment, and subcontracts, similarly documented.

E. For changes in the work performed on a time-and-materials basis, rental equipment will be paid as follows:

1. Rented equipment will be paid by actual invoice cost for the duration of time required to complete the extra work without markup for overhead and profit. If the extra work comprises only a portion of the rental invoice where the equipment would otherwise be on the site, the Contractor shall compute the hourly equipment rate by dividing the actual monthly invoice by 176. (One day equals 8 hours and one week equals 40 hours.)

2. Operating costs shall not exceed the estimated operating costs given in the Blue Book for the item of equipment. Overhead and profit will be allowed on operating cost.

F. For changes in the work performed on a time-and-materials basis using Contractor-owned equipment, use Blue Book rates as follows:

1. Contractor-owned equipment will be paid at the Blue Book Rental Rate for the duration of time required to complete the extra work without markup for overhead and profit. The Rental Rate utilized shall be the lowest cost combination of hourly, daily, weekly or monthly rates. Use 150 percent of the Rental Rate for double shifts (one extra shift per day) and 200 percent of the Rental Rate for more than two shifts per day. Standby rates shall be 50 percent of the appropriate Rental Rate shown in the Blue Book. No other rate adjustments shall apply.

2. Operating costs shall not exceed the estimated operating costs given in the Blue Book for the item of equipment. Overhead and profit will be allowed on operating cost. Operating costs will not be allowed for equipment on standby.

1.05 CHANGE PROCEDURES

A. Changes to Contract Price or Contract Time can only be made by issuance of a Change Order. Issuance of a Work Change Directive will be formalized into a Change Order. All changes will be in accordance with the requirements of Document 00700 - General Conditions.

B. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Time as authorized by the General Conditions by issuing supplemental instructions.

C. Contractor may request clarification of Drawings, Specifications or Contract Documents or other information by using a Request for Information. Response by the Engineer to a Request for Information does not authorize the Contractor to perform tasks outside the scope of the Work. All changes must be authorized as described in this section.

D. Change Orders for work not specified in Section 00405 – Schedule of Unit Price Work – shall be done as per Section C. Part 2 above.

1.06 PROPOSALS AND CONTRACT MODIFICATIONS

A. The Engineer may issue a Request for Proposal, which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications. The Engineer may also request a proposal in the response to a Request for Information. Contractor shall prepare and submit a proposal within 7 days or as specified in the request.

B. The Contractor may propose an unsolicited change by submitting a proposal to the Engineer describing the proposed change and its full effect on the Work, with a statement describing the reason for the change and the effect on the Contract Price and Contract Time including full documentation.

1.07 WORK CHANGE DIRECTIVE

A. Engineer may issue a signed Work Change Directive instructing the Contractor to proceed with a change in the Work. A Work Change Directive will subsequently be incorporated in a Change Order.

B. The document will describe changes in the Work and will designate a method of determining any change in Contract Price or Contract Time.

C. Contractor shall proceed promptly to execute the changes in the Work in accordance with the Work Change Directive.

1.08 STIPULATED PRICE CHANGE ORDER

A. A stipulated price Change Order will be based on an accepted proposal including the Contractor's lump sum price quotation with Schedule of Values.

1.09 UNIT PRICE CHANGE ORDER

A. Where Unit Prices for the affected items of Work are included in Document 00405 - Schedule of Unit Price Work, the unit price Change Order will be based on the unit prices.

B. Where unit prices of Work are not pre-determined in the Document 00405 - Schedule of Unit Price Work, the Work Change Directive or accepted proposal will specify the unit prices to be used.

1.10 TIME-AND-MATERIAL CHANGE ORDER

A. Contractor shall provide an itemized account and supporting data after completion of change.

B. Engineer will determine the change allowable in Contract Price and Contract Time as provided in Document 00700 - General Conditions.

C. Contractor shall maintain detailed records of work done on time-and-material basis as specified in paragraph 1.04, Documentation of Change in Contract Price and Contract Time.

D. Contractor shall provide full information required for evaluation of changes and shall substantiate costs for changes in the Work.

1.11 EXECUTION OF CHANGE DOCUMENTATION

A. Engineer will issue Change Orders, Work Change Directives, or accepted proposal for signatures of parties as described in Document 00700 - General Conditions. **All Change Orders must be approved by Weslaco City Commission.**

1.12 CORRELATION OF CONTRACTOR SUBMITTALS

A. For Stipulated Price Contracts, Contractor shall promptly revise the Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item.

B. For Unit Price Contracts, the next monthly estimate of work after acceptance of a Change Order will be revised to include any new items not previously included and the appropriate unit rates.

C. Contractor shall promptly revise progress schedules to reflect any change in Contract Time, and shall revise schedules to adjust time for other items of work affected by the change, and resubmit for review.

D. Contractor shall promptly enter changes to the on-site and record copies of the Drawings, Specifications or Contract Documents as required in Section 01785 - Project Record Documents.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01270

MEASUREMENT AND PAYMENT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Procedures for measurement and payment plus conditions for nonconformance assessment and nonpayment for rejected products.

1.02 AUTHORITY

A. Measurement methods delineated in Specification sections are intended to complement the criteria of this section. In the event of conflict, the requirements of the Specification section shall govern.

B. Resident Project Representative will take all measurements and compute quantities accordingly.

C. Contractor shall assist by providing necessary equipment, workers, and survey personnel as required by Resident Project Representative.

1.03 UNIT QUANTITIES SPECIFIED

A. Quantity and measurement estimates stated in the Agreement are for contract purposes only. Quantities and measurements supplied or placed in the Work and verified by Resident Project Representative shall determine payment as stated in Article 9 of the General Conditions.

B. If the actual Work requires greater or lesser quantities than those quantities indicated in the Bid Form, provide the required quantities at the unit prices contracted, except as otherwise stated in Article 9 of the General Conditions.

1.04 MEASUREMENT OF QUANTITIES

A. Measurement by Weight: Reinforcing steel, rolled or formed steel or other metal shapes will be measured by CRSI or AISC Manual of Steel Construction weights. Welded assemblies will be measured by CRSI or AISC Manual of Steel Construction or scale weights.

B. Measurement by Volume:

1. Stockpiles: Measured by cubic dimension using mean length, width, and height or thickness.

2. Excavation and Embankment Materials: Measured by cubic dimension using the average end area method.

C. Measurement by Area: Measured by square dimension using mean length and width or radius.

D. Linear Measurement: Measured by linear dimension, at the item centerline.

E. Stipulated Price Measurement: By unit designated in the agreement.

F. Other: (Including but not limited to , each and lump sum). Items measured by weight, volume, area, or lineal means or combination, as appropriate, as a completed item or unit of the Work.

1.05 PAYMENT

A. Payment Includes: Full compensation for all required supervision, labor, products, tools, equipment, plant, transportation, services, and incidentals; and erection, application or installation of an item of the Work; and Contractor's overhead and profit.

B. Total compensation for required Unit Price Work shall be included in Unit Price bid in Document 00405 - Schedule of Unit Price Work.

C. Interim payments for stored materials will be made only for materials to be incorporated under items covered in unit prices, unless disallowed in Supplementary Conditions.

D. Progress payments will be based on the Resident Project Representative's observations and evaluations of quantities incorporated in the Work multiplied by the unit price.

E. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities determined by Engineer multiplied by the unit price for Work which is incorporated in or made necessary by the Work.

1.06 NONPAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable to Resident Project Representative.
2. Products determined as nonconforming before or after placement.
3. Products not completely unloaded from transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work, unless specified otherwise.
6. Loading, hauling, and disposing of rejected products.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01292

SCHEDULE OF VALUES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Preparation and submittal of a Schedule of Values for stipulated price contracts or for major lump sum items on unit price contracts for which the Contractor requests progress payments.

1.02 DEFINITION

A. The Schedule of Values is an itemized list that establishes the value of each part of the Work for a stipulated price contract and for major lump sum items in a unit price contract. The Schedule of Values is used as the basis for preparing applications for payments. Quantities and unit prices may be included in the schedule when designated by the Engineer.

B. A major lump sum item is a lump sum item in the Schedule of Unit Price Work which qualifies as Major Unit Price Work as defined in Document 00700 - General Conditions.

1.03 PREPARATION

A. For stipulated price contracts, subdivide the Schedule of Values into logical portions of the Work, such as major work items or work in contiguous geographic areas. Use Section 01325 - Construction Schedule to guide the subdivision of work items. The items in the Schedule of Values will correlate directly with the tasks enumerated in the Construction Schedule. Then organize each portion using the Table of Contents of this Project Manual as an outline for listing the value of work by Sections. A pro rata share of mobilization, bonds, and insurance may be listed as separate items for each portion of the work.

B. For unit price contracts, items should include a proportional share of Contractor's overhead and profit so that the total of all items will equal the Contract Price.

C. For lump sum equipment items where submittal of operation/maintenance data and testing are required, include a separate item for equipment operation and maintenance data submittal valued at 5 percent of the lump sum amount for each equipment item and a separate item for testing and adjusting valued at 5 percent of the lump sum amount for each equipment item.

D. Round off figures for each listed item to the nearest $100.00 except for the value of one item, if necessary, to make the total of all items in the Schedule of Values equal the Contract Price for stipulated price contracts or the lump sum amount in the Schedule of Unit Price Work.

E. Type the schedule of values on 8-1/2-inch by 11-inch white bond paper.

1.04 SUBMITTAL

A. Submit within 30 days of Notice to Proceed, or at the pre-construction meeting, whichever occurs sooner.

B. Revise the Schedule of Values and resubmit for items affected by contract modifications, change orders, and work change directives. After the changes are reviewed without exception by the Engineer, make the submittal at least 10 days prior to submitting the next application for progress payment.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01312

COORDINATION AND MEETINGS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Section includes general coordination including preconstruction conference, site mobilization conference, and progress meetings.

1.02 RELATED DOCUMENTS

A. Coordination is required throughout the documents. Refer to all of the Contract Documents and coordinate as necessary.

1.03 ENGINEER AND REPRESENTATIVES

A. The Engineer may act directly or through designated representatives as defined in the General Conditions and as identified by name at the preconstruction conference.

1.04 CONTRACTOR COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Specifications sections to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify that utility requirement characteristics of operating equipment are compatible with existing or planned utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Conceal pipes, ducts, and wiring within the construction in finished areas, except as otherwise indicated. Coordinate locations of fixtures and outlets with finish elements.

D. Coordinate completion and clean up of Work for Substantial Completion and for portions of Work designated for Owner's partial occupancy.

E. Coordinate access to site for correction of nonconforming Work to minimize disruption of Owner's activities where Owner is in partial occupancy.

1.05 PRECONSTRUCTION CONFERENCE

A. Engineer will schedule a preconstruction conference.
B. Attendance Required: Owner’s Representatives, Engineer's Representatives, Resident Project Representative, Contractor and major Subcontractors.

C. Agenda:

1. Distribution of Contract Documents.

2. Designation of personnel representing the parties in Contract, and the Engineer.

3. Review of insurance.

4. Discussion formats proposed by the Contractor for schedule of values (if any), and construction schedule.

5. Procedures and processing of shop drawings and other submittals, substitutions, pay estimates or applications for payment, Requests for Information, Request for Proposal, Change Orders, and Contract closeout.

6. Scheduling of the Work and coordination with other contractors and utility service providers.

7. Review of Subcontractors.

8. Appropriate agenda items listed for Site Mobilization Conference, paragraph 1.06C, when preconstruction conference and site mobilization conference are combined.

9. Procedures for testing.

10. Procedures for maintaining record documents.

11. Other items as may be deemed appropriate.

1.06 SITE MOBILIZATION CONFERENCE

A. When required by the Contract Documents, Engineer will schedule a conference at the Project site prior to Contractor occupancy.

B. Attendance Required: Engineer representatives, Resident Project Representative, Special Consultants, Contractor's Superintendent, and major Subcontractors.

C. Agenda:

1. Use of premises by Owner and Contractor.

2. Safety and first aid procedures.

3. Construction controls provided by Owner.

4. Temporary utilities.

5. Survey and layout.

6. Security and housekeeping procedures.

7. Field office requirements.

1.07 PROGRESS MEETINGS

A. Project meetings shall generally be held at Weslaco City Hall Planning Conference Room or other location as designated by the Owner. Meeting shall generally be held at monthly intervals, or more frequent intervals if directed by City Engineer.

B. Attendance Required: Job superintendent, major Subcontractors and Suppliers, Owner’s Representatives, Engineer’s Representatives and Resident Project Representative as appropriate to agenda topics for each meeting.

C. Engineer or his representative will make arrangements for meetings, and recording minutes.

D. Engineer or his representative will prepare the agenda and preside at meetings.

E. Contractor shall provide required information and be prepared to discuss each agenda item.

F. Agenda:

1. Review minutes of previous meetings.
2. Review of Record Documents.
3. Review of Work progress schedule submittal, and pay estimates, payroll and compliance submittals.
4. Field observations, problems, and decisions.
5. Identification of problems which may impede planned progress.
6. Review of submittals schedule and status of submittals.
7. Review of RFI and RFP status.
8. Change order status.
9. Review of off-site fabrication and delivery schedules.
10. Maintenance of progress schedule.
11. Corrective measures to regain projected schedules.
12. Planned progress during succeeding work period.
13. Coordination of projected progress.
14. Maintenance of quality and work standards.
15. Effect of proposed changes on progress schedule and coordination.
16. Other items relating to Work.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

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Section 01321

CONSTRUCTION PHOTOGRAPHS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Photographic requirements for construction photographs and submittals.

1.02 SUBMITTALS

A. Prints: Furnish 2 sets of 4-inch by 6-inch prints of each view and submit 1 print directly to the Engineer within 7 days of taking photographs. One print shall be retained by the Contractor in the field office at the Project site and available at all times for reference.

B. Extra Prints: When requested by the Engineer, the Contractor shall submit extra prints of photographs, with distribution directly to designated parties who will pay the costs for the extra prints directly to the photographer.

C. When required by individual sections, submit photographs taken prior to start of construction to show original site conditions.

D. When required by Contract Documents, submit photographs with monthly Pay Estimate.

E. Negatives: With each submittal, include photographic negatives, in protective envelopes, identified by Project name, Contractor, and date photographs were taken.

F. In lieu of negatives, Contractor may submit electronic files of digital photographs if using a digital camera, but must comply with Parts 1 and 2 of this section.

1.03 QUALITY ASSURANCE

A. Contractor shall be responsible for the timely execution of the photographs, their vantage point, and quality.

B. Photographs: Two prints; color, matte finish; 4 x 6 -inch size, mounted on 8-1/2 x 11- inch soft card stock, with left edge binding margin for three hole punch. Digital photos shall not be distorted to fit card stock.

PART 2 P R O D U C T S

2.01 PRECONSTRUCTION PHOTOGRAPHS

A. Prior to the commencement of any construction, take 35 mm or digital color photographs of the site of the project and present two sets of prints to the Engineer for their use in contract administration and inspection. Subject matter of the photographs to be determined by the Engineer.

B. The photographs shall show on a non-reflective chalkboard readable in the photograph:

1. Job number.

2. Date and time photographs were taken.

3. Location and compass direction of the photograph, along with the project number.

4. Date shall be on negative (35mm) or on digital image.

5. Provide notation of vantage point marked for location and direction of shot, on a key plan of the site.

C. Sufficient number of photographs shall be taken to show the existence or non-existence of cracked paved surfaces and the condition of trees, shrubs, and grass.

D. Identify each photograph with an applied label or rubber stamp on the back with the following information:

1. Name of the Project.

2. Name and address of the photographer (if a professional photographer is used).

3. Name of the Contractor.

4. Date the photograph was taken.

5. Photographs shall be in plastic pockets and bound in three-ring notebook for easy access and viewing.

2.02 PROGRESS PHOTOGRAPHS

A. Take photographs of subject matter selected by Resident Project Representative at intervals, coinciding with the cutoff date associated with each application for payment. Select the vantage points for each shot each month to best show the status of construction and progress since the last photographs were taken.

1. Vantage Points: Follow direction by the Resident Project Representative to select vantage points. During each of the following construction phases take not less than 2 of the required shots from the same vantage point each time to create a time-lapse sequence.

2. Photos shall be submitted according to Paragraphs 1.03 B. and 2.01 B and D.

PART 3 E X E C U T I O N - Not Used

END OF SECTION

SECTION 01325

CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.01 GENERAL

A. Provide Construction Schedules for the Work included in this Contract in accordance with requirements in this Section. Create Construction Schedule using Critical Path Method (CPM) computer software capable of mathematical analysis of Precedence Diagramming Method (PDM) plan. Provide printed activity listings and bar charts in formats described in this Section.

B. Combine activity listings and bar charts with narrative report to form Construction Schedule submittal for Engineer.

1.02 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. During preconstruction meeting, as described in Section 01312 - Coordination and meetings, provide sample bar charts and activity listings produced from scheduling software proposed. Scheduling software is subject to review by Engineer and must meet requirements provided in this Section. Engineer will provide review of samples within seven days of submittal.

C. Within 21 days of receipt of approval of Contractor's format, or 30 days of Notice to Proceed, whichever is later, **submit proposed Construction Schedule for review**.

D. Construction Schedule submittals shall include:

1. Printed bar charts that meet criteria outlined in this Section;

2. Activity listings that meet criteria outlined in this Section and are produced by Contractor's approved scheduling software; and

3. A predecessor/successor listing sorted by Activity ID that meets criteria outlined in this Section and is produced by Contractor's scheduling software.

4. A logic network diagram is required with the first Construction Schedule submittal for facilities projects.

5. Prepare and submit graphic or tabular display of estimated monthly billings (i.e. a cash flow curve for the Work) with the first schedule submittal. This information is not required in monthly updates, unless significant changes in work require re-submittal of schedule for review. Display shall allocate units indicated in bid schedule or Schedule of Values to Construction Schedule activities. Weighted allocations are acceptable, where appropriate. Dollar value associated with each allocated unit will be spread across the duration of that activity on a monthly basis. Total for each month and cumulative total will be indicated. These monthly forecasts are only for Engineer’s planning purposes. Monthly payments for actual work completed will be made in accordance with Document 00700 - General Conditions.

6. Narrative Report that provides the information outlined in this Section.

E. No payment will be made until Engineer approves Construction Schedule and billing forecast.

F. If Contractor desires to make changes in its method of operating and scheduling, after Engineer has reviewed original schedule, notify Engineer in writing, stating reasons for changes. When Engineer considers these changes to be significant, Contractor may be required to revise and resubmit for review all or affected portion of Contractor's Construction Schedule to show effect on the Work.

G. Upon written request from Engineer, revise and submit for review all or any part of Construction Schedule submittal to reflect changed conditions in the Work or deviations made from original schedule.

H. Updated Construction Schedule with actual start and actual finish dates, percent complete, and remaining duration of each activity shall be submitted monthly. Data date used in updating monthly Construction Schedule shall be the same date as used in monthly Payment Application. Monthly update of Construction Schedule is required for monthly Payment Application to be processed for payment.

1.04 SCHEDULING COMPUTER SOFTWARE REQUIREMENTS

A. Contractor's scheduling software shall be capable of creating bar charts and activity listings, which can be sorted by various fields.

B. Use scheduling software to provide monthly time in Bar Chart format and scale with 12-month scale not to exceed one page width. Bar charts may be printed or plotted on 8-1/2 by 11-inch, 8-1/2 by 14-inch or 11 by 17-inch sheet sizes. Over-size plots are not acceptable.

1.05 NARRATIVE SCHEDULE REPORT

A. Narrative schedule report shall list activities started this month, activities completed this month, activities continued this month, activities scheduled to start or complete next month, problems encountered this month, and actions taken to solve these problems.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01326

CONSTRUCTION SCHEDULE (BAR CHART)

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Prepare and submit to the Engineer an initial Construction Schedule as required by this section for the Work. Do not start construction until the schedule is approved by the Engineer.

1.02 FORM AND CONTENT OF INITIAL CONSTRUCTION SCHEDULE

A. Bar Chart:

1. Show major construction activities such as pipe laying (by traffic control phases or other approved key areas), tunnel construction, pavement removal, pavement replacement, pressure testing, disinfection, clean up and punch out as separate activities on the schedule.

2. Show all work items where new water mains and other new utilities connect to Owner facilities.

3. Show separate activities for each shop drawing and product data submittal that are critical to timely completion. Show submission dates and dates approved submittals will be needed from the Engineer.

4. Provide separate horizontal bar for each activity. List start and finish date for each activity at left side of diagram.

5. Horizontal Time Scale: Identify first work day of each week.

6. Scale and Spacing: Notes must be legible and Contractor must allow space for notations and future revisions.

7. Order of Listings: Order bar chart listings by phases or other approved groups of activities that are contiguous. Activities shall be in chronological order within each phase or group. For example, for each segment of new open cut water main placement, the schedule shall have an activity for layout, traffic control, pavement removal, water main placement and backfill, pavement restoration, traffic control removal, pavement markings restoration and clean up. For each tunnel or auger activity, the schedule shall have an activity for layout, traffic control, shaft construction, tunnel construction or auger activity, pipe placement in tunnel or auger, routing (if required), shaft removal, pavement replacement, pavement marking replacement, traffic control removal, pavement marking restoration and clean up.

B. Narrative Description:

1. Submit narrative description of anticipated work sequence as indicated by sequence of activities presented in the schedule.

2. Narrative shall be of sufficient detail to discuss any activity that affects the public (such as phases of traffic control), interaction with specific Owner forces (such as valve operation, and testing) or other associated prime Contractors.

1.03 PROGRESS REVISIONS

A. Submit progress revisions monthly as part of Application for Payment or information necessary for Application for Payment. Application for Payment shall not be considered complete or processed for payment until progress revision is submitted. When required, re-submittal for rejected revision must be made, reviewed and approved prior to the following month's pay application being processed. Pay Application for the following month will not be processed until re-submittal is approved and Progress Revision required that month is received.

B. Provide Narrative Report to describe:

1. Major changes in scope.
2. Revised projections in progress, and completion, or changes in activity durations.
3. Other identifiable changes.
4. Problem areas, anticipated delays, and the impact on schedule.
5. Corrective action recommended and its effect.
6. Effect of changes on schedules or other prime contractors.
7. Material delivery delays.

C. Additional data to be included with Bar Chart described in Paragraph 1.01 of this section:

1. Original dates shown for each activity in the approved initial progress schedule shall be shown by a narrow bar next to wider bar for current schedule.
2. Date that each activity actually started or finished if that event has occurred. Actual dates must be clearly identified in two right-most columns in the left portion of 11-inch by 17-inch chart.
3. Indicate percentage progress of each activity to the date of submission.

1.04 SUBMISSIONS

A. Submit initial progress schedule within 15 days after award of contract. The Engineer will review the schedule and return the review copy.

B. Cut-off date for progress revision may be as early as the twentieth of the month so that submittal can be made without delay to processing of Application for Payment. Use same cut-off day for all revisions as used in first approved revision.

C. When required, resubmit within 7 days after return of review copy.

D. Schedule shall include connecting lines between bars to indicate sequence that activities will be accomplished such that if activity's start or finish is modified, then impact will be known by the corresponding changes to preceding or succeeding activities identified by the connecting lines.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01330

SUBMITTAL PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Submittal procedures for:

1. Schedule of Values.
2. Construction Schedules.
3. Shop Drawings, Product Data, and Samples
4. Operations and Maintenance Data.
5. Manufacturer's Certificates.
6. Construction Photographs.
7. Project Record Documents.
8. Design Mixes.

1.02 SUBMITTAL PROCEDURES

A. Scheduling and Handling:

1. Schedule submittals well in advance of the need for the material or equipment for construction. Allow time to make delivery of material or equipment after submittal has been approved.

2. Develop a submittal schedule that allows sufficient time for initial review, correction, resubmission and final review of all submittals. The Engineer will review and return submittals to the Contractor as expeditiously as possible but the amount of time required for review will vary depending on the complexity and quantity of data submitted. In no case will a submittal schedule be acceptable which allows less than 30 days for initial review by the Engineer. This time for review shall in no way be justification for delays or additional compensation to the Contractor. Recognizing that time is of the essence, the Contractor is to stamp the top of each submittal with the words ROUTINE or CRITICAL. Routine submittals shall be processed in accordance with the timeframe set forth previously. Critical submittals are those that: were overlooked by the Contractor, involve complex coordination, or are crucial to the successful completion of a specific portion of the project. For critical submittals:

   i. Contractor shall indicate on the submittal his realistically estimated date of when a review must be returned;

   ii. Upon return of critical submittals, Contractor shall date-stamp the transmittal page with date and time received;

iii. Contractor is cautioned that the use of critical submittals is not a substitute for proper due diligence on his part. Review of critical submittals found to be routine shall be accompanied by an invoice for excess time and material expenditures that were required in order to complete the critical review as compared to a routine review. The Resident Project Representative shall make the determination as to whether a critical submittal was in fact routine.

3. The Engineer's review of submittals covers only general conformity to the Drawings, Specifications and dimensions which affect the layout. The Contractor is responsible for quantity determination. Quantities may be verified by the Engineer. The Contractor is responsible for any errors, omissions or deviations from the Contract requirements; review of submittals in no way relieves the Contractor from his obligation to furnish required items according to the Drawings and Specifications.

4. Submit sufficient copies of documents. Unless otherwise specified in the following paragraphs or in the Specifications, provide 6 copies in addition to the number the Contractor requires returned. For portions of the project involving electrical or signal components, provide one additional copy (7 copies in addition to the number the Contractor requires returned).

5. Revise and resubmit submittals as required. Identify all changes made since previous submittal.

6. A maximum of three (3) reviews will be conducted on any one submittal. Submittals requiring more than three (3) reviews will be considered inadequate and result in a recovery of review expenses from the Contractor.

7. The Contractor shall assume the risk for material or equipment which is fabricated or delivered prior to approval. No material or equipment shall be incorporated into the Work or included in periodic progress payments until approval has been obtained in the specified manner.

B. Transmittal Form and Numbering:

1. Transmit each submittal to the Engineer with a Transmittal Cover.

2. Sequentially number each transmittal form beginning with the number 1. Re-submittals shall use the original number with an alphabetic suffix (i.e., 2A for first re-submittal of Submittal 2 or 15C for third re-submittal of Submittal 15). Each submittal shall only contain one type of work, material, or equipment. Mixed submittals will not be accepted.

3. Identify time nature of submittal, either ROUTINE or CRITICAL.

4. Identify variations from requirements of Contract Documents and identify product or system limitations.

5. For submittal numbering of video tapes, see paragraph 1.10 Video.

C. Transmittal Cover:

1. Transmittal Cover, certifying that the items have been reviewed in detail and are correct and in accordance with Contract Documents, except as noted by any requested variance. A stamp may be used to print the information on the Transmittal Cover

except for the Contractor's signature. Regardless of whether the transmittal cover is typed or stamped, the transmittal cover text shall be a minimum of fourteen (14) point.

2. As a minimum, Transmittal Cover information shall include:

   a. Contractor's name.
   b. Job number.
   c. Submittal number.
   d. Certification statement that the Contractor has reviewed the submittal and it is in compliance with the Contract Documents.
   e. Signature line for Contractor.
   f. Submittal type – routine or critical

3. The bottom half of the Transmittal Cover shall be kept blank.

1.03 SCHEDULE OF VALUES

A. Submit a Schedule of Values in accordance with Section 01292 - Schedule of Values.

1.04 CONSTRUCTION SCHEDULES

A. Submit Construction Schedules as provided in Project Manual.

1.05 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

A. Submit shop drawings in accordance with Section 01340 - Shop Drawings, Product Data, and Samples.

1.06 OPERATIONS AND MAINTENANCE DATA

A. Submit Operations and Maintenance data, as needed.

1.07 MANUFACTURER'S CERTIFICATES

A. When required in Specification sections, submit manufacturers' certificate of compliance for review by Engineer.

B. Transmittal Cover, as described in paragraph 1.02C, shall be placed on front page of the certification.

C. Submit supporting reference data, affidavits, and certifications as appropriate.

D. Certificates may be recent or previous test results on material or product, but must acceptable to Engineer.

1.08 CONSTRUCTION PHOTOGRAPHS

A. Submit Construction Photographs in accordance with Section 01321 - Construction Photographs.

1.09 PROJECT RECORD DOCUMENTS

A. Submit Project Record Documents in accordance with Section 01785 - Project Record Documents.

1.10 VIDEO

A. Submit television video tapes as required in Section 02533 - Acceptance Testing for Sanitary Sewers, if applicable.

B. Transmittal forms for video tapes shall be numbered sequentially beginning with T01, T02, T03, etc.

1.11 DESIGN MIXES

A. When specified in Specifications, submit design mixes for review.

B. Transmittal Cover, as described in paragraph 1.02C, shall be placed on front page of each design mix.

C. Mark each design mix to identify proportions, gradations, and additives for each class and type of design mix submitted. Include applicable test results on samples for each mix.

D. Maintain a copy of approved design mixes at mixing plant.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

A. Submittals made as part of this project will become a vital portion of the project record and will be referenced by the Owner for the useful life of the project. All submittals shall be of high quality. To this end, the following requirements are made:

i. As much as possible, all catalog cuts and manufacturer's information shall be original.

ii. Copies, when required, shall be clean and entirely legible.

iii. Neither facsimiles nor copies of facsimiles are to be included as part of any submittal.

iv. Binders, if used, shall be rugged, lock-ring type. Spine of binders shall be clearly labeled with the information outlined in items 1.02 C.2.a. through c.

B. Reviewed submittals shall be returned to Contractor for distribution to subcontractors and other trades as required. As a minimum, submittals returned to the Contractor will be marked with review comments indicating findings of the review and giving instruction as to necessity of a re-submittal. The Engineer may, at his option, use a stamp for this purpose. Detailed correspondence covering the review may also accompany returned submittals.

END OF SECTION

Section 01340

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Methods, schedule, and process to be followed for shop drawings, product data, and sample submittals.

1.02 REQUIREMENT

A. Submit shop drawings, product data and samples as required by the General Conditions and as designated in the Specifications using the procedures specified in Section 01330 – Submittal Procedures and the requirements of this Section.

B. Shop drawings, product data and samples are not considered Contract Documents.

1.03 SHOP DRAWING/SUBMITTAL SCHEDULE

A. Submit a separate Shop Drawing/Submittal schedule at the same time the construction schedule is submitted. List products, materials and equipment for which Shop Drawings and other submittals are required in the order in which they appear in the Specifications. Including product data and sample submittals in schedule.

1.04 SHOP DRAWINGS

A. Submit shop drawings for review as required by the Specifications.

B. Place Contractor's Transmittal Cover on each drawing as described in Section 01330 – Submittal Procedures.

C. On the drawings, show accurately and distinctly, the following:

1. Field and erection dimensions clearly identified as such;

2. Arrangement and section views;

3. Relation to adjacent materials or structure, including complete information for making connections between work under this Contract and work under other contracts;

4. Kinds of materials and finishes;

5. Parts list and descriptions;

6. Assembly drawings of equipment components and accessories showing their respective positions and relationships to the complete equipment package;

7. Where necessary for clarity, identify details by reference to the Contract Drawings.

D. Make drawings to scale providing a true representation of the specific equipment or item to be furnished.

1.05 PRODUCT DATA

A. Submit product data for review as required in Specification sections.

B. Place Contractor's Transmittal Cover on each data item submitted, as described in Section 01330 – Submittal Procedures.

C. Mark each copy to identify applicable products, models, and options to be used in this Project. Supplement manufacturers' standard data to provide information unique to this Project, where required by the Specifications.

D. For products specified only by reference standard, give manufacturers, trade name, model or catalog designation and applicable reference standard.

1.06 SAMPLES

A. Submit samples for review as required by the Specifications.

B. Place Contractor's Transmittal Cover on each sample as described in Section 01330 – Submittal Procedures.

C. Submit the number of samples specified in Specifications.

D. Reviewed samples which may be used in the Work are identified in Specifications.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 01410

TPDES REQUIREMENTS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Documentation to be prepared and signed by Contractor before conducting construction operations, in accordance with the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit Number TXR 150000 issued March 5, 2013 (the Construction General Permit).

B. Implementation, maintenance inspection, and termination 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 appropriate practices shown on the Drawings or specified elsewhere in the contract.

C. Review of the Storm Water Pollution Prevention Plan (SWP3) implementation with Engineer prior to start of construction.

1.02 DEFINITIONS

A. Commencement of Construction Activities: The exposure of soil resulting from activities such as clearing, grading, and excavating.

B. Large Construction Activity: Project that:

1. disturbs five acres or more, or

2. disturbs less than five acres but is part of a larger common plan of development that will disturb five acres or more of land.

C. Small Construction Activity: Project that:

1. disturbs one or more acres but less than five acres, or

2. disturbs less than one acre but is part of a larger common plan of development that will ultimately disturb one or more acres but less than five acres.

D. TPDES Operator:

1. The person or persons who have day-to-day operational control of the construction activities which are necessary to ensure compliance with the SWP3 for the site or other Construction General Permit conditions.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWP3)

A. Prepare a SWP3 following Part III of the Construction General Permit and the Storm Water Management Handbook for Construction Activities issued under Owner Ordinance Section 47-695(b). If conflicts exist between the Construction General Permit and the handbook, the more stringent requirements will apply.

B. Update or revise the SWP3 as needed during the construction following Part III, Section E of the Construction General Permit.

C. Submit the SWP3 and any updates or revisions to Engineer for review and address comments prior to commencing, or continuing, construction activities.

3.02 NOTICE OF INTENT for Large and Small Construction Activity

A. Fill out, sign, and date TCEQ Form 20022 (02/03) Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under the TPDES Construction General Permit (TXR 150000).

B. Transmit the signed Contractor's copy of TCEQ Form 20022 (03/05/2013), along with a $325.00 check ($225, if done online) or, made out to Texas Commission on Environmental Quality.

C. Submission of the Notice of Intent form by the Contractor to TCEQ is required a minimum of two days before Commencement of Construction Activities.

3.03 CERTIFICATION REQUIREMENTS

A. Fill out TPDES Operator's Information form, including Contractor's name, address, and telephone number, and the names of persons or firms responsible for maintenance and inspection of erosion and sediment control measures. Use multiple copies as required to document full information.

B. Contractor and Subcontractors shall sign and date the Contractor's / Subcontractor's Certification for TPDES Permitting.

C. Submit properly completed certification forms to Engineer for review before beginning construction operations.

D. Conduct inspections in accordance with TCEQ requirements. Ensure persons or firms responsible for maintenance and inspection of erosion and sediment control measures read, fill out, sign, and date the Erosion Control Contractor's Certification for Inspection and maintenance. Use the EPA NPDES Construction Inspection Form, SEE ATTACHMENT of this Section 01410; and the Owner's Storm Water Pollution Prevention Plan Construction Site Inspection Report.

3.04 RETENTION OF RECORDS

A. Keep a copy of this document and the SWP3 in a readily accessible location at the construction site from Commencement of Construction Activity until submission of the Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under TPDES Construction General Permit (TXR 150000) to TCEQ. Contractors with day-to-day operational control over SWP3 implementation shall have a copy of the SWP3 available at a central location, on-site, for the use of all operators and those identified as having responsibilities under the SWP3. Upon submission of the NOT, to TCEQ submit a copy of the SWP3 with all revisions to Engineer.

3.05 REQUIRED NOTICES

A. Post the following notices from effective date of the SWP3 until date of final site stabilization as defined in the Construction General Permit:

1. Post the TPDES permit number for Large Construction Activity, or a signed TCEQ Construction Site Notice for Small Construction Activity. Signed copies of the Owner's and Contractor's NOI must also be posted.
2. Post notices near the main entrance of the construction site in a prominent place for

public viewing. Post name and telephone number of Contractor's local contact person, brief project description and location of the SWP3.

a. If posting near a main entrance is not feasible due to safety concerns, coordinate posting of notice with Project Manager to conform to requirements of the Construction General Permit.

b. If Project is a linear construction project (e.g.: road, utilities, etc.), post notice in a publicly accessible location near active construction. Move notice as necessary.

3. Post a notice to equipment and vehicles operators, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post at each stabilized construction exit area.

4. Post a notice of waste disposal procedures in a readily visible location on site.

3.06 ON-SITE WASTE MATERIAL STORAGE

A. On-site waste material storage shall be self-contained and shall satisfy appropriate local, state, and federal rules and regulations.

B. Prepare list of waste material to be stored on-site. Update list as necessary to include up-to-date information. Keep a copy of updated list with the SWP3.

C. Prepare description of controls to reduce pollutants generated from on-site storage. Include storage practices necessary to minimize exposure of materials to storm water, and spill prevention and response measures consistent with best management practices. Keep a copy of the description with the SWP3.

3.07 NOTICE OF TERMINATION

A. Submit a NOTE to Project Manager within 30 days after:

1. Final stabilization has been achieved on all portions of the site that are the responsibility of the Contractor; or

2. Another operator has assumed control over all areas of the site that have not been stabilized; and

3. All silt fences and other temporary erosion controls have either been removed, scheduled to be removed as defined in the SWP3, or transferred to a new operator if the new operator has sought permit coverage.

B. Project Manager will complete Owner's NOT and submit Contractor and Owner's notices to the TCEQ and MS4 entities.

END OF SECTION

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Section 01422

REFERENCE STANDARDS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Section includes general quality assurance as related to Reference Standards and a list of references.

1.02 QUALITY ASSURANCE

A. For Products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on the date of the Contract.

C. Request clarification from Engineer before proceeding should specified reference standards conflict with Contract Documents.

1.03 SCHEDULE OF REFERENCES

AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333-9094
AGC	Associated General Contractors of America 1957 E Street, N.W. Washington, DC 20006
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, CO 80110
AISC	American Institute of Steel Construction 400 North Michigan Avenue Eighth Floor Chicago, IL 60611
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036

ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
APA	American Plywood Association Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L Street, N.W. Washington, DC 20005
AREA	American Railway Engineering Association 50 F Street, N.W. Washington, DC 20001
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWPA	American Wood-Preservers' Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society P.O. Box 35104 Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
CFR	Code of Federal Regulations
CLFMI	Chain Link Fence Manufacturers Institute 1101 Connecticut Avenue, N.W. Washington, DC 20036
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60173-4758
DIPRA	Ductile Iron Pipe Research Association
EJMA	Expansion Joint Manufacturers Association 707 Westchester Avenue White Plains, NY 10604

FS	Federal Standardization Documents General Services Administration Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, DC 20406
ICEA	Insulated Cable Engineer Association P.O. Box 440 S. Yarmouth, MA 02664
IEEE	Institute of Electrical and Electronics Engineers 445 Hoes Lane P.O. Box 1331 Piscataway, NJ 0855-1331
ISA	International Society of Arboriculture 303 West University P.O. Box GG Savoy, IL 61874
MIL	Military Specifications General Services Administration Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, DC 20406
NACE	National Association of Corrosion Engineers 1440 South Creek Drive Houston, TX 71084
NEMA	National Electrical Manufacturers' Association 2101 L Street, N.W., Suite 300 Washington, DC 20037
NFPA	National Fire Protection Association Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101
NRMCA	National Ready Mix Concrete Association
NSF	National Sanitary Foundation
OSHA	Occupational Safety Health Administration U.S. Department of Labor Government Printing Office Washington, DC 20402
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077-1083

PCI	Prestressed Concrete Institute 201 North Wacker Drive Chicago, IL 60606
SDI	Steel Deck Institute Box 9506 Canton, OH 44711
SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213
TAC	Texas Administrative Code
TxDOT	Texas Department of Transportation 11th and Brazos Austin, TX 78701 2483
UL	Underwriters' Laboratories, Inc. 333 Pfingsten Road Northbrook, IL 60062
UNI-BELL	UNI-BELL Pipe Association 2655 Villa Creek Drive, Suite 155 Dallas, TX 75234

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01450

CONTRACTOR'S QUALITY CONTROL

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Quality assurance and control of installation and manufacturer's field services and reports.

1.02 MEASUREMENT AND PAYMENT

A. No payment will be made for this item. Include the cost of Contractor's quality control in overhead cost for this project.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' installation instructions, including each step in sequence.

C. Request clarification from Engineer before proceeding should manufacturers' instructions conflict with Contract Documents.

D. Comply with specified standards as minimum requirements for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce the specified level of workmanship.

1.04 REFERENCES

A. Obtain copies of standards and maintain at job site when required by individual Specification sections.

1.05 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual Specification sections, provide material or product suppliers' or manufacturers' technical representative to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, operator training, test, adjust, and balance of equipment as applicable, and to initiate operation, as required. Conform to minimum time requirements for start-up operations and operator training if defined in Specification sections.

B. Manufacturer's representative shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions. Submit report within 14 days of observation to Resident Project Representative for review.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01452

INSPECTION SERVICES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Inspection services and references

1.02 INSPECTION

A. Engineer and/or Owner will appoint Resident Project Representative as a representative of the Owner to perform inspections, tests, and other services specified in individual specification Sections.

B. Alternately, Engineer and/or Owner may appoint, employ, and pay an independent firm to provide additional inspection, tests or construction management services as indicated in Section 01454 - Testing Laboratory Services.

C. Reports will be submitted by the independent firm to Engineer, and Owner, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

D. Assist and cooperate with the Resident Project Representative; furnish samples of materials, design mix, equipment, tools, and storage.

E. Notify Resident Project Representative 24 hours prior to expected time for operations requiring services.

F. Sign and acknowledge observation or testing reports when requested by Resident Project Representative or independent firm.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

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Section 01454

TESTING LABORATORY SERVICES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

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

1.02 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.

1.03 SELECTION AND PAYMENT

A. The Owner shall employ and pay for the services of an independent testing laboratory, or laboratories, to perform product and material quality control, perform in-place quality control and verification identified in individual Specification sections.

B. The Owner, with the assistance of the Engineer, shall have control of testing, sampling, and expenditures.

C. All tests required by the project plans and specifications shall be included in a schedule of fees.

D. The Contractor shall coordinate the services of the project's Geotechnical Engineer of Record to conduct observation and testing of the subgrade preparation, and the selection, placement and compaction of select fill material. The foundation excavations for structures shall be observed by the Geotechnical Engineer of Record prior to steel and/or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the subsurface materials described in the project's Geotechnical Engineering Study.

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

F. Remedial work and re-testing costs, resulting from deficiencies in materials and/or workmanship, shall be borne by the Contractor. Re-testing costs shall not be paid for from the allowance for field and laboratory testing.

1.04 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. 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.

1.05 LABORATORY REPORTS

A. The testing laboratory shall provide and distribute copies of laboratory reports to the distribution list provided by the Engineer.

B. One copy of each laboratory report distributed or faxed 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 fax or email from the testing laboratory to the material supplier, Contractor, Engineer and Resident Project Representative.

1.06 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.

1.07 CONTRACTOR RESPONSIBILITIES

A. Provide safe access to the Work and to manufacturer's facilities for the Engineer, Resident Project Representative and for 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 Resident Project Representative and the testing laboratory during normal working hours of the day previous 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 Resident Project Representative 24 hours in advance if the Specification requires the presence of the Resident Project Representative or testing laboratory 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 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 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

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SECTION 01504

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary facilities and necessary controls for the Project, including utilities, telephone, sanitary facilities, storage sheds and building, safety requirements, first aid equipment, fire protection, security measures, protection of the Work and property, access roads and parking, environmental controls, pest and rodent control and disposal of trash, debris and excavated material.

B. Facilities and controls specified in this section are considered minimum for the Project. Provide additional facilities and controls for proper execution of the Work and to meet Contractor's responsibilities for protection of persons and property.

1.02 CONTRACTOR'S RESPONSIBILITY

A. Comply with applicable requirements specified in other sections of the Specifications.

1. Maintain and operate temporary facilities and systems to assure continuous service.

2. Modify and extend systems as the Work progress requires.

3. Completely remove temporary materials and equipment when no longer required.

4. Restore existing facilities used for temporary services to specified or original condition.

PART 2 P R O D U C T S - NOT USED

PART 3 E X E C U T I O N

3.01 TEMPORARY UTILITIES

A. Obtaining Temporary Service:

1. Make arrangements with utility service companies for temporary services.

2. Abide by rules and regulations of the utility service companies or authorities having jurisdiction.

3. Responsible for utility service costs until Date of Substantial Completion. Included are fuel, power, light, heat, and other utility services necessary for execution, completion, testing, and initial operation of the Work.

B. Water:

1. Provide water required for and in connection with work to be performed and for specified tests of piping, equipment, devices, or for other use as required for proper completion of the Work.

2. Water to be drawn from public fire hydrants. Obtain transit meter from Owner. Pay required deposit based on rates established by latest ordinance.

3. Provide and maintain an adequate supply of potable water for domestic consumption by Contractor personnel, Engineer and representatives of the Owner.

C. Electricity and Lighting:

1. Provide electric power service required for the Work including required testing, lighting, operation of equipment, and other Contractor use.

2. Electric power service includes temporary power or generators required to maintain plant operations during scheduled shutdowns.

3. Minimum lighting level shall be 10 foot-candles for open areas; 20-foot-candles for stairs and shops. Provide a minimum of one 300-watt lamp for each 200 square feet of work area.

D. Temporary Heat and Ventilation:

1. Provide temporary heat necessary for protection or completion of the Work.

2. Provide temporary heat and ventilation to assure safe working conditions; maintain enclosed areas at a minimum of 50 degrees F.

E. Telephone:

1. Provide emergency telephone service at Project site for use by Contractor personnel and others performing work or furnishing services at the site.

F. Sanitary Facilities:

1. Provide and maintain sanitary facilities for persons on the site; comply with regulations of State and local departments of health.

2. Enforce use of sanitary facilities by construction personnel at site. Enclose sanitary facilities. Pit-type toilets are not permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause nuisance or health problems. Haul sewage and waste off-site and properly dispose in accordance with applicable regulations.

3. Locate toilets near the Work site and secluded from view insofar as possible. Keep toilets clean and supplied throughout the course of the Work.

3.02 STORAGE SHEDS AND BUILDINGS

A. Provide adequately ventilated, watertight storage facilities with floor above ground level for Products susceptible to weather damage.

B. Storage of Products not susceptible to weather damage may be on blocks off the ground.

C. Store Products in a neat and orderly manner. Place Products to permit easy access for identification, inspection and inventory.

D. Fill and grade site for temporary structures to provide drainage away from temporary and existing buildings.

3.03 SAFETY REQUIREMENTS

A. Submit a safety program at the pre-construction meeting and follow the Program. Include documented response to trench safety requirements of Section 01561 - Trench Safety System.

B. Conduct operations in strict accordance with applicable Federal, State and local safety codes and statutes and with good construction practice. Establish and maintain procedures for safety of all work, personnel and equipment involved in the Work.

C. Observe and comply with Texas Occupational Safety Act (Art. 5182a, V.C.S.) and with all safety and health standards promulgated by Secretary of Labor under Section 107 of Contract Work Hours and Standards Act, published in 29 CFR Part 1926 and adopted by Secretary of Labor as occupational safety and health standards under Williams-Steiger Occupational Safety and Health Act of 1970, and to other legislation enacted for safety and health of Contractor employees. Safety and health standards apply to Subcontractors and Suppliers as well as to the Contractor.

D. Observance of and compliance with safety regulations is Contractor's responsibility without reliance or superintendence of or direction by Engineer. Immediately advise Engineer of investigation or inspection by Federal Safety and Health inspectors of Contractor's or Subcontractor's work or place of work on site under the Contract, and after investigation or inspection, advise Engineer of results. Submit one copy of accident reports to Engineer within 10 days of occurrence.

E. Protect areas occupied by workmen using the best available devices for detection of lethal and combustible gases. Test devices frequently to assure functional capability. Constantly observe infiltration of liquids into the Work area for visual or odor evidence of contamination, and immediately take appropriate steps to seal off entry of contaminated liquids to the Work area.

F. Implement safety measures, including but not limited to safety personnel, first-aid equipment, ventilating equipment and other safety equipment specified or detailed on Drawings.

G. Maintain required coordination with City Police and Fire Departments during entire period covered by the Contract.

H. Include Project safety analysis in safety plan. Itemize major tasks and potential safety hazards. Plan to eliminate hazards or protect workers and public from each hazard.

3.04 FIRST AID EQUIPMENT

A. Provide a first aid kit throughout the construction period. List telephone numbers for physicians, hospitals, and ambulance services in each first aid kit.

B. Have at least one person thoroughly trained in first aid and CPR procedures present on the site when work is in progress. Contractor to conform to protocols and requirements for training and protection against "blood borne pathogens".

3.05 FIRE PROTECTION

A. Conform to specified fire protection and prevention requirements established by Federal, State, or local governmental agencies and as provided in Safety Program.

3.06 SECURITY MEASURES

A. Protect the Work, materials, equipment, and property from loss, theft, damage, or vandalism. Protect Owner property used in performance of the Contract.

B. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to existing.

3.07 PROTECTION OF UTILITIES AND PIPELINES

A. Prevent damage to existing public utilities during construction. Approximate locations of known utilities are shown on Drawings, but all lines may not be shown. Excavate with caution and repair lines damaged by construction operations.

B. Use the Utility Coordinating Committee One Call System which must be called 48 hours in advance. The toll free telephone number is 1-800-669-8344, Texas One Call System.

C. Before excavating, locate underground utilities by appropriate means including the use of metal detection equipment, and probes, or by excavation or surveys. Repair damage caused by investigative work and by failure to locate or to preserve underground utilities.

D. Give utility owners a minimum five days' notice before commencing excavation to allow time to locate utilities and make adjustments or relocations when they conflict with the Work. Include cost for temporary relocation of water, wastewater, and storm drainage lines, necessary to accommodate construction, in unit prices for utility construction unless otherwise noted. Bypassing of sanitary waste to storm drainage facilities is not allowed.

E. Prior to excavation near pipelines, request a representative of the pipeline company to meet with Contractor to locate the pipelines of proposed utility.

3.08 PROTECTION OF THE WORK AND PROPERTY

A. Preventive Actions

1. Take necessary precautions and actions to prevent damage, injury, or loss to the Work or public and private property, including:

   a. Storage of apparatus, supplies, and Products in an orderly, safe manner to limit interference with progress of the Work or work of other contractors, utility service companies, or the Owner's operations.

   b. Suitable storage for Products subject to damage by exposure to weather, theft, breakage, etc.

   c. Limitation of loading pressures imposed upon portions of the Work.

   d. Frequent clean up of refuse, scrap materials, and debris from construction operations, necessary to maintain the site in a safe and orderly condition.

   e. Provision of barricades and guard rails to protect pedestrian and traffic around openings, scaffolding, temporary stairs and ramps, excavations, elevated walkways, and other hazardous areas.

2. Protect public and private property adjacent to the site. Obtain written consent before entering or occupying privately-owned land except on easements provided for construction. Restore property damaged by construction operations

to condition equal to or better than that existing before the damage.

B. Barricades and Warning Systems

1. Where work is performed on or adjacent to roadways, rights-of-ways, or public land, provide barricades, fences, lights, warning signs, danger signals, and other precautionary measures necessary for protection of persons or property and for protection of the Work.

   a. Erect sufficient barricades to keep vehicles and pedestrians from entering the Work. Paint barricades to be visible at night. From sunset to sunrise, provide at least one light at each barricade.

   b. Maintain barricades, signs, lights, and provide watchmen until Engineer approves removal. Whenever work creates encroachment onto public roadways, station flagmen to manage traffic flow in accordance with approved traffic control plan.

   c. Conform to requirements of the latest version of the Texas Manual on Uniform Traffic Control Devices.

C. Protection of Existing Structures

1. Underground Facilities:

   a. Known Underground Facilities are shown on the Drawings but all Facilities may not be shown. Explore sufficiently ahead of trenching and excavation work to locate Underground Facilities in order to prevent damage to them and to prevent interruption of utility services. Restore damage to Underground Facilities to original condition at no additional cost to the Owner.

   b. If necessary to avoid unanticipated Underground Facilities, Engineer may make changes in location of the Work.

   c. If permanent relocation of an Underground Facility is required and not provided for in the Contract documents, Engineer will direct Contractor in writing to perform the Work.

2. Surface Structures include buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities that are visible above the ground level.

3. Protection of Underground Facilities and Surface Structures:

   a. Support in place and protect Underground Facilities and Surface Structures located within or adjacent to the limits of the Work from damage. Install supports as required by the owner of the structure. Satisfy Engineer that the owner of the facility or structure has approved methods and procedures before installing structure supports.

   b. Avoid moving or changing public utility or private corporation property without prior written consent of a responsible official of the facility or structure. Allow representatives of utilities to enter the construction site for maintenance and repair purposes or to make necessary changes.

c. Notify utility and pipeline owners and operators of the nature of construction operations and dates when operations will be performed. When construction operations are required in immediate vicinity of existing structures, pipelines, or utilities, give a minimum of five working days advance notice. Probe and flag location of Underground Facilities prior to commencement of excavation. Keep flags in place until construction operations uncover the facility.

d. Assume risk for damages and expenses to Underground Facilities and Surface Structures within or adjacent to the Work.

e. Employ a structural engineer to ensure protection measures are adequate for the safety and integrity of structures and facilities.

E. Protection of Installed Products:

1. Provide protection of Installed Products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of the Work.

2. Control traffic to prevent damage to Products and surfaces.

3. Provide coverings to protect Products from damage. Cover projections, wall corners, jambs, sills, and exposed sides of openings in areas used for traffic and passage of materials in subsequent work.

3.09 ROADS AND PARKING

A. Prevent interference with traffic and operations of the Owner on existing roads.

B. Designate temporary parking areas to accommodate construction and Owner personnel. When site space is not adequate, provide additional off-site parking.

C. Minimize use by construction traffic on existing streets and driveways.

D. Do not allow heavy vehicles or construction equipment in existing parking areas.

3.10 ENVIRONMENTAL CONTROLS

A. Use methods, equipment, and temporary construction necessary for control of environmental conditions at the site and adjacent areas.

B. Comply with statutes, regulations, and ordinances relating to prevention of environmental pollution and preservation of natural resources including National Environmental Policy Act of 1969, PL 91-190, Executive Order 11514.

C. Minimize impact to the surrounding environment. Do not use construction procedures that cause unnecessary excavation and filling of terrain, indiscriminate destruction of vegetation, air or stream pollution, or harassment or destruction of wildlife.

D. Limit disturbed areas to boundaries established by the Contract. Do not pollute on-site streams, sewers, wells, or other water sources.

E. Do not burn rubbish, debris or waste materials.

3.11 POLLUTION CONTROL

A. Provide methods, means, and facilities necessary to prevent contamination of soil, water or the atmosphere by discharge of Pollutants from construction operations.

B. Provide equipment and personnel to perform emergency measures to contain spillage, and to remove contaminated soils or liquids. Excavate and dispose of contaminated earth off-site in accordance with laws and regulations, and replace with suitable compacted fill and topsoil.

C. Provide systems necessary for control of Pollutants.

1. Prevent toxic concentrations of chemicals.

2. Prevent harmful dispersal of Pollutants into the environment.

D. Use equipment that conforms to current Federal, State, and local laws and regulations.

3.12 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.

B. Employ methods and use materials that will not adversely affect conditions at site or on adjoining properties.

3.13 NOISE CONTROL

A. Provide vehicles, equipment, and use construction activities that minimize noise to the greatest degree practicable. Conform to noise levels of Chapter 30 -Noise and Sound Level Regulation, City Code of Ordinances, and latest OSHA standards. Do not permit noise levels to interfere with the Work or create a nuisance to surrounding areas.

B. Conduct construction operations during daylight hours except as approved by Engineer.

C. Select construction equipment that operates with minimum noise and vibration. When directed by Engineer, correct objectionable noise or vibration produced by operation of equipment at no additional cost to the Owner. Sound Power Level (PWL) of equipment shall not exceed 85 dbA (re: 10-12 watts) measured five feet from the equipment, or at a lower level if prescribed by City of Weslaco Ordinances. Equipment noise requirements are contained in equipment specifications.

3.14 DUST CONTROL

A. Use water or other methods approved by Engineer to control amount of dust generated by vehicle and equipment operations.

3.15 WATER RUNOFF AND EROSION CONTROL

A. Comply with requirements of Section 01410 - TPDES Requirements.

B. Conduct fill, grading and ditching operations and provide adequate methods necessary to control surface water, runoff, subsurface water, and water from excavations and structures in order to prevent damage to the Work, the site, or adjoining properties.

1. Plan and execute construction and earthwork by methods that control surface drainage from cuts and fills, and from borrow and waste disposal areas.

2. Minimize area of bare soil exposed at one time.

3. Provide temporary control measures, such as berms, dikes, and drains.

4. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.

5. Construct fill and waste areas by selective placement of materials to eliminate erosion of surface silts or clays that may erode.

6. Direct water away from excavations, pits, tunnels, and other construction areas to prevent erosion, sedimentation or damage.

7. Maintain existing drainage patterns adjacent to the site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover.

8. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to the site or adjoining areas, in conformance with environmental requirements.

9. Inspect earthwork periodically to detect any evidence of erosion. Take corrective measures as required to control erosion.

END OF SECTION

Section 01555

TRAFFIC CONTROL AND REGULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Traffic Control and Regulation

1.02 METHODS OF PAYMENT

A. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

A. Texas Manual of Uniform Traffic Control Devices (TMUTCD)

B. Texas Department of Transportation (TxDOT) permit (if applicable)

C. Railroad company permit(s) (if applicable)

1.04 PERFORMANCE REQUIREMENTS

A. Provide all necessary signs, barricades, marking, lighting, and other equipment and supplies required to comply with the TMUTCD (and TxDOT permit, and/or Railroad Company permit, if applicable)

B. Provide all necessary certified flagmen required to comply with the TMUTCD (and TxDOT permit, if applicable)

PART 2 PRODUCTS

A. Equipment and materials must be furnished, installed and operated by an experienced contractor regularly engaged in traffic control system design, installation and operation.

B. All equipment must be in good repair and operating order.

C. Sufficient standby equipment and materials shall be kept available to ensure continuous operation, where required.

PART 3 EXECUTION

A. Provide labor, material, equipment, techniques and methods required to provide safe traffic control and regulation. Monitor effectiveness of the installed system and its effect on adjacent property.

B. Notify, TxDOT and/or Railroad Company as required by the permit(s) (if applicable).

C. Provide continuous system operation, including nights, weekends and holidays. Arrange for appropriate backup if electrical power is primary energy source for traffic control system.

D. Remove system(s) upon completion of construction or when traffic control is no longer required.

END OF SECTION

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Section 01561

TRENCH SAFETY SYSTEM

PART 1 G E N E R A L

1.01 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.

1.02 UNIT PRICES

A. Measurement for trench safety systems used on trench excavations is on a linear foot basis measured along the centerline of the trench, including manholes and other line structures.

B. Refer to Section 01270 - Measurement and payment for unit price procedures.

1.03 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 the 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.

1.04 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - 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 Contractor.

D. Review of the safety program by the Engineer will only be in regard to compliance with this specification and will not constitute approval by the Engineer nor relieve Contractor of obligations under State and Federal trench safety regulations.

1.05 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, as amended. The sections that are

incorporated into these specifications by reference include Sections 1926-650 through 1926-652.

B. The Contractor is responsible for obtaining a copy of the OSHA standards.

C. Legislation that has been enacted by the Texas Legislature with regard to Trench Safety Systems, is hereby incorporated, by reference, into these specifications. Refer to Texas Health and Safety Code Chapter 756.

1.06 INDEMNIFICATION

A. Contractor shall indemnify and hold harmless the Owner and Engineer, their employees and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgments 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 and Engineer is/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 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 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 Excavation Safety Program, shall verify that trench boxes and other premanufactured systems are certified for the actual installation conditions.

3.02 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.

3.03 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 01570

TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Section describes the requirements for the documents to be prepared by the Contractor for the Texas Pollutant Discharge Elimination System program for construction storm water. These documents are to be prepared, reviewed, and submitted to the Texas Commission on Environmental Quality (TCEQ) prior to commencing construction operations.

1.02 UNIT PRICES

A. No separate payment will be made for work performed under this Section. Include the cost of work performed under this Section in pay items of which this work is a component.

1.03 REFERENCES

A. Texas Commission on Environmental Quality – TPDES General Permit Number TXR150000 (attached)

B. Texas Department of Transportation – Storm Water Management Guidelines for Construction Activities

PART 2 P R O D U C T S – Not Used

PART 3 E X E C U T I O N

3.01 TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM

A. The Contractor shall prepare the necessary forms, Storm Water Pollution Prevention Plan (SWPPP), and comply with the TPDES General Permit Number TXR15000 referenced in item 1.03 A of this specification.

B. Copies of the Notice of Intent (NOI) with instructions, Notice of Termination (NOT) with instructions, and TPDES General Permit TXR150000 can be found on TCEQ's websitefor the Contractor's use.

C. The Contractor must pay any required application fees and water quality fees as outlined in the TPDES General Permit TXR150000.

3.02 PRECONSTRUCTION REVIEW AND SUBMITTALS

A. The Contractor shall submit to the Resident Project Representative a copy of the NOI prior to commencing construction.

3.03 CONSTRUCTION REQUIREMENTS

A. The Contractor shall be responsible for preparation of applicable forms, payment of fees, and retaining records as outlined in the TPDES General Permit TXR150000.

END OF SECTION

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Section 01571

STORM WATER POLLUTION PREVENTION PLAN

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Section describes the requirements for the documents to be prepared by the Contractor for the Storm Water Pollution Prevention Plan (SWPPP). These documents are to be prepared and reviewed prior to commencing construction operations.

1.02 UNIT PRICES

A. No separate payment will be made for work performed under this Section. Include the cost of work performed under this Section in pay items of which this work is a component.

1.03 REFERENCES

A. Texas Commission on Environmental Quality – TPDES General Permit Number TXR150000

B. Texas Department of Transportation – Storm Water Management Guidelines for Construction Activities

PART 2 P R O D U C T S – Not Used

PART 3 E X E C U T I O N

3.01 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. The Contractor shall prepare the SWPPP in accordance with the TPDES General Permit Number TXR150000 referenced in item 1.03 A of this specification.

B. The Contractor shall prepare the SWPPP using structural and nonstructural control measures included in the Plans and Specifications throughout the construction and post construction periods. These control measures shall not be used as a substitute for the permanent pollution control measures unless otherwise directed by the Resident Project Representative in writing. The control measures may include silt fences, straw bales, stabilized construction exits, or other structural or nonstructural storm water pollution controls. Additional information regarding these controls can be found in the Texas Department of Transportation Manual referenced in item 1.03 B of this specification.

B. The SWPPP shall include at a minimum:

1. A site map showing the areas of soil disturbance, areas not to be disturbed, drainage patterns, approximate slopes anticipated after major grading activities, locations where storm water discharges to surface waters (including wetlands) and/or leaves the project site, locations of structural and nonstructural controls for regulating the discharge of storm water pollutants, locations of waste, borrow, and equipment storage areas, and location where stabilization practices are expected to occur.

2. A description including the nature of the construction activity, a description of the intended sequence of major activities which disturb soils for major portions of the site (grubbing,

excavation, grading, utilities and infrastructure installation), estimates of the total area of the site, and the total area of the site that is to be disturbed

3. A description of the control measures that will be implemented as part of the construction activity to control pollutants in storm water discharges, and the general timing during the construction process that these measures will be implemented.

4. A description of construction and waste materials expected to be stored on site with updates as appropriate. The SWPPP shall also include a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to storm water, and spill prevention and response.

5. A description of pollutant sources from areas other than the construction site over which the Contractor has control for the project (including but not limited to dedicated asphalt plants, dedicated concrete plants, haul roads, and field offices), and the control measures implemented to reduce pollutants.

3.02 PRECONSTRUCTION REVIEW AND SUBMITTALS

A. The Contractor shall review implementation of the SWPPP in a meeting with the Engineer and the Resident Project Representative prior to the start of construction.

B. The Contractor shall submit to the Resident Project Representative for acceptance schedules for accomplishment of the storm water pollution control measures in accordance with the SWPPP. Work on the project shall not begin until the schedules for implementation of the controls and methods of operation have been reviewed and accepted in writing by the Resident Project Representative.

3.03 CONSTRUCTION REQUIREMENTS

A. The Contractor shall be responsible for implementation, maintenance, and inspection of storm water pollution prevention control measures and other practices shown on the SWPPP, the Plan Drawings, or specified elsewhere in this or other Specifications.

B. The contractor shall effectively prevent and control erosion and sedimentation on the site at the earliest practicable time as outlined in the approved schedule and SWPPP. Control measures, where applicable, will be implemented prior to the commencement of each construction operation or immediately after the area has been disturbed. Failure to have erosion control measures is a reason for Resident Project Representative to place a Stop Work Order at Contractor's expense and with no additional time to be added to Contract.

END OF SECTION

Section 01572

SOURCE CONTROLS FOR EROSION AND SEDIMENTATION

PART 1 G E N E R A L

1.01 SECTION INCLUDES

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

1.02 UNIT PRICES

A. No separate payment will be made for work performed under this Section. Include cost of work performed under this Section in pay items of which this work is a component.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 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 Resident Project 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 and sediment control measures and practices as specified in the SWPPP, Drawings, and in this or other Specifications.

3.02 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, berms, 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, and immediately prior to dumping and spreading the topsoil, loosen the subgrade 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 sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.03 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 Resident Project 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 Resident Project Representative, by other appropriate methods. The Contractor shall remove sediment accumulations and deposit the spoils in an area approved by the Resident Project 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 Resident Project Representative; however, areas adjacent to receiving waters shall generally have priority, followed by devices protecting storm sewer inlets.

3.04 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.

3.05 KEEPING STREETS CLEAN

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 specified in Section 01575 - Stabilized Construction Exit.

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

3.06 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.

3.07 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.

3.08 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.

3.09 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 form 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 City 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 01573

FILTER FABRIC FENCE

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Installation of erosion and sediment control filter fabric fences used during construction and until final development of the site. The purpose of filter fabric fences is to contain pollutants from overland flow. Filter fabric fences are not for use in channelized flow areas.

1.02 UNIT PRICES

A. Temporary Silt Fence will be paid by the Linear Foot (LF). Inlet Protection will be paid per EACH.

1.03 SUBMITTALS

A. Manufacturer's catalog sheets and other product data on geotextile fabric.

1.04 REFERENCES

A. ASTM D3786 - Standard Test Method for Hydraulic Bursting Strength for Knitted Goods and Nonwoven Fabrics

B. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

PART 2 P R O D U C T S

2.01 FILTER FABRIC

A. Provide woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material.

B. Geotextile fabric shall have a grab strength of 100 psi in any principal direction (ASTM D-4632), Mullen burst strength exceeding 200 psi (ASTM D-3786), and the equivalent opening size between 50 and 140.

C. Filter fabric material shall contain ultraviolet inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 degrees F to 120 degrees F.

D. Representative Manufacturers: Mirafi, Inc., or equal.

PART 3 E X E C U T I O N

3.01 PREPARATION AND INSTALLATION

A. Provide erosion and sediment control systems at the locations shown on the SWPPP. Such systems shall be of the type indicated and shall be constructed in accordance with the requirements shown on the Drawings and specified in this Section.

B. 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 Resident Project Representative to allow soil testing and surveying.

C. Maintain existing erosion and sediment control systems located within the project site until acceptance of the project or until directed by the Resident Project Representative to remove and discard the existing system.

D. Regularly inspect and repair or replace damaged components of filter fabric fences as specified in this Section. Unless otherwise directed, maintain the erosion and sediment control systems until the project area stabilization is accepted by the City. Remove erosion and sediment control systems promptly when directed by the Resident Project Representative. Discard removed materials off site.

E. Remove sediment deposits and dispose of them at the designated spoil site for the project. If a project spoil site is not designated on the Drawings, dispose of sediment off site at a location not in or adjacent to a stream or floodplain. Off-site disposal is the responsibility of the Contractor. Sediment to be placed at the project site should be spread evenly throughout the site, compacted and stabilized. Sediment shall not be allowed to flush into a stream or drainage way. If sediment has been contaminated, it shall be disposed of in accordance with existing federal, state, and local rules and regulations.

F. 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.

G. Conduct all construction operations under this Contract in conformance with the erosion control practices described in Section 01572- Source Controls for Erosion and Sedimentation.

3.02 CONSTRUCTION METHODS

A. Provide filter fabric fence systems in accordance with the Drawing detail for Filter Fabric Fences. Filter fabric fences shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.

B. Attach the filter fabric to steel posts spaced 6 to 8 feet and embedded a minimum of 18 inches. Steel posts shall have a minimum length of 4 feet. If filter fabric is factory preassembled with support netting, then maximum spacing allowable is 8 feet. Install stakes at a slight angle toward the source of anticipated runoff.

C. Trench in the toe of the filter fabric fence with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow. The v-trench configuration as shown on the Drawings may also be used. Lay filter fabric along the edges of the trench. Backfill and compact trench.

D. Filter fabric fence shall have a minimum height of 18 inches and a maximum height of 36 inches above natural ground.

E. Provide the filter fabric in continuous rolls and cut to the length of the fence to minimize the use of joints. When joints are necessary, splice the fabric together only at a support post with a minimum 6-inch overlap and seal securely.

F. Inspect sediment filter barrier systems after each rainfall, daily during periods of prolonged rainfall, and at a minimum once each week. Repair or replace damaged sections immediately. Remove sediment deposits when silt reaches a depth one-third the height of the fence or 6 inches, whichever is less.

END OF SECTION

Section 01575

STABILIZED CONSTRUCTION EXIT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Installation of erosion and sediment control for stabilized construction exits used during construction and until final development of the site.

1.02 SUBMITTALS

A. Manufacturer's catalog sheets and other product data on geotextile fabric.

B. Sieve analysis of aggregates conforming to requirements of this Specification.

1.03 UNIT PRICES

A. No separate payment will be made for work performed under this Section. Include cost of work performed under this Section in pay items for which this work is a component.

1.04 REFERENCES

A. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

PART 2 P R O D U C T S

2.01 GEOTEXTILE FABRIC

A. Provide woven or nonwoven geotextile fabric made of either polypropylene, polyethylene, ethylene, or polyamide material.

B. Geotextile fabric shall have a minimum grab strength of 270 psi in any principal direction (ASTM D-4632), and the equivalent opening size between 50 and 140.

C. Both the geotextile and threads shall be resistant to chemical attack, mildew, and rot and shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable life at a temperature range of 0°F to 120°F.

D. Representative Manufacturers: Mirafi, Inc., or equal.

2.02 COARSE AGGREGATES

A. Coarse aggregate shall consist of crushed stone, gravel, crushed blast furnace slag, or a combination of these materials. Aggregate shall be composed of clean, hard, durable materials free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic and injurious matter.

B. Coarse aggregates shall conform to the following gradation requirements.

Sieve Size (Square Mesh)	Percent Retained (By Weight)
2-1/2”	0
2”	0 - 20
1-1/2”	15 - 50
3/4”	60 - 80
No. 4	95 - 100

PART 3 E X E C U T I O N

3.01 PREPARATION AND INSTALLATION

A. If necessary to keep the street clean of mud carried by construction vehicles and equipment, Contractor shall provide stabilized construction roads and exits at the construction, staging, parking, storage, and disposal areas. Such erosion and sediment controls shall be constructed in accordance with the details shown on the Drawings and specified in this Section.

B. No clearing and grubbing or rough cutting shall be permitted until erosion and sediment control systems are in place, other than as specifically directed by the Resident Project Representative to allow soil testing and surveying.

C. Maintain existing erosion and sediment control systems located within the project site until acceptance of the project or until directed by the Resident Project Representative to remove and discard the existing system.

D. Regularly inspect and repair or replace components of stabilized construction exits. Unless otherwise directed, maintain the stabilized construction roads and exits until the project is accepted by the City. Remove stabilized construction roads and exits promptly when directed by the Resident Project Representative. Discard removed materials off site.

E. 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.

F. Conduct all construction operation under this Contract in conformance with the erosion control practices described in the Specification 01572 - Source Controls for Erosion and Sedimentation.

3.02 CONSTRUCTION METHODS

A. Provide stabilized construction exits, and truck washing areas when approved by Resident Project Representative, of the sizes and locations where shown on SWPPP or as specified in this Section.

B. Vehicles leaving construction areas shall have their tires cleaned to remove sediment prior to entrance onto public right-of-way. When washing is needed to remove sediment, Contractor shall construct a truck washing area. Truck washing shall be done on stabilized areas which drain into a drainage system protected by erosion and sediment control measures.

C. Details for stabilized construction exit shall be shown on the SWPPP. Construction of all other stabilized areas shall be to the same requirements. Roadway width shall be at least 14 feet for one-way traffic and 20 feet for two-way traffic and shall be sufficient for all ingress and egress. Furnish and place geotextile fabric as a permeable separator to prevent mixing of coarse aggregate with underlaying soil. Exposure of geotextile fabric to the elements between laydown and cover shall be a maximum of 14 days to minimize damage potential.

D. Roads and parking areas shall be graded to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards, or similar methods to prevent sediment from entering public right-of-way, receiving stream or storm water conveyance system.

E. The stabilized areas shall be inspected and maintained daily. Provide periodic top dressing with additional coarse aggregates to maintain the required depth. Repair and clean out damaged control measures used to trap sediment. All sediment spilled, dropped, washed, or tracked onto public right-of-way shall be removed immediately.

F. The length of the stabilized area shall be as shown on the SWPPP, but not less than 50 feet. The thickness shall not be less than 8 inches. The width shall not be less than the full width of all points of ingress or egress.

G. Stabilization for other areas shall have the same coarse aggregate, thickness, and width requirements as the stabilized construction exit, except where shown otherwise on the SWPPP.

H. Stabilized area may be widened or lengthened to accommodate truck washing area when authorized by Resident Project Representative.

I. Alternative methods of construction may be utilized when shown on SWPPP, or when approved by the Resident Project Representative. These methods include the following:

1. Cement-Stabilized Soil - Compacted cement-stabilized soil or other fill material in an application thickness of at least 8 inches.

2. Wood Mats/Mud Mats - Oak or other hardwood timbers placed edge-to-edge and across support wooden beams which are placed on top of existing soil in an application thickness of at least 6 inches.

3. Steel Mats - Perforated mats placed across perpendicular support members.

END OF SECTION

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Section 01576

WASTE MATERIAL DISPOSAL

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Disposal of waste material and salvageable material.

1.02 UNIT PRICES

A. No separate payment will be made for waste material disposal under this Section. Include payment in unit price for related sections.

1.03 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

B. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances.

C. Submit a copy of written permission from property owner, along with description of property, prior to disposal of excess material adjacent to the Project. Submit a written and signed release from property owner upon completion of disposal work.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 SALVAGEABLE MATERIAL

A. Excavated Material: When indicated on Drawings, load, haul, and deposit excavated material at a location or locations shown on Drawings outside the limits of Project.

B. Other Salvageable Materials: Conform to requirements of individual Specification Sections.

3.02 EXCESS MATERIAL

A. Vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage, shall become the property of Contractor and shall be removed from the job site and legally disposed of.

B. Excess soil may be deposited on private property adjacent to the Project when written permission is obtained from property owner. See Paragraph 1.03 C above.

C. Waste materials shall be removed from the site on a daily basis, such that the site is maintained in a neat and orderly condition.

END OF SECTION

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Section 01578

CONTROL OF GROUND WATER AND SURFACE WATER

PART 1 G E N E R A L

1.01 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 tunnel excavations.

B. Protecting work against surface runoff and rising flood waters.

C. Disposing of removed water.

1.02 METHOD OF PAYMENT

A. No separate payment will be made for control of ground water and surface water. Include the cost to control ground water and surface water in unit price for work in related sections.

1.03 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.

D. Texas Commission of Environmental Quality, TCEQ General Permit Number TX150000 Relating to Discharges from Construction Activities.

1.04 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 keeping 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.

1.05 PERFORMANCE REQUIREMENTS

A. Conduct surface and subsurface investigations to identify ground water and surface water conditions and to provide parameters for design, installation, and operation of control systems.

B. Design a ground water control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 and Section 01561 - 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 that may include single-stage or multiple-stage well point systems, eductor and ejector-type 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 and surface 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 control operations. Modify 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 control systems or resulting from failure of the system to protect property as required.

1.06 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittals.

B. Submit a Ground Water and Surface Water Control Plan for review by the Engineer prior to start of any field work. 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. Excavation drainage methods including typical drainage layers, sump pump application and other necessary means.

3. Surface water control and drainage installations.

4. Proposed methods and locations for disposing of removed water.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of agencies having jurisdiction.

B. Obtain permit from TCEQ under the Texas Pollutant Discharge Elimination System (TPDES), for storm water discharge from construction sites. Refer to Section 01570 – Texas Pollutant Discharge Elimination System. (If Applicable)

C. Monitor ground water discharge for contamination while performing pumping in the vicinity of potentially contaminated sites.

PART 2 P R O D U C T S

2.01 EQUIPMENT AND MATERIALS

A. Equipment and materials are at the option of Contractor as necessary to achieve desired results for control of ground and surface water.

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 E X E C U T I O N

3.01 GROUND WATER CONTROL

A. Provide labor, material, equipment, techniques and methods to lower, control and manage ground water in a manner compatible with construction methods and site conditions. Monitor effectiveness of the installed system and its effect on adjacent property.

B. Install, operate, and maintain ground water control systems in accordance with the Ground Water and Surface Water Control Plan. Notify Engineer in writing of any changes made to accommodate field

conditions and changes to the Work. Provide revised drawings and calculations with such notification.

C. Provide for continuous system operation, including nights, weekends, and holidays. Arrange for appropriate backup if electrical power is primary energy source for dewatering system.

D. Remove system upon completion of construction or when dewatering and control of surface or ground water is no longer required.

E. Compact backfill to not less than 98 percent of the maximum dry density in accordance with ASTM D 698.

3.02 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.

3.03 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 01610

BASIC PRODUCT REQUIREMENTS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Requirements for transportation, delivery, handling, and storage of materials and equipment.

1.02 PRODUCTS

A. Products: Means material, equipment, or systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components designated for reuse.

B. Do not reuse materials and equipment, designated to be removed, except as specified by the Contract Documents.

C. Provide equipment and components from the fewest number of manufacturers as is practical, in order to simplify spare parts inventory and to allow for maximum interchangeability of components. For multiple components of the same size, type or application, use the same make and model of component throughout the project.

1.03 TRANSPORTATION

A. Make arrangements for transportation, delivery, and handling of equipment and materials required for timely completion of the Work.

B. Transport and handle products in accordance with instructions.

C. Consign and address shipping documents to the proper party giving name of Project and street address. Shipments shall be delivered to the Contractor.

1.04 DELIVERY

A. Arrange deliveries of products to accommodate the short term site completion schedules and in ample time to facilitate inspection prior to installation. Avoid deliveries that cause unnecessarily lengthy use of limited storage space.

B. Coordinate deliveries to avoid conflict with Work and conditions at the site and to accommodate the following:

1. Work of other contractors or the Owner.

2. Limitations of storage space.

3. Availability of equipment and personnel for handling products.

4. Owner's use of premises.

C. Have products delivered to the site in manufacturer's original, unopened, labeled containers.

D. Immediately upon delivery, inspect shipment to assure:

1. Product complies with requirements of Contract Documents.

2. Quantities are correct.

3. Containers and packages are intact; labels are legible.

4. Products are properly protected and undamaged.

1.05 PRODUCT HANDLING

A. Coordinate the off-loading of materials and equipment delivered to the job site. If necessary to move stored materials and equipment during construction, Contractor shall relocate materials and equipment at no additional cost to the Owner.

B. Provide equipment and personnel necessary to handle products, including those provided by the Owner, by methods to prevent damage to products or packaging.

C. Provide additional protection during handling as necessary to prevent breaking, scraping, marring, or otherwise damaging products or surrounding areas.

D. Handle products by methods to prevent over bending or overstressing.

E. Lift heavy components only at designated lifting points.

F. Handle materials and equipment in accordance with Manufacturer's recommendations.

G. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

1.06 STORAGE OF MATERIAL

A. Store and protect materials in accordance with manufacturer's recommendations and requirements of these Specifications.

B. Make necessary provisions for safe storage of materials and equipment. Place loose soil materials, and materials to be incorporated into the Work to prevent damage to any part of the Work or existing facilities and to maintain free access at all times to all parts of the Work and to utility service company installations in the vicinity of the Work. Keep materials and equipment neatly and compactly stored in locations that will cause a minimum of inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants. Arrange storage in a manner to provide easy access for inspection.

C. Restrict storage to areas available on the construction site for storage of material and equipment as shown on Drawings or approved by the Resident Project Representative.

D. Provide off-site storage and protection when on-site storage is not adequate.

E. Do not use lawns, grass plots, or other private property for storage purposes without written permission of the owner and other person in possession or control of such premises.

F. Protect stored materials and equipment against loss or damage.

G. Store in manufacturers' unopened containers.

H. Materials delivered and stored along the line of the Work shall be neatly, safely, and compactly stacked along the work site in such manner as to cause the least inconvenience and damage to property owners and the general public, and shall be not closer than 3 feet to any fire hydrant. Public and private drives and street crossings shall be kept open.

I. Damage to lawns, sidewalks, streets or other improvements shall be repaired or replaced to the satisfaction of the Resident Project Representative. The total length which materials may be distributed along the route of construction at any one time is 1000 lineal feet, unless otherwise approved in writing by the Resident Project Representative.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

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Section 01630

PRODUCT SUBSTITUTION PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Options for making product or process selections.

B. Procedures for proposing equivalent construction products or processes.

1.02 DEFINITIONS

A. Product: Means materials, equipment, or systems incorporated into the Project. Product does not include machinery and equipment used for production, fabrication, conveying, and erection of the Work. Products may also include existing materials or components designated for reuse.

B. Process: Any proprietary system or method for installing system components resulting in an integral, functioning part of the Work. For this Section, the word Product includes Processes.

1.03 SELECTION OPTIONS

A. Approved Products: Construction products or processes of certain manufacturers or suppliers designated in the Specifications followed by the words "or approved equal." Approval of alternate products or processes not listed in the Specifications may be obtained through provisions for product options and substitutions in Document 00700 - General Conditions, and by following the submittal procedures specified in 01330- Submittal Procedures.

B. Product Compatibility: To the maximum extent possible, provide products that are of the same type or function from a single manufacturer, make, or source. Where more than one choice is available as a Contractor's option, select a product which is compatible with other products already selected, specified, or in use by the Owner.

1.04 CONTRACTOR'S RESPONSIBILITY

A. The Contractor's responsibility related to product options and substitutions is defined in Document 00700 - General Conditions.

B. Furnish information the Engineer deems necessary to judge equivalency of the alternate product.

C. Pay for laboratory testing, as well as any other review or examination costs, needed to establish the equivalency between products in order to obtain information upon which the Engineer can base a decision.

D. If the Engineer determines that an alternate product is not equal to that named in the Specifications, the Contractor shall furnish the specified products.

1.05 ENGINEER'S REVIEW

A. Alternate products or processes may be used only if approved in writing by the Engineer. The Engineer's determination regarding acceptance of a proposed alternate product is final.

B. Alternate products will be accepted if the product is judged by the Engineer to be equivalent to the specified product or to offer substantial benefit to the Owner.

C. The Owner retains the right to accept any product or process deemed advantageous to the Owner, and similarly, to reject any product or process deemed not beneficial to the Owner.

1.06 SUBSTITUTION PROCEDURE

A. Collect and assemble technical information applicable to the proposed product to aid in determining equivalency as related to the approved product specified.

B. Submit a written request for a construction product to be considered as an alternate product.

C. Submit the product information after the effective date of the Agreement.

D. Submit 5 copies of each request for alternate product approval. Include the following information:

1. Complete data substantiating compliance of proposed substitution with Contract Documents.

2. For products:
   a. Product identification, including manufacturer's name and address.
   b. Manufacturer's literature with product description, performance and test data, and reference standards.
   c. Samples, as applicable.
   d. Name and address of similar projects on which product was used and date of installation. Include the name of the Owner, Architect/Engineer, and installing contractor.

3. For construction methods:
   a. Detailed description of proposed method.
   b. Drawings illustrating methods.

4. Itemized comparison of proposed substitution with product or method specified.

5. Data relating to changes in construction schedule.

6. Relation to separate contracts, if any.

7. Accurate cost data on proposed substitution in comparison with product or method specified.

8. Other information requested by the Engineer.

E. Approved alternate products will be subject to the same review process as the specified product would have been for shop drawings, product data, and samples.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Maintain at the site for the Owner one record copy of:
1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other Modifications to the Contract
5. Engineer Field Orders or written instructions
6. Approved Shop Drawings, Product Data and Samples
7. Approved Operation and Maintenance Data
8. Field Test records
9. Receipts for delivery of items to Owner

B. Delegate the responsibility for maintenance of record documents to one person on the Contractor's staff as approved in advance by the Engineer.

C. Thoroughly coordinate all changes within the record documents, making adequate and proper entries on each page of the specifications and each sheet of drawings and other documents where such entry is required to properly show the change. Accuracy of records shall be such that future search for items shown in the contract documents may reasonably rely on information obtained from the approved record documents.

D. Make all entries within 24 hours after receipt of information. One (1) set is to be maintained at the Contractor's job trailer at all times. As-builts are to be updated as a condition of each pay application

1.02 RELATED REQUIREMENTS

A. Section 01300: Submittals

B. Section 01700: Contract Closeout

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. File documents and samples in accordance with specification format.

B. Maintain documents in a clean, dry legible condition and in good order. Do not use record documents for construction purposes.

C. Make documents and samples available at all times for inspection by Engineer and Owner.

1.04 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with construction progress.
1. Do not conceal any work until required information is recorded.

C. Drawings; Legible mark to record actual construction:
   1. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements..
   2. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
   3. Field changes of dimension and detail.
   4. Changes made by Field Order or by Change Order.
   5. Details not on original contract drawings.
   6. For gravity sewer lines: Elevation and alignment of line, location of cleanouts, distance between cleanouts, and location of each service line referenced by distance from main trunk line and distance from sewer centerline to end of service line.

D. Use all means necessary to maintain the job set of record documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of the recorded data to the final record documents. In the event of loss of recorded data, use all means necessary to secure the data to the Engineer's approval; such means shall include, if necessary in the opinion of the Engineer, removal and replacement of concealing materials and, in such case, all replacements shall be to the standards originally specified in the contract documents.

E. Specifications and Addenda; Legibly mark each Section to record:
   1. Manufacturer, trade name, catalog number, and Supplier of each Product and item of equipment actually installed.

G. Clearly describe all change orders by note and by graphic line, as required. Date all entries. Call attention to the entry by highlighting around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes.

1.05 SUBMITTAL

A. At Contract close-out, deliver Record Documents to Engineer for the Owner.

B. Accompany submittal with transmittal letter in duplicate, containing:
   1. Date
   2. Project title and number
   3. Contractor's name and address
   4. Title and number of each Record Document
   5. Signature of Contractor or his authorized representative.

1.06 PAYMENT

A. Project record documents are incidental to Work for which no separate payment will be made.

B. No payment will be made to the Contractor for any portion of the work for which the project record documents including recording are not complete.

END OF SECTION

Section 01725

FIELD SURVEYING

PART 1 G E N E R A L

1.01 QUALITY CONTROL

A. Conform to State of Texas laws for surveys requiring licensed surveyors.

1.02 UNIT PRICES

A. Payment will be made for Field Surveying at a lump sum unit.

1.03 SUBMITTALS

A. Submit to Engineer the name, address, and telephone number of Surveyor before starting survey work.

B. Submit documentation verifying accuracy of survey work on request.

C. Submit certificate signed by surveyor, that the elevations and locations of the Work are in conformance with Contract Documents.

D. Submit information under provisions of Section 01330 - Submittal Procedures.

1.04 PROJECT RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. Prepare a certified survey setting forth dimensions, locations, angles, and elevations of construction and site Work upon completion of foundation walls and major site improvements.

C. Submit Record Documents under provisions of Section 01785 - Project Record Documents.

1.05 EXAMINATION

A. Verify locations of survey control points prior to starting Work.

B. Notify Engineer immediately of any discrepancies discovered.

1.06 SURVEY REFERENCE POINTS

A. Control datum for survey is that established by Owner-provided survey as indicated on Drawings.

B. Locate and protect survey control points prior to starting site work; preserve permanent reference points during construction.

C. Notify Engineer 48 hours in advance of need for relocation of reference points due to changes in grades or other reasons.

D. Report promptly to Engineer the loss or destruction of any reference point.

E. Contractor shall reimburse Owner for cost of reestablishment of permanent reference points disturbed by Contractor's operations.

1.07 SURVEY REQUIREMENTS

A. Utilize recognized engineering survey practices.

B. Establish elevations, lines and levels to provide appropriate controls for the Work. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading; fill and topsoil placement; utility locations, slopes, and invert elevations.

2. Grid or axis for structures.

3. Building foundation, column locations, ground floor elevations.

D. Verify periodically layouts by same means.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01732

PROCEDURE FOR WATER VALVE ASSISTANCE

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Operation of existing valves is by the owner's employees. Operation of new valves by the Contractor's employees is included in the project. No valve will be operated without prior approval by the Resident Project Representative.

1.02 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost of valve operation and valve assistance in Unit Price bid for valves and water mains.

1.03 PROCEDURE

A. The Contractor will notify the Resident Project Representative to coordinate valve operation.

1.04 CANCELLATION

A. Scheduled valve closures may be terminated in the event of a water system emergency at no cost to the Owner.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

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Section 01740

RESTORATION OF SITE IMPROVEMENTS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Restoration of the Work site in public rights-of-way or easements and adjacent public or private property affected by construction operations, including pavement, esplanades, sidewalks, driveways, fences, lawns and landscaping.

1.02 UNIT PRICES

A. Unpaved Surface Restoration.

1. No separate payment will be made for Restoration of Site Improvements in unpaved areas. Include the cost of the Restoration of Site Improvements in unpaved areas in the unit prices of other associated work.

B. Paved Surface Restoration.

1. Pavement and Driveway Replacement. Measure replaced pavement by the linear foot along the associated pipeline. Payment will be made at the applicable unit price for concrete pavement replacement. Payment will be made at the applicable unit price for asphaltic concrete pavement replacement. Payment will be made at the applicable unit price for gravel (crushed stone) road or driveway replacement.
2. Sidewalk Replacement. Measure sidewalks by the linear foot a long the associated pipeline. Payment will be made at the unit price for sidewalk replacement.
3. Curb and Gutter. Measure curb and gutter by the linear foot for the distance between the limits of the minimum trench width plus 2 feet or the trench length, as applicable. Payment will be made at the unit price for curb and gutter replacement.
4. Replacement Outside of Minimum Dimensions. Pavements, driveways and sidewalks damaged outside of the minimum dimensions for payment shall be replaced by the Contractor at no additional cost to the City.

1.03 REFERENCES

A. ANSI Z60.1. American Standard for Nursery Stock.

1.04 DEFINITIONS

A. Site Restoration. Replacement or reconstruction of site improvements to rights-of-way, easements, public property, and private property that are affected or altered by construction operations, with the improvements restored to a condition which is equal to, or better than, that which existed prior to construction operations.

B. Site Improvements. Includes but is not limited to pavement, curb and gutter, esplanades, sidewalks, driveways, fences, lawns, irrigation systems, and landscaping.

1.05 SUBMITTALS

A. Make submittals in conformance with Section 01330 - Submittal Procedures.

1.06 QUALITY ASSURANCE

A. Have landscape plantings planted by qualified personnel.

1.07 SCHEDULING

A. Site restoration shall be performed no later than 60 days following installation of the Work.

1.08 WARRANTY

A. Replaced plants and grasses are covered by the Contractor's general warranty and guarantee.

B. Replace plants that fail during the warranty period.

C. Contractor to provide a written notification to homeowner stating that homeowner is responsible for watering replaced plants and grasses.

D. Damage caused by natural hazards such as hail, high winds or storm is not covered by the warranty.

E. Existing plant material required to be moved on the site are covered under the warranty.

PART 2 P R O D U C T S

2.01 MATERIALS

A. Pavement, Sidewalks and Driveways. Use materials as specified in Section 02744 – Pavement Replacement for Utility Construction.

B. Seeding and Sodding. Provide sod as specified in Section 02922 - Sodding. For areas to be seeded, conform to Section 02922 - Hydromulch Seeding.

C. Landscape Plantings, Trees and Shrubs. Provide trees, shrubs and plants of quantity, size, genus, species and variety of those being replaced and complying with recommendations and requirements of ANSI Z60.1.

PART 3 E X E C U T I O N

3.01 EXAMINATION

A. Construction Site Photographs. Document conditions on and adjacent to the construction site with construction photographs.

3.02 PREPARATION

A. Removing Pavements and Structures.

1. Remove the minimum pavement, curb and gutter, and other structures as required to perform the Work.
2. Remove concrete and asphaltic concrete material using sawed joints in accordance with Section 02752 - Concrete Pavement Joints.

B. Remove or relocate existing fencing, if required, for construction operations. Maintain the integrity of the private property owner's fencing if needed for protection of children, pets, livestock or property. Notify the property owner 72 hours in advance before removing fencing and coordinate security needs.

3.03 INSTALLATION

A. Pavement, Sidewalk, and Driveway Restoration.

1. Replace pavement, curb and gutter, sidewalks, and driveways removed or damaged as the result of construction operations. Reconstruct in accordance with Section 02951 - Pavement Replacement for Utility Construction.

B. Seeding and Sodding.

1. Clean up construction debris and level the area with bank sand so that the resulting surface of the new grass matches the level of the existing grass and maintains pre-construction drainage patterns. Level minor ruts or depressions caused by construction operations where grass is still viable by filling with bank sand.
2. Restore grass areas disturbed or damaged by construction with grass comparable with that previously existing.
3. Restore established lawn areas, including easements and esplanades disturbed or damaged by construction, by sodding and fertilizing in accordance with Section 02922 - Sodding, except that measurement and payment shall be as specified in this Section.

4. Restore grass areas not requiring sodding using hydromulch methods in accordance with Section 02922 - Hydromulch Seeding, except that measurement and payment shall be as specified in this Section.

C. Trees, Shrubbery and Plants.

1. Extra care shall be taken in removing and replanting trees, shrubbery and plants. Trees, shrubbery and plants shall be removed in a way that leaves soil around the roots. Trees, shrubbery and plants shall be placed outside of excavation area.
2. Replace in kind any trees, shrubbery, and plants removed or damaged by construction operations.
3. Have a nursery or landscape firm make tree replacements using balled-and- burlapped nursery stock. Within the availability of standard nursery stock, replace each removed tree with one of an equivalent species and size, but with not less than a 2-1/2-inch-diameter trunk, as measured 1-1/2 feet above natural ground.

D. Fence Removal and Replacement.

1. Replace fencing removed or damaged, including, but not limited to, posts, caps, concrete footings, concrete curb under fence, wire, wire mesh, wood panels, top and bottom railing.
2. Reconstruct any portion of the fence disturbed by construction which is not equal to or better than that which existed prior to construction operations as evidenced by preconstruction photographs or videos.
3. Remove and dispose of damaged or substandard material.

3.04 CLEANING

A. Remove debris and trash which is the result of the Contractor's operation to maintain a clean and orderly site.

3.05 MAINTENANCE

A. Maintain plantings, sodded areas and seeded areas through warranty period.

B. Replace plantings and seeded or sodded areas that fail to become established through the warranty period.

C. Maintain plantings as follows:

1. Initial watering shall be by Contractor. Continued maintenance shall be by homeowner.
2. Repair or replace bracing as necessary.
3. Prune as necessary.

D. If it is necessary to remove tree branches, have removal and other necessary pruning performed by an qualified nursery or landscape firm utilizing best standard practices.

END OF SECTION

Section 01770

CLOSEOUT PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Closeout procedures including final submittals such as operation and maintenance data, warranties, and spare parts and maintenance materials.

1.02 CLOSEOUT PROCEDURES

A. Comply with Document 00700 - General Conditions regarding Final Completion and Final Payment when Work is complete and ready for Engineer's final inspection.

B. Provide Project Record Documents in accordance with Section 01785.

C. Complete or correct items on punch list, with no new items added. Any new items will be addressed during warranty period.

D. The Owner will occupy portions of the Work as specified in other Sections.

1.03 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. For facilities, clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to a sanitary condition.

D. Clean or replace filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and temporary construction facilities from the site following the final test of utilities and completion of the work.

1.04 ADJUSTING

A. Adjust operating equipment to ensure smooth and unhindered operation.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operations and maintenance data as noted in 01330 - Submittal Procedures.

1.06 WARRANTIES

A. Provide one original of each warranty from Subcontractors, suppliers, and manufacturers.

B. Provide Table of Contents and assemble warranties in 3-ring/D binder with durable plastic cover.

C. Submit warranties prior to final Application for Payment.

D. Warranties shall commence in accordance with the requirements in Document 00700 - General Conditions.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual Specification sections.

B. Deliver to location within the Owner's jurisdiction as directed by Resident Project Representative; obtain receipt prior to final Application for Payment.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01785

PROJECT RECORD DOCUMENTS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Maintenance and Submittal of Project Record Documents and samples.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain one record copy of documents at the site in accordance with Document 00700 - General Conditions.

B. Store Record Documents and samples in Contractor's field office if a field office is required by Contract Documents, or in a secure location. Provide files, racks, and secure storage for Record Documents and samples.

C. Label each document "PROJECT RECORD" in neat, large, printed letters.

D. Maintain Record Documents in a clean, dry, and legible condition. Do not use Record Documents for construction purposes.

E. Keep Record Documents and Samples available for inspection by Resident Project Representative.

1.03 RECORDING

A. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.

B. Contract Drawings and Shop Drawings: Legibly mark each item to record all actual construction, or "as built" conditions, including:

1. Measured depths of elements of foundation in relation to finish first floor datum.

2. Measured horizontal locations and elevations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Elevations of underground utilities referenced to bench mark utilized for project.

4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.

5. Field changes of dimension and detail.

6. Changes made by modifications.

7. Details not on original contract drawings.

8. References to related shop drawings and modifications.

C. Record information with a red felt-tip marking pen on a set of blue or black line opaque drawings, provided by Engineer.

1.04 SUBMITTALS

A. At contract closeout, deliver Project Record Documents to Engineer.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 02047

FLEXIBLE BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

This work shall consist of furnishing and placing a foundation course for surface courses or for other base courses.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Flexible base will be measured by the square yard of surface area of completed, placed thickness and accepted work based on the width of flexible base as shown on the plans.

2. The accepted quantities of flexible base of the type, grade, and compaction method specified will be paid at the contract unit price per square yard, complete in place.

3. All sprinkling, rolling, and manipulation required will not be paid for directly, but will be considered incidental work.

4. Passing "Density Control" tests shall be paid by the OWNER. Failing "Density Control" tests shall be paid by the CONTRACTOR.

5. The unit prices bid shall each be full compensation for shaping and fine grading the roadbed; for securing and furnishing all materials, including all royalty and freight involved; for furnishing scales and labor involved in weighing the material when required; for loosening, blasting, excavating, screening, crushing and temporary stockpiling when required; for loading all materials for all hauling and delivering. on the road; for spreading, mixing, blading, dragging, shaping and finishing and for all manipulation, labor, tools and incidentals necessary to complete the work.

6. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit material and details of following items for approval:

1. Proposed material source location

2. Proctor of the material

3. Liquid Limit of the material

4. Plasticity Index of the material

5. Wet Ball Mill of the material

6. Gradation of the material

PART 2 P R O D U C T S

2.01 MATERIALS

A. Flexible base shall be composed of either caliche (argillaceous limestone, calcareous or calcareous clay particles, with or without stone, conglomerate, gravel, sand or other granular materials), crushed stone, or gravel.

B. When lime stabilization of the sub-grade is specified, the flexible base is to be added in accordance with Section 260, Lime stabilization.

C. Materials for flexible base shall be crushed as necessary to comply with the requirements hereinafter specified.

D. Materials shall consist of durable course aggregate particles mixed with approved binding materials.

2.02 FLEXIBLE BASE LIME STABILIZATION

Where shown on the plans, or directed by the ENGINEER, material for flexible base shall be lime stabilized in accordance with the provisions of Section 020XX – Lime Stabilization.

2.03 FLEXIBLE BASE TYPES

A. Type A - Crushed or broken aggregate (excluding gravel aggregate).

B. Type B - Gravel Aggregate

C. Type F - Caliche

D. Unless otherwise noted on the plans, the CONTRACTOR may use any one type of these types provided the material to be used meets the requirements of Table 1.

TABLE 1

Property	Test Method	Grade 1	Grade 2	Grade 3	Grade 4
Master gradation sieve size (% retained)	Tex-110-E				
2-1/2 in.		-	0	0	
1-3/4		0	0-10		
7/8 in.		10-35	-	-	
3/8 in.		30-50	-	-	
No. 4		45-65	45-75	45-75	
No. 40		70-85	60-85	50-85	
Liquid limit, % max	Tex-104-E	35	40	40	
Plasticity index, max	Tex-106-E	10	12	12	
Plasticity index, min					
Wet ball mill, % max	Tex-116-E	40	45	-	
Wet ball mill, max increase passing the No. 40 sieve		20	20	-	
Classification	Tex-117-E	1.0	1.1 – 2.3	-	
Min compressive strength, psi					
Lateral pressure 0 psi		45	35	-	
Lateral pressure 15 psi		175	175	-	

2.04 PHYSICAL REQUIREMENTS

A. All flexible bases shall, when tested in accordance with standard laboratory test procedures, meet the physical requirements set forth in Table 1.

B. Testing of flexible base materials shall be in accordance with the following test procedures:

TEST	TESTING PROCEDURE
Preparation for soil constants and sieve analysis	TEX-101-E
Liquid Limit	TEX-104-E
Plastic Limit	TEX-105-E
Plasticity Limit	TEX-106-E

Sieve Analysis	TEX-110-E
Wet Ball Mill	TEX-116-E
Triaxial Test	TEX-117-E (Part I or II)

C. Unless otherwise specified on the plans, samples for testing the material for Soil Constants, Gradation and Wet Ball Mill shall be taken prior to the compaction operations.

D. Unless otherwise specified on the plans, samples for triaxial tests shall be taken from the stockpile or from production, as directed by the ENGINEER, where stockpiling is required and from production where stockpiling is not required.

2.05 MATERIAL TOLERANCES

A. The limits establishing reasonable close conformity with the specified gradation and plasticity index are defined by the following:

1. The ENGINEER may accept the material, providing not more than 2 of 10 consecutive gradation tests performed are outside the specified limits on any individual or combination of sieves by no more than 5% and where no two consecutive tests are outside the specified limits.

2. The ENGINEER may accept the material providing not more than 2 of 10 consecutive plasticity index samples tested are outside the specified limit by no more than two points and where no two consecutive tests are outside the specified limit.

2.05 STOCKPILING:

A. When specified on the plans, the material shall be stockpiled prior to delivery on the road. The stockpile shall be not less than the height indicated and shall be made up of layers of material not to exceed the depth shown on the plans.

B. After a sufficient stockpile has been constructed as specified on the plans, the CONTRACTOR may proceed with loading from the stockpile for delivery to the road.

C. In loading from the stockpile for delivery to the road, the material shall be loaded by making successive vertical cuts through the entire depth of the stockpile.

D. If the CONTRACTOR elects to produce the Type "A" material from more than one material or more than one source, each material shall be crushed separately and placed in separate stockpiles so that at least 75 percent of the material in the course aggregate stockpiles will be retained on the No. 4 sieve and at least 70 percent of the material in the fine aggregate stockpile will pass the No. 4 sieve.

E. The materials shall be combined in a central mixing plant in the proportions determined by the ENGINEER to produce a uniform mixture which meets all of the requirements of the specification. In the event that combinations of the materials produced fail to meet all of the specification requirements, the CONTRACTOR will be required to secure other materials which will meet specifications requirements.

F. The central mixing plant shall be either the batch or continuous flow type, and shall be equipped with feeding and metering devices which will add the materials into the mixer in the specified quantities.

G. Mixing shall continue until a uniform mixture is obtained.

PART 3 - EXECUTION

3.01 PREPARATION OF SUBGRADE:

A. Flexible base shall be constructed as specified herein in one or more courses in conformance with details, lines and grades shown on the plans, and as established by the ENGINEER.

B. Type roadbed shall be excavated and shaped in conformity with the typical sections shown on the plans and to the lines and grades as established by the ENGINEER.

C. All unstable or otherwise objectionable material shall be removed from the subgrade and replaced with approved material.

D. All holes, ruts and depressions shall be filled with approved material and, if required, the subgrade shall be thoroughly wetted with water and reshaped and rolled to the extent directed in order to place the subgrade in an acceptable condition to receive the base material.

E. The surface of the subgrade shall be finished to line and grade as established and in conformity with the typical section shown on plans, and any deviation in excess of 1/2 inch in cross section and in a length of 16-feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.

F. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of the work.

G. Material excavated in the preparation of the subgrade shall be utilized in the construction of adjacent shoulders and slopes or otherwise disposed on as directed, and any additional material required for the completion of the shoulders and slopes shall be secured from sources indicated on plans or as directed by the Engineer.

3.02 PLACEMENT OF FIRST COURSE - ALL MATERIAL TYPES

A. Immediately before placing the base material, the subgrade shall be checked as to conformity with grade and section.

B. The material shall be delivered in approved vehicles of a uniform capacity, and it shall be the charge of the CONTRACTOR that the required amount of specified material shall be delivered in each 100- foot station.

C. Material deposited upon the subgrade shall be spread and shaped the same day.

D. In the event inclement weather or other unforeseen circumstances render impractical the spreading of the material during the first 24-hour period, the materials shall be scarified and spread as directed by the Engineer.

E. The material shall be sprinkled, if directed, and shall then be bladed, dragged and shaped to conform to typical sections as shown on plans.

F. All areas and "nests" of segregated coarse or fine material shall be corrected to removed and replaced with well graded material, as directed by the ENGINEER.

G. If additional binder is considered desirable or necessary after the material is spread and shaped, it shall be furnished and supplies in the amount directed by the ENGINEER. Such binder material shall be carefully and evenly incorporated with the material in place by scarifying, harrowing, brooming or by other approved methods.

H. The course shall be compacted by method of compaction hereinafter specified as the "Ordinary Compaction" method or the "Density Control" method of compaction as indicated on the plans, or as directed by the ENGINEER.

1. When the "Ordinary Compaction" method is to be used, the following provisions shall apply:

a. The course shall be sprinkled as required and rolled as directed until a uniform compaction is secured. Throughout this entire operation, the shape of the course shall be maintained by blading and the surface upon completion shall be smooth and in conformity with the typical sections shown on plans and to the established lines and grades.

b. In that area on which pavement is to be placed, any deviation in excess of 1/4 inch in cross section in a length of 16 feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.

c. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding suitable material as required, reshaping and recompacting by sprinkling and rolling.

2. When the "Density Control" method of compaction is to be used, the following provisions shall apply:

   a. The course shall be sprinkled as required and compacted to the extent necessary to provide not less than the percent density as hereinafter specified under "Density".

   b. In addition to the requirements specified for density, the full depth of the flexible base shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment.

   c. After each section of flexible base is completed, density tests shall be performed as required by the ENGINEER. If the material fails to meet the density requirements, it shall be reworked as necessary to meet the density requirements.

   d. Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical sections shown on the plans and to the established lines and grades.

   e. In that area on which pavement is to be placed, any deviation in excess of 1/4 inch in cross section in a length of 16 feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.

   f. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding suitable material as required, reshaping and recompacting by sprinkling and rolling.

I. Should the base course, due to any reason or cause, lose the required stability, density or finish before the surfacing is complete, it shall be recompacted and refinished at the sole expense of the CONTRACTOR.

3.05 PLACEMENT OF SUCCEEDING COURSES - ALL MATERIAL TYPES

A. Construction methods shall be the same as prescribed for the first course.

B. Prior to placing the surfacing on the completed base, the base shall be "dry cured" to the extent directed by the ENGINEER.

3.06 DENSITY CONTROL

A. When the "Density Control" method of compaction is indicated on the plans, each course of flexible base shall be compacted to the percent density shown on the plans.

B. The testing will be as outlined in TX DOT Test Method Tex-114-E.

C. It is the intent of this specification to provide the base material below the finished surface of the roadway not less than 98 percent of the density as determined by the compaction ratio method.

D. Field density determination shall be made in accordance with TX DOT Test Method Tex-115-E.

3.07 TOLERANCES

A. When tolerances are permitted by the plans, the limits establishing reasonable close conformity with percent density specified are defined by the following:

1. The ENGINEER may accept the work providing not more than 25 percent of the density tests performed each day are outside the specified density by no more than three pounds per cubic foot and where no two consecutive tests on continuous work are outside the specified limits.

END OF SECTION

Section 02069

DEMOLITION

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. This Section includes the removal and disposal of old structures, or portions of old structures at location(s), as shown on PLANS. Also included is all excavation and backfill to complete the removal of these items hereinafter described.

1.02 MEASUREMENT AND PAYMENT

A. Unit Price.

1. Measurement: Work as provided for by this Section to be measured as each individual structure to be removed, except that pipe sewers shall be measured as each structure, and removal of existing curb and gutter shall be measured by the linear foot. The removal of structure is to include all appurtenances thereto.

2. Payment: Work as prescribed for in the Section to be paid for at unit price bid per each for “Removing Old Structures, Large” and “Removing Old Structures, Small” or Removing Old Structures (Pipe)” per each structure and curb and gutter shall be per linear foot, which price to be full compensation for all work, labor, tools, equipment, excavations, backfilling, materials, and incidentals necessary to complete the work.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

PART 2 P R O D U C T S

2.01 SCHEDULE

A. Coordinate activities with other work if being performed not to cause any interruption during work being completed under this Contract.

PART 3 E X E C U T I O N

3.01 ERECTION/ INSTALLATION/ APPLICATION AND OR CONSTRUCTION:

A. Culverts or Sewers

Unless otherwise shown on the PLANS, remove pipe and appurtenances by careful excavation of all dirt on top and sides in such a manner that pipe will not be damaged.

B. Concrete Structures

Remove concrete structures or concrete portions of structures in sizes, not larger than 1 cubic foot. Concrete portions of structures below the permanent ground line which will not interfere in any manner with the proposed construction may be left in place, but removal to be carried at least 2 feet below the permanent ground line and neatly squared off. Cut off reinforcement flush to the concrete.

C. Steel Structure

Dismantle steel structures, or steel portions of structures, in sections as determined by the ENGINEER. Section to be of such weight and dimensions as to permit convenient handling, hauling, and storing if material is to be reused or salvaged. Remove revits and bolts connecting steel railing members, steel beams of beam spans, and steel stringers of truss spans by cutting heads with a “cold cut” and punching or drilling from the how or by such other method as will not injure members for reuse if materials is to be reused or salvaged and will meet approval of the ENGINEER. Removal of rivets and bolts from connections of truss members, bracing members, and other similar members in the structure not required unless specifically called for on the PLANS. CONTRACTOR to have the option of dismantling these members by flame-cutting the members immediately adjacent to the connections. Flame-cutting is not permitted, however, when shown on PLANS calls for the structure unit to be salvaged in such manner as to permit re-erection. In such case, carefully matchmark all members with paint in accordance with diagram furnished by the ENGINEER prior to dismantling, and remove all rivets and bolts from the connections in the manner specified in the first portion of this paragraph.

D. Timber Structure

Remove timber structures, or timber portions of structures, in such a manner as to not damage the timber as little as possible for further use. Remove all bolts and nails from such lumber as deemed salvageable by the ENGINEER. Unless otherwise shown on PLANS, CONTRACTOR may remove entirely or cut off timber piles at a point not less than 2 feet below ground line.

E. Brick or Stone Structure

Remove brick or stone structures, or stone portions of structures, in size not larger than 1 cubic foot. Portions of such structures below the permanent ground line which will not in any manner interfere with the proposed construction may be left in place, but removal to be carried at least 2 feet below the permanent ground line square off.

F. Material Salvage

All materials such as pipe, timber, railing, etc., which the ENGINEER deems as salvageable for reuse, and all structural steel to be carefully placed in neat piles at convenient loading points which will not interfere with traffic construction. Unless designated point shown on PLANS, all other materials deemed salvageable by the OWNER to be removed by the CONTRACTOR and neatly piled at convenient loading points on site at no cost to OWNER. All of these specified materials to be the property of OWNER. I – beams, stringers, etc., specified to be dismantled with damage for reuse, and all steel members match marked and dismantles for reuse, to be blocked off the ground in an upright position to protect the members against further damage. Materials, other than structural steel, deemed non-salvageable become the property of the CONTRACTOR, to be removed off the site by the CONTRACTOR and disposed of in a satisfactory manner. When temporary structure(s) are necessary for a detour adjacent to the present structure, CONTRACTOR will be permitted to use the material in the old structure for the detour structure, but he is to dismantle and stack or dispose of material as required above, as soon as new structure is complete.

END OF SECTION

SECTION 02100

Site Clearing

PART 1 - GENERAL

1.01 GENERAL DESCRIPTION OF WORK

A. Cleaning and grubbing on project site of trees, stumps, brush, roots, vegetation, logs rubbish and other objectionable matter within limits described in specifications or as shown on plans.

B. Cleaning and grubbing shall be in advance of grading operation except that in cuts over 3 feet in depth, grubbing may be done simultaneously with excavation, provided objectionable matter is removed as specified.

C. Dispose of all debris resulting from clearing and grubbing work.

1.02 PROTECTION OF ADJACENT WORK:

A. Protect all areas outside indicated construction areas.

B. Protect existing improvements, adjacent property, utilities and other facilities, and trees and plants not to be removed from injury or damage.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Provide materials required to perform work as specified.

PART 3 - EXECUTION

3.01 CLEARING:

A. Clear all areas covered by tables, benches, dikes, roads, structures and embankments within project limits unless otherwise shown in plans.

B. Remove all saplings, brush, down-timber and debris unless shown or directed otherwise.

C. Use tree wound paint to treat scars, gashes or limbs stubs on trees not removed.

3.02 GRUBBING:

A. Trees, stumps, root systems, rocks and other obstructions shall be removed to the depths shown when they fall within the construction templates for the following items:

1.	Footings	18-inches below bottom of footing.
2.	Sidewalks (or other types ofwalks)	12-inches below bottom of walk.
3.	Roadways or Streets	18-inches below bottom of subgrade
4.	Parking Areas	18-inches below bottom of subgrade
5.	Grassed Areas	18-inches below top soil
6.	Fills	24-inches below bottom of fill

B. Blasting not permitted.

3.03 REMOVAL OF DEBRIS AND CLEANUP

A. Burning is not permitted.

B. Dispose of all waste materials not burned by removal from site.

C. Materials cleared and grubbed shall be the property of the Contractor and shall be his responsibility for disposal.

PART 4 - MEASUREMENT AND PAYMENT

4.01 CLEARING AND GRUBBING:

A. Clearing and Grubbing shall be measured for payment either in acres or by lump sum only for areas indicated on the plans, or as provided in the proposal and contract.

B. When not listed as separate contract pay item, Clearing and Grubbing shall be considered as incidental work, and the cost thereof shall be included in such contract pay items as are provided in the proposal contract.

C. Compensation, whether by contract pay item or incidental work will be for furnishing all materials, labor equipment, tools and in incidentals required for the work, all in accordance with the plans and these specifications.

D. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

END OF SECTION

SECTION 02200

EARTHWORK AND SITE GRADING

PART 1 - GENERAL

1.01 SCOPE

A. Perform all work required to complete the project as indicated by the Contract Documents, and furnish all supplementary items necessary for the completion of all work specified in this Section.

B. The work included in this Section shall include furnishing all labor, tools, materials and incidentals required to complete the work; excavate and fill to the lines, elevations and limits shown on the drawings for all pavements, buildings, landscaped areas, etc. as indicated below and cleaning up. The landscaped areas shall be graded to an elevation 6 inches below finished grade allowing for topsoil placement. The pavement areas shall be graded to an elevation below finished grade allowing for pavement placement. Building foundation areas shall be prepared in accordance with the geotechnical investigation and these specifications. The Contractor shall comply with all requirements of the city standards, the E.P.A. requirements and with the standards and specifications stated herein. All earthwork shall be done in accordance with the Geotechnical Investigation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02100 - Site Clearing
B. Section 02270 - Soil Erosion and Sediment Control
B. Section 03300 - Concrete

1.03 QUALITY ASSURANCE

A. Codes and Standards

1. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction. The contractor shall have a trench safety plan prepared by a registered professional engineer for all excavations in excess of 5 feet deep.

B. Testing and Inspection Service

1. The owner will engage a soil testing and inspection service for quality control testing during earthwork operations to inspect and test all soil materials proposed for use in all excavation and fill operations.

1.04 JOB CONDITIONS

A. Existing Utilities

1. It shall be the Contractor's responsibility to verify the location (horizontal and vertical depth) of all utilities prior to beginning earthwork operations. If utilities are to remain in place, provide protection from damage during construction operations.

2. Should uncharted or incorrectly charted piping or other utilities be encountered

during excavation, consult owner immediately for directions as to how to proceed. Cooperate with owner, public and private utility companies in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

3. Do not interrupt existing utilities serving facilities occupied and used by owner or adjacent properties, except when permitted in writing by property owner and then only after temporary utility services have been provided.

B. Use of Explosives

1. The use of explosives is not permitted.

C. Protection of Persons and Property

1. Barricade open excavations occurring as part of this work and post with warning lights. Provide traffic control as required by the city and as required to protect the public.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout and other hazards created by excavation operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Fill Material:

1. Onsite excavated material free from trash, vegetation, rocks and lumps of earth larger than 4 inches in diameter or other objectionable material. Imported fill, if required, shall also be clean and have a liquid limit less than 50 percent.

B. Select Material:

1. Uniformly blended clayey sand to very sandy with a plasticity index between 6 and 15 and liquid limit of less than 35 percent.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which earthwork and site grading operations are to be performed. After excavation to subgrade, proofroll with a heavy pneumatic tired roller, loaded dump truck or similar equipment weighing approximately 25 tons or greater to help compact pockets of loose soil and expose additional areas of weak, soft or wet soils in the presence of the owner's representative. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 EXCAVATION

A. The Contractor shall excavate to the lines and elevations shown on the drawings, as previously indicated herein, regardless of the type, condition, or moisture content of the material encountered. Conduct excavation operations to provide positive drainage, at contractor's expense, at all times during construction. If positive drainage cannot be maintained, contractor shall keep standing water out of all excavations with adequate

dewatering equipment.

B. All areas shall be cut accurately to the indicated grades. Care shall be taken to prevent excavation below the grades indicated and any bottoms or slopes that have been undercut shall be backfilled with approved materials and compacted to the required fill density.

C. Excavation required for rough grading shall be finished within a tolerance of 0.10 foot above or below the rough grade and in no case shall depressions be left that will not completely drain.

3.3 BUILDING SUBGRADE

A. Follow recommendations in geotechnical report and on the structural drawings.

3.4 FILLING

A. Remove all vegetation, organic materials and debris prior to placing fill.

B. Fill used below the parking and landscape areas shall be onsite soils encountered in the excavation or imported fill except grass, weeds, roots, vegetation and similar materials. The largest rock, particle or clod shall be less than 4 inches in diameter prior to compaction.

C. Care should be taken that utility cuts are not left open for extended periods and that cuts are properly backfilled. A positive cut-off of 1' thick compacted clay at the building line shall be used to help prevent water from migrating in the utility trench.

D. Before fill is placed under pavement or if subgrade is in an excavation, subgrade soils shall be scarified to a depth of 8" and recompacted between 95 and 98 percent of maximum dry density per ASTM D698 at a moisture content from +2 to +5 percent above optimum moisture content.

E. Fill below all pavement and landscaped areas shall be placed in 6 to 8 inch loose lifts and compacted to a minimum dry density of 95 percent of the standard proctor density (ASTM D698) under pavement and 95 percent elsewhere. The moisture content shall be between -1 and +3 percent above optimum.

F. Compaction shall be obtained by use of sheeps foot rollers, rubber-tired rollers, or other approved equipment capable of obtaining the required density. In the event the embankment material is too wet or too dry for adequate compaction, the contractor shall add moisture or dry the material as required to the extent necessary to obtain the required density.

3.5 PAVEMENT SUBGRADE

A. Construct subgrades for paved areas to conform to the grades, lines and cross sections shown on the drawings and per the recommendations in the geotechnical report.

B After the pavement subgrades have been shaped and compacted, bring the surface to a firm, unyielding surface by rolling the entire area with an approved vibratory roller. Compact all areas inaccessible to the roller with hand tampers weighing not less than 50 pounds, and with face area not more than 100-square-inches. Unless the material at the time of the rolling contains sufficient moisture to insure proper compaction, add water as directed before compacting. Allow the material containing excess moisture to dry to the proper consistency and moisture content before being compacted.

3.6 MOISTURE CONTROL

A. Where soil material must be moisture conditioned before compaction, uniformly apply required amount of water to surface of soil material in such manner as to prevent free water appearing on surface during, or subsequent to, compaction operations.

B. Remove and replace, or scarify and air dry soil material that is too wet to permit compaction to specified percentage of maximum density.

C. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread on surface where directed by owner's representative and permitted to dry. Assist drying by discing, harrowing or pulverizing until moisture-density relation tests fall within the herein-specified range.

3.7 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction

1. Testing laboratory services shall be in accordance with section 01454.
2. Allow owner's testing service to inspect and approve subgrades and fill layers before further construction work is performed. In the building areas, there will be at least 1 density test per 2500 square feet per lift with a minimum of 3. In the pavement areas there will be at least 1 density test per 5000 square feet per lift with a minimum of 3.
3. If, in the opinion of the owner, based on testing service and inspection, the subgrade or fills which have been placed are below the specified density, the contractor shall provide additional compaction and testing at no additional expense to the owner.
4. The results of density tests which may be selected will be considered satisfactory when they are in each instance equal to or greater than the specified density, and if not more than 1 density test out of 5 has a value greater than 2% below the required density.

3.8 MAINTENANCE

A. Protection of Graded Areas

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
2. Repair and re-establish grades in settled, eroded, and rutted areas to the specified tolerances.

B. Reconditioning Compacted Areas

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction. Use hand tamping for recompaction over underground utilities.

3.8 DISPOSAL OF EXCESS AND WASTE MATERIALS

Remove all excess excavation, trash, debris and waste materials, and legally dispose of off the owner's property, at no additional cost.

END OF SECTION

Section 02221

REMOVING EXISTING PAVEMENTS AND STRUCTURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Removing concrete pavement, asphaltic concrete pavement, and base courses.

B. Removing concrete curbs, concrete curbs and gutters, sidewalks and driveways.

C. Removing pipe culverts and storm sewers.

D. Removing existing inlets and manholes.

E. Removing miscellaneous structures of concrete or masonry.

F. Removing irrigation concrete pipe, stand pipes, valves and related irrigation structures.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No Separate payment will be made for work performed under this Section. Include cost of work performed under this Section in pay items for which this work is a component.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REGULATORY REQUIREMENTS

A. Conform to Section 01576 – Waste Material Disposal, applicable codes, and local laws for disposal of debris.

B. Coordinate clearing work with utility companies.

1.04 SUBMITTALS

A. Conform to the requirements of Section 01330 – Submittal Procedures.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 PREPARATION

A. Obtain advance approval from Resident Project Representative for dimensions and limits of removal work. Submit preconstruction photographs in accordance with the applicable portions of Section 01321 – Construction Photographs.

B. Locate and identify buried utilities. Identification shall be by flagging and offset staking.

3.02 PROTECTION

A. Protect the following from damage or displacement:

1. Adjacent public and private property.

2. Trees, plants, and other landscape features designated to remain.

3. Utilities designated to remain.

4. Benchmarks, monuments, and existing structures designated to remain.

3.03 REMOVALS

A. Remove pavement and structures by methods that will not damage underground utilities. Do not use a drop hammer near existing underground utilities.

B. Minimize amount of earth loaded during removal operations.

C. Where existing pavement is to remain, make straight saw cuts in existing pavement to provide clean breaks prior to removal. Do not break concrete pavement or base with drop hammer unless concrete or base has been saw cut to a minimum depth of 2-inches.

D. Where street and driveway saw cut locations coincide or fall within 3-feet of existing construction or expansion joints, break out to existing joints.

E. Remove sidewalks and curbs to nearest existing dummy, expansion, or construction joint.

F. Where existing end of pipe culvert or end of sewer is to remain, install and 8-in-thick masonry plug in pipe end prior to backfill.

G. Remove all irrigation structure that are to be abandoned as per the construction plans, all underground pipes and appurtenances shall be removed and the disturbed soils shall be replaced and compact to a minimum of 90% density to the elevation equal to the surrounding natural ground.

3.04 BACKFILL

A. Backfill of removal areas shall be in accordance with requirements of Section 02316 – Excavation and Backfill of Structures.

3.05 DISPOSAL

A. Disposal shall in accordance with requirements of Section 01576 – Waste Material Disposal.

B. Remove debris, rubbish, and extracted plant material from the site in accordance with requirements of Section 01576 - Waste Material Disposal.

END OF SECTION

Section 02241

PNEUMATIC TIRE ROLLING

PART 1 -GENERAL

1.01 GENERAL DESCRIPTION OF WORK:

A. This work shall consist of the compaction of embankment, flexible base, surface treatments, or pavements by the operation of approved pneumatic tire rollers.

PART 2 -PRODUCTS

2.01 GENERAL REQUIREMENTS:

A. When used on seal coats, asphaltic surface treatments, and bituminous mixture pavements, the roller shall be self-propelled and equipped with smooth tread tires with a tire pressure of 45 psi.

B. The roller shall be so constructed as to be capable of being operated in both a forward and a reverse direction.

C. When used on bituminous mixture pavements, the roller shall have suitable provision for moistening the surface of the tires while operating.

D. When turning is impractical or detrimental to the work and when specifically directed by the ENGINEER, the roller shall be of the self-propelled type.

E. In lieu of the rolling equipment specified, the CONTRACTOR may operate other compacting equipment that will produce equivalent relative compaction in the same period of time as the specified equipment. If the substituted compaction equipment fails to produce the desired compaction within the same period of time, its use shall be discontinued.

F. Rollers shall be maintained in good repair and operating condition and shall be approved by the ENGINEER.

2.02 LIGHT PNEUMATIC TIRE ROLLER:

A. The light pneumatic tire roller shall consist of not less than 9 pneumatic tire wheels, running on axles in such manner that the rear group of tires will cover the entire gap between adjacent tires of the forward group, mounted in

a rigid frame, and provided with a loading platform or body suitable for ballast loading.

B. The front axle shall be attached to the frame in such manner that the roller may be turned within a minimum circle.

C. Under working conditions the pneumatic tire roller shall have an effective rolling width of approximately 60 inches and shall be so designed that by ballast loading the total load can be varied uniformly from 9,000 pounds or less to 18,000 pounds or more.

D. The roller shall be equipped with tires that will afford ground contact pressures to 45 pounds per square inch or more. The operating load and tire air pressure shall be within the range of the manufacturer's chart. The roller under working conditions shall provide a uniform compression under all wheels.

E. Individuals tire inflation pressures shall be within +5 psi of each other.

F. The pneumatic tire roller shall be drawn by a suitable crawler type tractor, a pneumatic tired tractor, a truck of adequate tractive effort or may be of the self-propelled type and the roller, when drawn or propelled by either type of equipment, shall be considered a light pneumatic tire roller unit.

2.03 MEDIUM PNEUMATIC TIRE ROLLER (TYPE A):

A. The medium pneumatic tire roller (Type A) shall consist of not less than 7 pneumatic tired wheels, running on axles in such manner that the rear group of tires will cover the entire gap between adjacent tires of the forward group and mounted in a rigid frame and provided with a loading platform or body suitable for ballast loading.

B. The front axles shall be attached to the frame in such a manner that the roller may be turned within a minimum circle. The pneumatic tire roller, under working conditions, shall have an effective rolling width of approximately 84 inches and shall be so designed that, by ballast loading, the total load may be varied uniformly from 23,500 pounds or less to 50,000 pounds or more.

C. The roller shall be equipped with tires that will afford ground contact pressures to 80 pounds per square inch or more. Individual tire inflation pressures shall be within +5 psi of each other.

D. The operating load and tire air pressure shall be within the range of the

manufacturer's chart.

E. The pneumatic tire roller shall be drawn by a suitable crawler type tractor, a pneumatic tired tractor, a truck of adequate tractive effort or may be of the self-propelled type.

F. The roller, when drawn or propelled by any type of equipment, shall be considered a medium pneumatic tire roller unit.

G. The power unit shall have adequate tractive effort to properly move the operating roller at variable uniform speeds up to approximately 5 miles per hour.

2.04 MEDIUM PNEUMATIC TIRE ROLLER (Type B):

A. The medium pneumatic tire roller (Type B) shall conform to the requirements for Medium Pneumatic Tire Roller (Type A) as speCified above, except that the roller shall be equipped with tires that will afford ground contact pressures to 90 psi or more.

PART 3 -EXECUTION

3.01 CONSTRUCTION METHODS:

A. The embankment layer or the base course be sprinkled if directed and rolling with a pneumatic tire roller shall start longitudinally at the sides and proceed towards the center, overlapping on successive trips by at least 112 of width of the pneumatic tire roller.

B. On super-elevated curves, rolling shall begin at the low sides and progress towards the high sides.

C. Alternative trips of the roller shall be slightly different in length.

D. The light pneumatic tire roller shall be operated at speeds between 2 and 6 miles per hour for asphalt surfacing work and all other work.

E. The medium pneumatic tire roller shall be operated at speeds which produce a satisfactory product.

F. Sufficient rollers shall be provided to compact the material in a satisfactory

manner. When operations are so isolated from one another that 1 roller unit cannot perform the required compaction satisfactorily, additional roller units shail be provided.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT:

A. No additional compensation will be made for materials, equipment or labor required by this item, but shall be considered subsidiary to the various items of the contract.

END OF SECTION

Section 02241

PROOF ROLLING

PART 1- GENERAL

1.01 GENERAL DESCRIPTION WORK:

A. This work shall consist of furnishing and operating heavy, pneumatic-tired, compaction equipment for testing the compaction of embankment, subgrade or flexible base.

B. Proof roll is to be used to locate unstable areas.

PART 2- PRODUCTS

2.01 EQUIPMENT:

A. The proof rolling equipment shall consist of not less than 4 pneumatic tired wheels, running on axles carrying not more than 2 wheels, mounted in a rigid frame, and provided with a loading platform or a body suitable for ballast loading.

B. All wheels shall be arranged so that they will carry approximately equal loads when operating on uneven surfaces.

C. Under working conditions the proof roller shall have a rolling width of 8 feet to 10 feet and shall be so designed that by ballast loading the gross load may be varied uniformly from 25 tons to 50 tons.

D. The tires shall be capable of operating under the various loads with variable air pressure up to 150 pounds per square inch. The operating load and tire pressure shall be within the range of the manufacturer's chart and as directed by the ENGINEER.

E. The proof roller may be of the self-propelled type or shall be drawn by a suitable crawler-type tractor or a rubber tired tractor of adequate tractive effort. There shall be a sufficient quantity of ballast available to load the equipment to a maximum gross weight of 50 tons.

F. Rubber tired tractive equipment shall be used on base courses.

G. Other type tractive equipment may be used on embankment subgrade.

H. The heavy pneumatic tired roller unit shall be capable of turning 180 degrees in the crown width.

I. In lieu of the rolling equipment specified, the CONTRACTOR may, upon written permission from the ENGINEER, operate other equipment that will produce equivalent results as the specified equipment. If the substituted equipment fails to produces the desired results as would be expected of the specified equipment as determined by the ENGINEER, its use shall be discontinued.

PART 3 -EXECUTION

3.01 CONSTRUCTION METHODS:

A. This work shall be done to proof all prepared subgrade and flexible base courses or as directed by the ENGINEER.

B. On embankment compaction, each layer will be placed to specified thickness at optimum moisture and compacted with conventional equipment to comply with the requirements of the governing embankment item.

C. Prior to placing the overlaying course, the layer shall be proof rolled as directed by the ENGINEER.

D. When the operation of the proof rolling unit shows an area to be unstable or nonuniform, such area shall be brought to satisfactory stability and uniformity by additional compaction or by removal of unsuitable materials and replacement with suitable materials and recompacted.

E. The surface tested shall then be checked for conformity with line and grade and any irregularities corrected.

F. Roller shall be operated at speeds between 2 and 6 miles per hour or as directed by the ENGINEER.

PART 4- MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT:

A. No additional payment will be made for the materials, equipment or labor required by this item and shall be considered subsidiary to the various items included in the contract.

END OF SECTION

SECTION 02270

SOIL EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials, tools, equipment, and services for all soil erosion and sediment control, as indicated, in accord with provisions of Contract Documents.

B. Completely coordinate with work of all other trades.

C. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation in order to meet the United States Environmental Protection Agency requirements.

1.2 QUALITY ASSURANCE

A. Erosion Control Standards:

1. United States Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES) - Storm Water Management for Construction Activities.

2. North Central Texas Council of Governments (NCTCOG) - Storm Water Quality Best Management Practices for Construction Activities.

1.3 EROSION CONTROL PRINCIPLES:

A. Perform demolition, construction and other soil disturbances in a manner which minimizes soil erosion.

B. Retain and protect existing vegetation as much as is feasible.

C. Keep area which is exposed and free of vegetative cover to a minimum, within practical limits.

D. Protect exposed critical areas during prolonged construction or other land disturbance by temporary seeding, mulching or other suitable stabilization measures.

1.4 JOB CONDITIONS:

A. Comply with all requirements of the EPA for implementation of the storm water pollution prevention plan, under the NPDES General Permits for Storm Water Discharges from Construction Sites.

1.5 SUBMITTALS

A. Project Information:

1. Submit copy of NPDES Storm Water Permit for Construction Activities to Owner prior to construction.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Filter Fabric: Sediment control silt fabrics, AMOCO Style #2125 or approved equal.

B. Crushed stone.

C. Metal clips or ties.

D. Steel fence posts.

E. Grass Seed: annual ryegrass or Bermuda depending on the season.

F. Concrete block.

G. Wire screen.

PART 3 - EXECUTION

3.1 BEGINNING CONSTRUCTION

A. Prior to general demolition, install temporary silt fences and stabilized construction entrance as indicated on the storm water pollution prevention plan or where directed by Owner.

B. Construct erosion control devices in accordance with the storm water pollution prevention plan and as directed by the Owner during demolition and as demolition progresses.

C. Seed disturbed areas where construction activities temporarily cease at rate necessary to achieve a full stand of grass. Reseed as required until good stand of grass is achieved.

3.2 DURING CONSTRUCTION

A. Maintain temporary silt fences.

B. Inspect regularly, especially after rainstorms.

C. Repair or replace damaged or missing items.

D. Sow temporary grass cover over disturbed areas where construction activities temporarily cease for more than 21 days and as required by NPDES permit.

E. Install inlet protection as indicated by the storm water pollution prevention plan at each inlet.

F. Provide swales and dikes as necessary to direct all water towards a protected device.

G. Do not disturb existing vegetation (grass and trees) outside limits of demolition.

H. Remove sediment from behind temporary silt fences when it reaches a depth of 6 in.

3.3 COMPLETION OF CONSTRUCTION AND STABILIZATION OF THE SITE

A. Remove from site all temporary erosion control devices.

END OF SECTION

Section 02316

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Clearing and grubbing, excavation, backfilling, and compaction of backfill for structures.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No payment will be made for structural excavation and backfill under this Section. Include payment in unit price or lump sum for construction of structures.

2. No separate or additional payment will be made for clearing and grubbing, surface water control, ground water control, or for excavation drainage. Include in the unit price or lump sum construction of structures.

3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 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 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.

B. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement shall be considered suitable, unless otherwise indicated.

C. Select Material: Material as defined in Section 02320 - Utility Backfill Materials.

D. Backfill: Select material meeting specified quality requirements, placed and compacted under controlled conditions around structures.

E. 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.

F. Foundation Base: For foundation base material, use 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.

G. Foundation Subgrade: Foundation subgrade is the surface of the natural soil which has been excavated and prepared to support the foundation base or foundation backfill, where needed.

H. Ground Water Control Systems: Installations external to the excavation such as well points, eductors, or deep wells. Ground water control includes dewatering to lower the ground water, intercepting seepage which would otherwise emerge from the side or bottom of the excavation, and depressurization to prevent failure or heaving of the excavation bottom. Refer to Section 01578 - Control of Ground Water and Surface Water.

I. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from the excavation. Remove rain water and surface water which accidentally enters the excavation as a part of excavation drainage.

J. Excavation Drainage: Removal of surface and seepage water in the excavation by sump pumping and using French drains surrounding the foundation to intercept the water.

K. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below the foundation as shown on Drawings, and backfilled with foundation backfill material.

L. Shoring System: A structure that supports the sides of an excavation to maintain stable soil conditions and prevent cave-ins.

1.04 REFERENCES

A. ASTM D 558 - Test Methods for Moisture-Density Relations of Soil Cement Mixtures.

B. 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. (304.88-mm) Drop.

C. ASTM D 1556 - Density of Soil in Place by the Sand-Cone Method.

D. ASTM D 2487 - Classification of Soils for Engineering Purposes.

E. ASTM D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

F. ASTM D 3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).

G. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

H. TxDOT Tex-101-E - Preparation of Soil and Flexible Base Materials for Testing.

I. TxDOT Tex-110-E - Determination of Particle Size Analysis of Soils.

J. Federal Regulations, 29 CFR, Part 1926, Standards - Excavation, Occupational Safety and Health Administration (OSHA).

1.05 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit a work plan for excavation and backfill for each structure with complete written description which identifies details of the proposed method of construction and the sequence of operations for construction relative to excavation and backfill activities. The descriptions, with supporting illustrations, shall be sufficiently detailed to demonstrate to the Engineer that the procedures meet the requirements of the Specifications and Drawings.

C. Submit excavation safety system plan.

1. The excavation safety system plan shall be in accordance with applicable OSHA requirements for all excavations.

2. The excavation safety system plan shall be in accordance with the requirements of Section 01561 - Trench Safety System, for all excavations that fall under State and Federal trench safety laws.

D. Submit a ground and surface water control plan in accordance with requirements in this Section and Section 01578 - Control of Ground Water and Surface Water.

E. Submit backfill material sources and product quality information in accordance with requirements of Section 02320 - Utility Backfill Materials.

F. Submit project record documents under provisions of Section 01785 - Project Record Documents. Record location of utilities, as installed, referenced to survey benchmarks. Include location of utilities encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

1.06 TESTS

A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory in accordance with requirements of Section 01454 - Testing Laboratory Services and as specified in this Section.

B. Contractor shall perform embedment and backfill material source qualification testing in accordance with requirements of Section 02320- Utility Backfill Materials.

PART 2 P R O D U C T S

2.01 EQUIPMENT

A. Perform excavation with equipment suitable for achieving the requirements of this Specification.

B. Use equipment which will produce the degree of compaction specified. Backfill within 3 feet of walls shall be compacted with hand operated equipment. Do not use equipment weighing more than 10,000 pounds closer to walls than a horizontal distance equal to the depth of the fill at that time. Use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

2.02 MATERIAL CLASSIFICATIONS

A. Backfill materials shall conform to the classifications and product descriptions of Section 02320 - Utility Backfill Materials. The classification or product description for backfill applications shall be as shown on the Drawings and as specified.

PART 3 E X E C U T I O N

3.01 PREPARATION

A. Conduct an inspection to determine condition of existing structures and other permanent installations.

B. Set up necessary street detours and barricades in preparation for excavation if construction will affect traffic. Conform to requirements of Section 01555 - Traffic Control and Regulation. Maintain barricades and warning devices at all times for streets and intersections where work is in progress, or where affected by the Work, and is considered hazardous to traffic movements.

C. Perform work in accordance with OSHA standards. Employ an excavation safety system as specified in Section 01561 - Trench Safety Systems.

D. Project sites, rights-of-way and easements shall be made ready for construction operations in accordance with Section 02200 – Earthwork and Site Grading.

E. Remove existing pavements and structures, including sidewalks and driveways, in accordance with requirements of Section 02221 - Removing Existing Pavements and Structures.

F. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section 01578 - Control of Ground Water and Surface Water.

3.02 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within the grading limits as designated on the Drawings, and in accordance with requirements of City Ordinance.

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. Prevent erosion of excavations and backfill. Do not allow water to pond in excavations.

E. Maintain excavation and backfill areas until start of subsequent work. Repair and recompact slides, washouts, settlements, or areas with loss of density at no additional cost to the Owner.

3.03 EXCAVATION

A. Perform excavation work so that the underground structure can be installed to depths and alignments shown on Drawings. Use caution during excavation work to avoid disturbing surrounding ground and existing facilities and improvements. Keep excavation to the absolute minimum necessary. No additional payment will be made for excess excavation.

B. The use of explosives or headache balls is prohibited.

C. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify Resident Project Representative and obtain instructions before proceeding in such areas.

D. Immediately notify the agency or company owning any line which is damaged, broken or disturbed. Obtain approval from Resident Project Representative and agency for any repairs or relocations, either temporary or permanent.

E. Avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, dewatering, or other construction methods.

F. Provide surface drainage during construction to protect work and to avoid nuisance to adjoining property. Where required, provide proper dewatering and piezometric pressure control during construction.

G. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed by the Engineer, replace those which are damaged or destroyed by the Work.

H. Provide sheeting, shoring, and bracing where required to safely complete the Work, to prevent excavation from extending beyond limits indicated on Drawings, and to protect the Work and adjacent structures or improvements. Sheeting, shoring, and bracing used to protect workmen and the public shall conform to requirements of Section 01561 - Trench Safety Systems.

I. Prevent voids from forming outside of sheeting. Immediately fill voids with grout, concrete fill, cement stabilized sand, or other material approved by Resident Project Representative.

J. After completion of the structure, remove sheeting, shoring, and bracing unless shown on Drawings to remain in place or directed by Engineer in writing that such temporary structures may remain. Remove sheeting, shoring and bracing in such a manner as to maintain safety during backfilling operations and to prevent damage to the Work and adjacent structures or improvements.

K. Immediately fill and compact voids left or caused by removal of sheeting with cement stabilized sand or material approved by Resident Project Representative.

3.04 HANDLING EXCAVATED MATERIALS

A. Classify excavated materials. Place material which is suitable for use as backfill in orderly piles at a sufficient distance from excavation to prevent slides or cave-ins.

3.05 DEWATERING

A. Provide ground water control per Section 01578 - Control of Ground Water and Surface Water.

B. Keep ground water surface elevation a minimum of 2 feet below the bottom of the foundation base.

C. Maintain ground water control as directed by Section 01578 - Control of Ground Water and Surface Water and until the structure is sufficiently complete to provide the required weight to resist hydrostatic uplift with a minimum safety factor of 1.2.

3.06 FOUNDATION EXCAVATION

A. Notify Resident Project Representative at least 48 hours prior to planned completion of foundation excavations. Do not place the foundation base until the excavation is accepted by the Resident Project Representative.

B. Excavate to elevations shown on Drawings, as needed to provide space for the foundation base, forming a level undisturbed surface, free of mud or soft material. Remove pockets of soft or otherwise unstable soils and replace with foundation backfill material or a material as directed by the Resident Project Representative. Prior to placing material over it, recompact the subgrade where indicated on the Drawings, scarifying as needed, to 98 percent of the maximum Standard Dry Density according to ASTM D 698. If the specified level of compaction cannot be achieved, moisture condition the subgrade and recompact until 98 percent is achieved, over-excavate to provide a minimum layer of 24 inches of foundation backfill material, or other means acceptable to the Resident Project Representative.

C. Fill unauthorized excessive excavation with foundation backfill material or other material as directed by the Resident Project Representative.

D. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in a satisfactory, undisturbed condition. Keep excavations free of standing water and completely free of water during concrete placement.

E. Soils which become unsuitable due to inadequate dewatering or other causes, after initial excavation to the required subgrade, shall be removed and replaced with foundation backfill material, as directed by Resident Project Representative, at no additional cost to the Owner.

F. Place foundation base, or foundation backfill material where needed, over the subgrade on same day that excavation is completed to final grade. Where base of excavations are left open for longer periods, protect them with a seal slab or cement-stabilized sand.

G. Crushed aggregate, and other free draining Class I materials, shall have a filter fabric as specified in Section 02621 - Geotextile, separating it from native soils or select material backfill. The fabric shall overlap a minimum of 12 inches beyond where another material stops contact with the soil.

H. Crushed aggregate, and other Class I materials, shall be placed in uniform layers of 8-inch maximum thickness. Compaction shall be by means of at least two passes of a vibratory compactor.

3.07 FOUNDATION BASE

A. After the subgrade is properly prepared, including the placement of foundation backfill where needed, the foundation base shall be placed. The foundation base shall consist of a 12-inch layer of crushed stone aggregate or cement stabilized sand. Alternately, a seal slab with a minimum thickness of 4 inches may be placed. The foundation base shall extend a minimum of 12 inches beyond the edge of the structure foundation, unless shown otherwise on the Drawings.

B. Where the foundation base and foundation backfill are of the same material, both may be placed in one operation.

3.08 BACKFILL

A. Complete backfill to surface of natural ground or to lines and grades shown on Drawings. Use existing material that qualifies as select material, unless indicated otherwise. Deposit backfill in uniform layers and compact each layer as specified.

B. Do not place backfill against concrete walls or similar structures until laboratory test breaks indicate that the concrete has reached a minimum of 90 percent of the specified compressive strength. Where walls are supported by slabs or intermediate walls, do not begin backfill operations until the slab or intermediate walls have been placed and concrete has attained sufficient strength.

C. Remove concrete forms before starting backfill and remove shoring and bracing as work progresses.

D. Maintain fill material at no less than 2 percent below nor more than 2 percent above optimum moisture content. Place fill material in uniform 8-inch maximum loose layers. Compaction of fill shall be to at least 95 percent of the maximum Standard Dry Density according to ASTM D 698 under paved areas. Compact to at least 95 percent around structures under unpaved areas.

E. Where backfill is placed against a sloped excavation surface, run compaction equipment across the boundary of the cut slope and backfill to form a compacted slope surface for placement of the next layer of backfill.

F. Place backfill using cement stabilized sand in accordance with Section 02321 - Cement Stabilized Sand.

3.09 FIELD QUALITY CONTROL

A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.

B. Tests will be performed initially on minimum of one different sample 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.

C. In-place density tests of compacted subgrade and backfill 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 100 cubic yards of compacted backfill material.

2. A minimum of three density tests for each full work shift.

3. Density tests will be performed in all placement areas.

4. The number of tests will be increased if inspection determines that soil types or moisture contents are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density.

D. At least one test for moisture-density relationships will be initially performed for each type of backfill material in accordance with ASTM D 698. Additional moisture-density relationship tests will be performed whenever there is a noticeable change in material gradation or plasticity.

E. If tests indicate work does not meet specified compaction requirements, recondition, recompact, and retest at Contractor's expense.

3.10 DISPOSAL OF EXCESS MATERIAL

A. Dispose of excess materials in accordance with requirements of Section 01576 - Waste Material Disposal.

END OF SECTION

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Section 02317

EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Excavation, trenching, foundation, embedment, and backfill for installation of utilities, including manholes and other pipeline structures.

1.02 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, ground water control, or for excavation drainage. Include in the unit price for the installed piping, sewer, conduit, or duct work.

3. Concrete Encasement shall be measured and paid for by cubic yard, complete in place. Measurement shall be to the neat lines shown on the plans.

4. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 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 01578 - 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 01561 - Trench Safety Systems.

1. 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.

2. 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.

3. Special Shoring: A shoring system meeting special shoring as specified in Paragraph 1.08, Special Shoring Design Requirements, for locations identified on the Drawings.

1.04 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. Code of Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).

1.05 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.

1.06 SUBMITTALS

A. Conform to Section 01330 - 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.

C. Submit a ground and surface water control plan in accordance with requirements in this Section and Section 01578 - Control of Ground Water and Surface Water.

D. Submit backfill material sources and product quality information in accordance with requirements of Section 02320 - Utility Backfill Materials.

E. Submit a trench excavation safety program in accordance with requirements of Section 01561 - 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.

1.07 TESTS

A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory in accordance with requirements of Section 01454 - Testing Laboratory Services and as specified in this Section.

B. Perform backfill material source qualification testing in accordance with requirements of Section 02320- Utility Backfill Materials.

1.08 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 P R O D U C T S

2.01 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.

2.02 MATERIAL CLASSIFICATIONS

A. Embedment and Trench Zone Backfill Materials: Conform to classifications and product descriptions of Section 02320 - Utility Backfill Materials.

B. Concrete Encasement and Backfill: Conform to requirements for Class B concrete as specified in Section 03315 - Concrete for Utility Construction.

C. Geotextile (Filter Fabric): Conform to requirements of Section 02621- Geotextile.

D. Concrete for Trench Dams: Concrete backfill or 3 sack premixed (bag) concrete.

E. Timber Shoring Left in Place: Untreated oak.

PART 3 E X E C U T I O N

3.01 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 with 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.

3.02 PREPARATION

A. Establish traffic control to conform with requirements of Section 01555 - Traffic Control and Regulation. Maintain barricades and warning lights for streets and intersections affected by the Work, and 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 01561 - 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 Resident Project Representative and agency 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 02221 - Removing Existing Pavements and Structures, as applicable.

E. Install and operate necessary dewatering and surface water control measures to conform with Section 01578 - 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 01725 - Field Surveying.

3.03 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within the grading limits as designated on the Drawings, and in accordance with requirements of City Ordinance.

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 Owner.

3.04 EXCAVATION

A. Except as otherwise specified or shown on the Drawings, install underground utilities in open cut trenches with vertical sides. Open cut excavation does not include the use of explosives or headache balls. The use of explosives or headache balls is prohibited.

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 Resident Project Representative 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 Engineer, 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.

3.05 HANDLING EXCAVATED MATERIALS

A. Use only excavated materials which are suitable as defined in this Section and conforming with Section 02320 - 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 02320 - 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 01504 - Temporary Facilities and Controls.

3.06 GROUND WATER CONTROL

A. Implement ground water control according to Section 01578 - Control of Ground Water and Surface Water. Provide a stable trench to allow installation in accordance with the Specifications.

3.07 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.

3.08 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 sand bags or other suitable means.

H. Place electrical conduit, if used, directly on foundation without bedding.

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. Neither water tamping nor jetting are allowed.

J. For water line construction embedment, use bank run sand, concrete sand, gem sand, pea gravel, or crushed limestone as specified in Section 02320 - Utility Backfill Material.

K. 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.

L. The Contractor shall provide whatever means and materials are required to prevent pipe flotation at no separate pay.

3.09 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. When shown on Drawings, a random backfill of suitable material may be used in trench zone for trench excavations outside pavements.

D. Place trench zone backfill in lifts and compact by methods selected by the Contractor. Fully compact each lift before placement of the next lift.

1. Bank run sand.

   a. Maximum 9-inches compacted lift thickness.

   b. Compaction by vibratory equipment to a minimum of 95 percent of the maximum dry density determined according to ASTM D 698.

   c. Moisture content within 3 percent of optimum determined according to ASTM D 698

2. Cement-stabilized sand.

   a. Maximum lift thickness determined by Contractor to achieve uniform placement and required compaction, but not exceeding 24 inches.

   b. Compaction by vibratory equipment to a minimum of 95 percent of the maximum dry density determined according to ASTM D 558.

   c. Moisture content on the dry side of optimum determined according to ASTM D 558 but sufficient for cement hydration.

3. Select fill.

   a. Maximum 6-inches compacted lift thickness.

   b. Compaction by equipment providing tamping or kneading impact to a minimum of 95 percent of the maximum dry density determined according to ASTM D 698.

   c. Moisture content within 2 percent of optimum determined according to ASTM D 698.

E. 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.

F. Concrete encasement shall be placed at locations shown on the drawings and as directed by the Resident Project Representative.

G. For electric conduits, remove form work 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 02320 - 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 100 Linear feet of trench of compacted embedment and 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 non-conforming density, core and test for compressive strength at Contractor's expense.

G. Acceptability of crushed rock compaction will be determined by inspection.

3.12 DISPOSAL OF EXCESS MATERIAL

A. Dispose of excess materials in accordance with requirements of Section 01576 - Waste Material Disposal

END OF SECTION

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Section 02318

EXCAVATION (Detention)

This specification includes requirements for the construction of new ditches or widening existing ditches within the Work area, and includes the following:

1.0 General
2.0 Materials & Equipment
3.0 Construction Methods
4.0 Measurement and Payment

PART 1 - GENERAL

1.1 RELATED DOCUMENTS, CONTRACT CLAUSES, & SPECIFICATIONS

The following may not include all related documents, contract clauses, & technical specifications, and does not relieve the Contractor of the responsibility of performing work associated with this specification in accordance with all terms of the Contract herein.

1.2 GENERAL

In general, the Contractor shall excavate areas as shown on the plans or as directed, and remove materials encountered to the lines, grades, and typical sections shown on the plans and cross-sections.

PART 2 – MATERIALS & EQUIPMENT (Not Applicable To This Specification)

PART 3 – CONSTRUCTION METHODS

Excavated material shall be stockpiled in areas as identified in the plans. If otherwise noted in the plans, that the excavated material is identified as unsuitable or excess material, the Contractor shall accept ownership and dispose of material in accordance with local, state, and federal regulations at locations outside the right of way. The Contractor shall maintain drainage in the excavated area as required. The Contractor shall shape slopes to avoid loosening material below or outside the proposed grades, and remove and dispose of slides as directed by the Engineer.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

This Item will be measured by the cubic yard in its original position as computed by the method of average end areas. This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified in accordance with Contract provisions. Additional measurements

or calculations will be made if adjustments of quantities are required. Shrinkage or swelling factors will not be considered in determining the calculated quantities.

4.2 PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Ditch Excavation". Price is full compensation for authorized excavation; drying; undercutting subgrade and reworking or replacing the undercut material in rock cuts; hauling; disposal of material not used elsewhere on the project; scarification and compaction; and equipment, labor, materials, tools, and incidentals.

END OF SECTION

Section 02320

UTILITY BACKFILL MATERIALS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Material Classifications.

B. Utility Backfill Materials:
Concrete sand
Gem sand
Pea gravel
Crushed stone
Crushed concrete
Bank run sand
Select backfill
Random backfill

C. Material Handling and Quality Control Requirements.

1.02 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.

2. Payment for backfill material, when included as a separate pay item, is on a cubic yard basis for material placed and compacted within theoretical trench width limits and thickness of material according to Drawings.

3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 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 due to either gradation, plasticity, or moisture content.

3. Materials that contain large clods, aggregates, or 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 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 A 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 course 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 02317 - Excavation and Backfill for Utilities for other definitions regarding utility installation by trench construction.

1.04 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.

1.05 SUBMITTALS

A. Conform to requirements of Section 01330 - 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 2.03, 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.

1.06 TESTS

A. Perform tests of sources for backfill material in accordance with Paragraph 2.03.

B. Verification tests of backfill materials may be performed by the Owner in accordance with Section 01454 - Testing Laboratory Services and in accordance with Paragraph 3.03.

C. Random fill obtained from the project excavation as source is exempt from pre-qualification requirements by Contractor but must be inspected by Owner's testing lab for unacceptable materials based on ASTM D 2488.

PART 2 P R O D U C T S

2.01 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 2.01B, or by product descriptions, as given in Paragraph 2.02.

B. Class Designations Based on Laboratory Testing:

1. Class IA. Class IA materials shall be manufactured aggregates with an open graduation. Materials shall consist of angular, crushed stone or rock, or crushed gravel. Class IA embedment material shall have a large void content and contain little or no fines. 100% of the material shall pass a 1 ½ " sieve, up to 10% shall pass a No. 4 sieve, and no more than 5% shall pass a No. 200 sieve. Class IA materials used for foundation, replacement of over-excavation, or in the pipe embedment zone shall be wrapped in one layer of geotextile filter cloth when groundwater is present in the excavated trench and the trench walls in the pipe embedment zone are composed of fine granular soils. Filter cloth shall be Poly-Filter GB, Nicolon 70/20, or Nicolon 40/30A.

2. Class IB. Class IB materials shall be manufactured / processed aggregates with a dense graduation. Materials shall consist of angular, crushed stone (or other Class IA materials) and stone/sand mixtures and contain little or no fines. 100% of the material shall pass a 1 ½ " sieve, up to 50% shall pass a No. 4 sieve, and no more than 5% shall pass a No. 200 sieve.

3. Class II. Class II materials shall be clean, coarse-grained soils classified as GW, GP, SW, or SP soil groups under ASTM D 2487 or coarse-grained soils which are borderline clean to with fines classified as GW-GC or SP-SM under ASTM D 2487. 100% of the GW, GP, SW, SP, GW-CC, and SP-SM soils shall pass a 1 ½ " sieve. Up to 50% of the GW and GP coarse fraction (material retained on a No. 200 sieve) shall pass a No. 4 sieve. Up to 5% of the GW, GP, SW, and SP soils shall pass a No. 200 sieve. Between 5% and 12% of the GW-CC and SP-SM soils shall pass a No. 200 sieve.

4. Class III. Class III materials shall be coarse-grained soils with fines. The soils shall be classified as GM, GC, SM, or SC soil groups under ASTM D 2487. 100% of the GM, GC, SM, and SC soils shall pass a 1 ½ " sieve. Up to 50% of the GM and GC coarse fractions (material retained on a No. 200 sieve) shall pass a No. 4 sieve. At least 50% of the SM and SC coarse fractions shall pass a No. 4 sieve. Between 12% and 50% of the GM, GC, SM, and SC soils shall pass a No. 200 sieve.

2.02 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 Resident Project Representative. Soils in Class IVB, fat clay (CH) may be used as backfill materials where allowed by the applicable backfill installation specification. Refer to Section 02316 - Excavation and Backfill for Structures and Section 02317 - Excavation and Backfill for Utilities.

B. Provide backfill material that is free of stones greater than 6 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 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 course 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 to100
No. 4	10 to 30
No. 8	0 to 10
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 wear 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 are not acceptable materials 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.

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 02316 - Excavation and Backfill for Structures and Section 02317 - Excavation and Backfill for Utilities.

K. Cement Stabilized Sand: Conform to requirements of Section 02321 - Cement Stabilized Sand.

L. Concrete Backfill: Conform to Class B concrete as specified in Section 03315 - Concrete for Utility Construction.

2.03 MATERIALS 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. Tests 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 wear of material retained on the No. 4 sieve.

4. Clay lumps.

5. Lightweight pieces

6. Organic impurities

C. Production Testing. Provide reports to the Engineer from an independent testing laboratory that backfill materials to be placed in the Work meet applicable specification requirements.

D. Deliver material samples for verification testing to the site of the Work.

PART 3 E X E C U T I O N

3.01 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 and deliver samples for verification testing to the site of the Work.

C. Obtain approval for each material source by the Engineer 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 requirements of 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 Engineer, 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 does not represent or guarantee that any soil found in the excavation work will be suitable or acceptable as backfill material.

3.02 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 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.

3.03 FIELD QUALITY CONTROL

A. Quality Control

1. The Resident Project Representative 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 Resident Project Representative may resample material at any stage of work or location if changes in characteristics are apparent.

B. Production Verification Testing: The project testing laboratory will provide verification testing on backfill materials, as directed by the Resident Project Representative. Samples may be taken at the source or at the production plant, as applicable.

END OF SECTION

Section 02321

CEMENT STABILIZED SAND

1.0 G E N E R A L

1.01 SECTION INCLUDES

A Cement stabilized sand for backfill and bedding.

B References to Technical Specifications:

1. Section 01330 – Submittals
2. Section 02320 – Utility Backfill Materials
3. Section 01454 – Testing Laboratory Services

C Referenced Standards:

1. American Society for Testing and Materials (ASTM)

a. ASTM D 558, “Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures”

b. ASTM D 1632, “Practice for Making and Curing Soil-Cement Compression and Flexure Test Specimens in the Laboratory”

c. ASTM D 1633, “Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders
”

d. ASTM C 150, “Standard Specification for Portland Cement”

e. ASTM C 33, “Standard Specification for Concrete Aggregates”

f. ASTM D 2487, “Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)”

g. ASTM C 142, “Standard Test Method for Clay Lumps and Friable Particles in Aggregates”

h. ASTM C 123, “Standard Test Method for Lightweight Particles in Aggregate”

i. ASTM C 40, “Standard Test Method for Organic Impurities in Fine Aggregates for Concrete”

j. ASTM C 4318, “Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils”

k. ASTM C 94, “Standard Specification for Ready-Mixed Concrete”

l. ASTM C 31, “Standard Practice for Making and Curing Concrete Test Specimens in the Field”

1.02 MEASUREMENT AND PAYMENT

A Unless indicated as an Extra Item, no separate payment will be made for cement stabilized sand under this Section. Include cost in Bid Items for applicable utility or structure installation.

B If use of cement stabilized sand is allowed, based on the Engineer's direction, and indicated in Section 00405 – Schedule of Unit Price work as an Extra Item, measurement will be on a per ton basis. A conversion between volumes calculated based on theoretical limits and total weight will be made based on a ratio of 1.64 tons per cubic yard.

1.03 SUBMITTALS

A Make Submittals required by this Section under the provisions of Section 01330 – Submittals.

B Submit material qualification and design mix tests to include:

1. Three series of tests of sand or fine aggregate material from the proposed source. Tests shall include procedures defined in this Section, 2.01 “Materials”.

2. Three moisture-density relationship tests prepared using the material qualified by the tests in this Section, 1.03B1. Blends of fine aggregate from crushed concrete and bank run sand shall be tested at the ratio to be used for the design mix testing.

3. Design mix report to meet the specifications of this Section, 1.04 “Design Requirements”. The design mix shall include compressive strength tests after 48-hours and 7 days curing.

1.04 DESIGN REQUIREMENTS

A Design sand-cement mixture to produce a minimum unconfined compressive strength of 100 pounds per square inch in 48 hours when compacted to a minimum 95 percent in accordance with ASTM D 558 and when cured in accordance with ASTM D 1632, and tested in accordance with ASTM D 1633. Mix shall contain a minimum of 1-1/2 sacks of cement per cubic yard. Compact mix with moisture content on the dry side of optimum.

2.0 P R O D U C T S

2.01 MATERIALS

A Cement shall be Type 1 Portland cement conforming to ASTM C 150.

B Sand shall be clean, durable, and meet grading requirements for fine aggregates of ASTM C 33 and the following requirements:

1. Classified as SW, SP or SM by the United Soil Classification System of ASTM D 2487.

2. Deleterious material content:

a. Clay lumps shall comprise less than 0.5 percent by ASTM C 142.

b. Lightweight pieces shall comprise less than 5.0 percent by ASTM C 123.

c. Organic impurities shall produce color no darker than the standard color by ASTM C 40 ASTM.

3. Plasticity index of 4 or less when tested in accordance with ASTM D 4318.

C Fine aggregate, manufactured from crushed concrete meeting the quality requirements for crushed rock material in Section 02320 - Utility Backfill Materials, may be used as a complete or partial substitute for Bank Sand. The blending ratio of fine aggregate from crushed concrete and Bank Sand shall be defined in the mix design report.

D Water shall be potable, free of oils, acids, alkalies, organic matter, or other deleterious substances, meeting requirements of ASTM C 94.

2.02 MIXING MATERIALS

A Thoroughly mix sand, cement and water in proportions of the mix design using a pugmill-type mixer. The plant shall be equipped with automatic weight controls to ensure correct mix proportions.

B Stamp batch ticket at plant with time of loading directly after mixing. Material not placed and compacted within 4 hours after mixing shall be rejected.

3.0 E X E C U T I O N

3.01 PLACEMENT AND COMPACTION

A Place sand-cement mixture in 8-inch-thick loose lifts and compact to a minimum of 95 percent of ASTM D 558, unless otherwise specified on Plans. The moisture content during compaction shall be on the dry side of optimum but sufficient for hydration. Perform and complete compaction of sand-cement mixture within 4 hours after addition of water to mix at the plant.

B Do not place or compact sand-cement mixture in standing or free water.

3.02 FIELD QUALITY CONTROL

A Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.

B Mixing plant inspections will be performed periodically. Material samples will be obtained and tested in accordance with this Section, 2.01 “Materials”, if there is evidence of change in material characteristic.

C One sample of cement stabilized sand shall be obtained for each 150 tons of material placed per day with no less than one sample per day of production. Random samples of delivered cement stabilized sand shall be taken in the field at point of delivery in accordance with

ASTM 3665. Obtain three individual samples of approximately 12 to 15 lb each from the first, middle, and last third of the truck and composite them into one sample for test purpose.

D Prepare and mold four specimens (for each sample obtained) in accordance with ASTM D558, Method A, without adjusting moisture content. Samples will be molded at approximately same time material is being used, but no later than 4 hours after water is added to mix.

E After molding, specimens will be removed from molds and cured in accordance with ASTM D 1632.

F Specimens will be tested for compressive strength in accordance with ASTM D 1633, Method A. Two specimens will be tested at 48 hours plus or minus 2 hours and two specimens will be tested at 7 days plus or minus 4 hours.

G A strength test will be average of strengths of two specimens molded from same sample of material and tested at same age. Average daily strength will be average of strengths of all specimens molded during one day's production and tested at same age.

H Precision and Bias: Test results shall meet recommended guideline for precision in ASTM D 1633 Section 9.

I Reporting: Test reports shall contain, as a minimum, the following information:

1. Supplier and plant number
2. Time material was batched
3. Time material was sampled
4. Test age (exact hours)
5. Average 48-hour strength
6. Average 7-day strength
7. Specification section number
8. Indication of compliance / non-compliance
9. Mixture identification
10. Truck and ticket numbers
11. The time of molding
12. Moisture content at time of molding
13. Required strength
14. Test method designations

15. Compressive strength data as required by ASTM D 1633

16. Supplier mixture identification

17. Specimen diameter and height, in.

18. Specimen cross-sectional area, sq. in.

J The cement content will be checked on samples obtained in the field whenever there are apparent changes in the mix properties.

3.03 ACCEPTANCE

A Strength level of material will be considered satisfactory if:
1. The average 48-hour strength is greater than 100 psi with no individual strength test below 70 psi.
2. All 7-day individual strength tests (average of two specimens) are greater than or equal to100 psi.

B Material will be considered deficient when 7-day individual strength test (average of two specimens) is less than 100 psi but greater than 70 psi. See Paragraph 3.04 Adjustment for Deficient Strength.

C The material will be considered unacceptable and subject to removal and replacement at Contractors expense when individual strength test (average of two specimens) has 7-day strength less than 70 psi

D When moving average of three daily 48-hour averages falls below 100 psi, discontinue shipment to project until plant is capable of producing material, which exceeds 100 psi at 48 hours. Five 48-hour strength tests shall be made in this determination with no individual strength tests less than 100 psi.

E Testing laboratory shall notify Contractor, Project Manager, and material supplier by facsimile of tests indicating results falling below specified strength requirements within 24 hours.

F If any strength test of laboratory cured specimens falls below the specified strength, Contractor may, at his own expense, request test of cores drilled from the area in question in accordance with ASTM C42. In such cases, three (3) cores shall be taken for each strength test that falls below the values given in 3.03.A.

G Cement stabilized sand in an area represented by core tests shall be considered satisfactory if the average of three (3) cores is equal to at least 100 psi and if no single core is less that 70 psi. Additional testing of cores extracted from locations represented by erratic core strength results will be permitted.

3.04 ADJUSTMENT FOR DEFICIENT STRENGTH

A When mixture produces 7-day compressive strength greater than or equal to 100 psi, then material will be considered satisfactory and bid price will be paid in full.

B When mixture produces 7-day compressive strength less than 100 psi and greater than or equal to 70 psi, material shall be accepted contingent on credit in payment Compute credit by the following formula:

$$\text{Credit per Cubic Yard} = \frac{\$30.00 \times 2\,(100\text{ psi} - \text{Actual psi})}{100}$$

C When mixture produces 7-day compressive strength less than 70 pounds per square inch, then remove and replace cement-sand mixture and paving and other necessary work at no cost to City.

END OF SECTION

Section 02580

PAVEMENT MARKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pavement striping and handicap symbols.
2. Primer adhesive.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product literature and installations instructions including guidelines and templates as required.

B. Samples: Submit test samples when requested.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Handicap parking space marking shall comply with state of Texas and city requirements.

1.4 PROJECT CONDITIONS

A. Apply marking when surfaces are thoroughly dry and when air temperature is above 40 degrees F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Sherwin-Williams.
2. Pratt & Lambert.

2.2 MATERIALS

A. Latex Paint:

1. Colors: White, yellow, red, and blue as required.

2. Acceptable products - Sherwin-Williams:
   a. White or Yellow: Set Fast Latex Traffic Marking Paint or Acrylic Water Borne Traffic Marking Paint.
   b. Red or Blue: Metalatex Semi-Gloss Coatings.

3. Acceptable Products - Devoe:
   a. White or Yellow: #416XX Traffic-Line Water Based Traffic Marking Paint.
   b. Red or Blue: #83XX Mirrolac W.B.

B. Paint Primer: As recommended by paint manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Ensure new concrete and asphaltic concrete paving has cured for 30 days minimum prior to application of pavement marking.

3.2 PREPARATION

A. Clean surface of scale, dirt, mud, sand gravel, oil, grease and other foreign material.

B. On portland cement concrete, apply primer for striping as recommended by paint manufacturer to act as barrier coat with curing compound.

C. Layout lines and symbols in advance of making application. Space control points at intervals to ensure accurate location of markings.

3.3 PAINT STRIPING APPLICATION

A. Lay out markings using guide line, templates and forms as required. Use white or yellow, match existing paint to distinguish parking spaces. Use red paint for fire lanes.

B. Apply 4" wide stripes at manufacturer's recommended rate.

C. Stencil "FIRE LANE - NO PARKING" in 4" high white block letters on red background 6" high and of appropriate length for lettering background at intervals not closer than 25 ft. and not farther apart than 50 ft. on curbs and pavement throughout length of fire lane.

E. Place suitable warning signs near work site to alert approaching traffic from all directions to prevent damage to newly painted surfaces.

3.4 PROTECTION

A. Protect pavement markings in accordance with manufacturer's instructions.

END OF SECTION

SECTION 02711

CHAIN LINK FENCE

PART 1 GENERAL

1.01 DESCRIPTION

A. Work under this section includes furnishing and installation of all chain link fence, grates, and accessories complete with all required accessories, as shown on the drawings and as specified herein.

B. Refer to the following Sections for related work:

1. Section 02200 - Earth Work
2. Section 03300 - Concrete

1.02 QUALITY ASSURANCE

A. Steel pipe for posts and accessories shall be hot dip galvanized conforming to provisions of ASTM A-123 for zinc coating.

B. Chain link fabric shall conform to ASTM A-392 Class 2 for wire galvanized coating.

1.03 SUBMITTALS

A. Submit complete installation shop drawings showing placement of posts, bracing and gates. Do not begin work prior to approval of submittal.

PART 2 PRODUCT

2.01 MATERIALS

A. Gate posts shall be schedule 0 pipe 2-7/8 inch outside diameter for single gates 6 feet or less in width and double gates 12 feet or less in width for fences less than 72 inches high. Rolling gates shall be supported on rolling wheels at the top of the gate. Minimum clearance shall be 1 foot.

B. End, corner and slope posts shall be schedule 0 pipe 2-3/8 inch outside diameter for fences less than 72 inches high.

C. Line posts shall be schedule 0 pipe 1-7/8 inch outside diameter for fences less than 72 inches high.

D. Top rail shall be schedule 0 pipe 1-5/8 inch outside diameter.

E. Horizontal braces shall be schedule 0 pipe 1-5/8 inch outside diameter with 3/8 inch truss rod at all gate and terminal posts.

F. Chain link fabric shall be woven from 9 gage wire with knuckled finish top and bottom edges.

G. Gate frames shall be schedule 0 pipe 1-7/8 inch outside diameter.

H. All incidental fittings, braces, post caps, gate hinges shall be manufacturer's standard metal fittings, coated as previously specified for posts.

2.02 FABRICATION

A. Fabricate all components form new ferrous galvanized materials. Chain link fabric to be galvanized after fabrication.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify location of fencing with approved shop drawings and layout of property.

3.02 INSTALLATION

A. Footings shall be concrete a minimum of 8 inches diameter. Footings for line posts shall be at least 3 feet deep, gate posts shall be at least 4 feet deep. Crown footings to shed water. Concrete shall meet Section 03300 requirements. Line posts at 10 feet o.c. maximum. The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within 7 days after the individual post footing is completed.

B. Attach fabric, bracing, gates and accessories in conformance with manufacturer's standard. Fabric to be placed on outward facing side of posts. Gates shall have provision for padlock security fastening.

C. The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.

D. Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.

E. The wire fabric shall be firmly attached to the posts and braced in the manner shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than 1 inch or more than 4 inches from the ground surface. Grading shall be performed where necessary to provide a neat appearance.

3.03 CLEANUP

A. Inspect fence, touch-up any damaged finish, remove all work related debris.

END OF SECTION

SECTION 02720

STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes storm drainage systems consisting of storm sewers, inlets, culverts and other drainage structures as shown on the Drawings and specified herein from a point 5 feet outside the buildings to the point of disposal.

B. Related Sections: The following Sections contain requirements that relate to this section.

1. Division 2 Section 02200: Earthwork and Site Grading
2. Division 2 Section 02516: Cast-in-Place Concrete

1.3 SUBMITTALS

A. General: Submit the following:

1. Product data and certification of pipe quality from the manufacturer prior to installation.
2. A trench safety plan for all excavation in excess of 5 feet which meets all requirements of Texas state law and O.S.H.A.
3. Testing laboratory certification of specified materials.
4. Compaction tests for embedment and backfill.
5. Shop drawings and manufacturer's certifications for precast concrete inlets.
6. Shop drawings, product data, mix designs and materials certifications for reinforced concrete structures.
7. Shop drawings for grates and castings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Pipe: (15” and larger - public). Reinforced concrete culvert pipe conforming to ASTM C76, Class III, with tongue and groove joints. Lifting holes in pipe sections are not permissible.

B. Corrugated Polyethylene Pipe: (15” and smaller – private) Polethylene pipe with corrugated exterior and smooth interior conforming to ASTM F405. Use fittings manufactured specifically for use with this pipe.

C. PVC Pipe: (12” and smaller – private) PVC pipe per ASTM D-3034, SDR-35.

D. Aluminized Steel: (8” – private) Type 2 to meet all requirements by Contech or approved equal.

E. Cement Mortar: One part cement and two parts clean sharp sand with lime added in an amount not exceeding twenty-five percent of volume of cement. Mix dry and then wet to proper consisting for use. Use no mortars that have stood for more than one hour.

F. Reinforced Concrete: Reinforced concrete conforming to Section 02516 for inlets, culverts and headwalls.

G. Precast Inlets: Precast inlets shall be reinforced concrete with 4500 psi concrete at 28 days and grade 60 reinforcing steel.

H. Jointing Materials:

1. Reinforced Concrete Pipe: Cold applied preformed plastic gaskets suitable for sealing joints of tongue and groove concrete pipe. Use "Ram-nek" brand or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Pipe Trenches:

1. Excavate the pipe trenches to the widths necessary for the proper laying of the pipe but in no case wider than 24 inches plus the outside diameter of the pipe and keeping the banks as nearly vertical as practicable to at least 12 inches above top of pipe. In paved areas, maintain the trench walls vertical and sheeted, if required, with the clearance between the pipe and trench wall or back of sheeting not exceeding 12 inches. Excavate the bottom of the trenches to a depth as indicated on the plans and replace any over excavation with suitable compacted material.
2. Remove for the full width of the excavation soft, spongy, or otherwise unstable material encountered below the established grade of the excavation which will not provide a firm foundation for subsequent work and replace with approved fill material.
3. Where sheeting and bracing are necessary to prevent caving of the trench sidewalls of excavation for other structures, and to safeguard the workmen, excavate the trench or excavation for other structures to such width that the proper allowance is made for the space occupied by the sheeting and bracing to provide clearance as specified above.
4. Place embedment as foundation for pipe in accordance with City standard details.

3.2 PIPE INSTALLATION

A. General

1. Pipe Handling: All pipe, fittings and specials shall be handled in such a manner as not to damage the material. All pipe and fittings handled with clamps or slings must meet with the approval of the Owner; no hooks shall be permitted. When it becomes necessary to deflect the pipe to avoid obstructions, the deflection of each joint must be within the limits provided by the manufacturer and be approved by the Owner.
2. Laying Underground Conduit Pipe: Previous to being lowered into the trench, each pipe shall be carefully inspected; and those not meeting specifications shall be rejected and either destroyed or removed from the job. All lumps or excrescences on the ends of conduit shall be removed before it is lowered into the trench. No pipe shall be laid except in the presence of the Owner, unless otherwise specified; and the Owner may order the removal of and re-laying of any pipe not so laid. The pipe and

specials shall be so laid in the trench that after the project is completed the interior surface shall conform accurately to the grade and alignment indicated on the plans. Bell holes shall be excavated and all pipe shall be carefully adjusted to fit snugly in the bedding so that the entire length bears on bedding material with no wedging or blocking to hold up the bell. All pipe shall be laid in the dry, regardless of the type of joint used. Pipes shall be laid with the bell or groove end upgrade unless otherwise approved by the Owner; and, in any event, shall be laid with the bell or collar away from the last section placed. Before laying the pipe, the interior of the joints shall be carefully bored smooth and clean and the annular space shall be kept free from dirt, stones or water. Pipe shall be installed and joints made up in complete conformance with the instructions and recommendations regarding proper installation and assembly furnished by the manufacturer. Proper facilities shall be provided for hoisting and lowering the section of the pipe into the trench without disturbing the prepared foundation and the sides of the trench. All pipe shall be so laid that the contact in the joint between two lengths of pipe shall be uniform throughout the circumference of the joint. Where curves in the alignment are indicated on the drawings, standard pipe (short sections of pipe or bevels) shall be used with the outside edge of the joint pulled away from the seat to make a smooth curve.

B. Drainage Structures

1. Construct concrete structures in conformity with City and TxDOT standard details. Design and construct forms so that they may be removed without injury to the concrete. Thoroughly compact the concrete and leave forms in place for at least 24 hours after concrete is poured. Cure the concrete for at least 5 days after removal of forms. Thoroughly clean honeycomb places, saturate with water and point up with mortar.

C. Inlets: Inlets shown on the plans may be precast or poured-in-place reinforced concrete at the Contractor's option.

3.3 BACKFILLING FOR PIPE AND STRUCTURES

A. After the pipe has been installed on specified embedment, place specified backfill at a moisture content which will facilitate compaction alongside the pipe in layers not exceeding 6 inches loose measure in depth. Thoroughly compact the fill under the haunches of the pipe and compact each layer by rolling or tamping with mechanical rammers. Continue this method of filling and compacting until the fill is 12-inches above the pipe, then place the remainder of the backfill, in lifts not exceeding 9-inches. Operate heavy equipment in a manner so that no damage to the pipe will result. Compact backfill to a point 12 inches above the pipe to not less than 95 percent of maximum dry unit weight as determined by ASTM D698. Compact backfill material 12 inches and more above the pipe to not less than 95 percent of the maximum dry unit weight as determined by ASTM D698 under pavement and 90 percent elsewhere.

B. Place and compact backfill for drainage structures in the same manner as specified above for pipe, except allow the concrete to cure for not less than five days before placing the backfill.

END OF SECTION

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Section 02740

ASPHALT OVERLAY AND BASE REPAIR

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. This item shall consist of repairing the existing pavement and base, installation of asphaltic concrete level-up course, and asphaltic concrete overlay as herein specified and in conformity with typical sections, lines and grades shown on the plans and established by the Engineer.

1.02 MEASUREMENT AND PAYMENT

A. Tack Coat will be measured at the point of application to the street in gallons at the applied temperature. Hot mixed asphalt pavement shall be measured by the number of square yards complete in-place.

B. Hot mixed asphalt will be measured by the number of square yards complete in-place.

C. The work performed and materials furnished as prescribed by this item and measured as provided under “Measurement” will be paid for at the unit price bid for:

a. “Tack Coat”

b. “Hot Mixed Asphaltic Pavement, Type “D”

D. The unit bid price shall be full compensation for furnishing all material, freight, heating, mixing, hauling, cleaning of the existing base course or pavement, pavement preparation, tack coat, placing asphaltic concrete mixture, rolling and finishing, and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

1.03 REFERENCES – Not Used

1.04 SUBMITTALS – Not Used

PART 2 P R O D U C T S

2.01 MATERIALS

E. Hot Mix Asphaltic Concrete: The hot mix asphaltic concrete shall conform to the requirements of the Texas Department of Transportation 1993 Specifications, Item 340. The paving mixture to be used shall be type designated on the plans. The Contractor shall provide appropriate documentation from the producer and a commercial laboratory that the hot mix asphaltic concrete used in the overlay meets these requirements. The asphalt to be used shall be A.C. 10.

F. Tack Coat shall be AC-5

PART 3 E X E C U T I O N

3.01 PREPARATION

A. The pavement surface shall be dry free of dirt, grease and loose material. All "pot holes" shall be cleaned, primed and repaired with hot mix asphaltic concrete. Large cracks (greater than ¼ inch) shall be filled with AC-5. Level-up course shall be applied as needed and as directed by the Engineer.

3.03 BASE REPAIR

A. The existing base and asphaltic mat to be scarified and reshaped shall first be cleaned of all dirt, vegetation or other objectionable materials, and then scarified to a minimum depth of 6 inches. In no case shall the underlying sub-grade be disturbed. The asphaltic mat may either be removed and disposed of by the Contractor or broken into particles not more than 2 inches in their greatest dimensions. Caliche base shall be added as necessary to bring the surface to finish shape and grade as shown on the plans. Such caliche added shall be subsidiary to the various pay items.

B. The reshaped surface and base shall be sprinkled as required and rolled as directed until a uniform compaction is secured. Throughout this entire operation, the shape of the course shall be maintained by blading and the surface upon completion shall be smooth and in conformity with the typical sections shown on plans and to the established lines and grades. In that area on which pavement is to be placed, any deviation in excess of ¼ inch in cross-section in a length of 12 feet measured longitudinally shall be corrected by loosening, adding or removing material reshaping and re-compacting by sprinkling and rolling. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding suitable material as required, reshaping and re-compacting by sprinkling and rolling.

C. The Contractor shall "proof roll" the finish surface and directed by the Engineer to determine any weak spots. The "proof rolling" will be done with a loaded water truck (2000 gallon maximum).

D. "Base Repair" is specified based on the assumption that the underlying courses have not failed and have adequate strength to support the loads applied to them during construction. The Contractor may "proof roll" the area designated for "scarify and reshape surface and base" before beginning work. If such "proof rolling" indicates failure in the underlying courses a "change order" will be made to pay for the additional work to repair the underlying courses. Once work has begun on an area, the Contractor shall be responsible for any failures in the underlying courses. Should the areas of "scarified and reshaped surface and base", due to any reason or cause, lose the required stability, density and finish before the surfacing is complete, it shall be re-compacted and refinished at the sole expense of the Contractor. Prime coat shall be subsidiary to "Scarify and Reshape Surface and Base".

3.04 TACK COAT

A. Tack coat shall be sprayed uniformly in one pass at a spray width of the existing roadway. The tack coat shall not be placed more than 1 inch onto the lip of the "Curb and Gutter", "Valley Gutter" or edge of pavement. The tack coat shall be uniformly metered at the rate specified on the plans with a tolerance of plus or minus 0.05 gallons per square yard. Any excessive spills shall be removed and any obvious deviation from the rate specified will be rejected by the Engineer.

3.05 HOT MIX ASPHALTIC CONCRETE (HMAC)

A. The prime coat, tack coat or the asphaltic mixture when placed with a spreading and finishing machine; shall not be placed when the air temperature is below 50° F and is falling, but it may be placed when the air temperature is above 50°F and is rising.

B. The air temperature shall be taken in the shade away from artificial heat. It is further provided that the prime coat, tack coat, or asphaltic mixture shall be placed only when the humidity, general weather conditions, and temperature and moisture condition of the base, in the opinion of the Engineer, are suitable.

C. If the temperature of the asphaltic mixture of a load or any part of a load becomes less than 225°F or more than 350°F after being dumped from the mixer and prior to passing through the lay-down machine, all or any part of the load may be rejected.

a. Prime Coat: A prime coat shall be applied at the rate shown on the plans. The application temperature shall be as provided above. The tack coat or asphaltic concrete shall not be applied on a previously primed flexible base until the primed base has completely cured to the satisfaction of the Engineer.

b. Tack Coat: Before the asphaltic mixture is laid, the surface upon which the tack coat is to be placed shall be cleaned thoroughly to the satisfaction of the Engineer. The surface shall be given a uniform application of tack coat using asphaltic materials specified in the plans. This tack coat shall be applied, as directed by the Engineer, with an approved sprayer at a rate not to exceed 0.10 gallons per square yard or surface. All contact surfaces of curbs and structures and all joints shall be painted with a thin uniform coat of the asphaltic material meeting the requirements for tack coat. The tack coat shall be rolled with a pneumatic tire roller when directed by the Engineer.

c. Transporting Asphaltic Concrete: The asphaltic mixture, prepared as specified above, shall be hauled to the work in tight vehicles previously cleaned of all foreign material. The dispatching of the vehicles shall be arranged so that all material delivered may be placed, and all rolling shall be completed during daylight hours. In cool weather or for long hauls, canvas covers and insulating of the truck bodies may be required. The inside of the truck body may be given a light coating of oil, lime slurry or other material satisfactory to the Engineer, if necessary, to prevent mixture from adhering to the body.

d. Placing:

i. Generally, the asphaltic mixture shall be dumped and spread on the approved prepared surface with specified spreading and finishing machine, in such manner that when properly compacted the finished pavement will be smooth, of uniform density and will meet the requirement of the typical cross sections and the surface tests. During the application of asphaltic materials, care shall be taken to prevent splattering of adjacent pavement; curb and gutter and structures.

ii. In placing a level-up course with the spreading and finishing machine, binder twine or cord shall be set to line and grade established by the Engineer. If approved by the Engineer, level-up courses may be spread with a motor grader.

iii. When the asphaltic mixture is placed in a narrow strip along the edge of an existing pavement, or used to level up small areas of an existing pavement or placed in small irregular areas where the use of a finishing machine is not

practical, the finishing machine may be eliminated when authorized by the Engineer, provided a satisfactory surface can be obtained by other approved methods.

iv. Flush Structures. Adjacent to flush curbs, gutters, liners and structures, the surface shall be finished uniformly high so that when compacted it will be slightly above the edge of the curb or flush structure.

e. Compacting:

i. Rolling with the three wheel and tandem rollers shall start longitudinally at the sides and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the rear wheel unless otherwise directed by the Engineer. Alternate trips of the roller shall be slightly different in length. On super-elevated curves, rolling shall begin at the low side and progress toward the high side unless otherwise directed by the Engineer. Rolling with pneumatic-tire roller shall be done as needed. Rolling shall be continued until no further compression can be obtained and all roller marks are eliminated. One tandem roller, one pneumatic-tire roller and at least one three wheel roller, as specified above shall be provided for each job. If the Contractor elects, he may substitute the three axle tandem roller for the two axle tandem roller and/or the three wheel roller; but in no case shall less than three roller be in use on each job. Additional rollers shall be provided if needed. The motion of the roller shall be slow enough at all times to avoid displacement of the mixture. If any displacement occurs, it shall be corrected at once by the use of rakes and of fresh mixtures where required. The roller shall not be allowed to stand on pavement which has not been fully compacted. To prevent adhesion of the surface mixture to the roller, the wheels shall be kept thoroughly moistened with water, but an excess of water will not be permitted. All rollers must be in good mechanical condition. Necessary precautions shall be taken to prevent the dropping of gasoline, oil, grease or other foreign matter on the pavement, either when the rollers are in operation or when standing.

ii. In lieu of the rolling equipment specified, the Contractor may, upon written permission from the Engineer, operate other compacting equipment that will produce equivalent relative compaction as the specified equipment. If the substituted compaction equipment fails to produce the desired compaction as would be expected of the specified equipment, as determined by the Engineer, its use shall be discontinued.

iii. Hand Tamping: The edges of the pavement along curbs, headers and similar structures, and all places not accessible to the roller, or in such positions as will not allow thorough compaction with the rollers, shall be thoroughly compacted with lightly oiled tamps.

f. Opening to Traffic:

i. The pavement shall be opened to traffic when directed by the Engineer. The Contractor’s attention is directed to the fact that all construction traffic allowed on pavement open to the public will be subject to the laws governing traffic on Public Roads and Streets.

ii. If the surface ravels, it will be the Contractor’s responsibility to correct this condition at this expense.

g. Density Test - Acceptance Sampling and Testing of Hot Mix Asphaltic Concrete (Compaction):

i. Hot Mix Asphaltic Concrete will be accepted for density on a lot basis. A lot will consist of one day's production or 1,200 tons, whichever is less and shall be divided into four equal sublots. One test shall be made for each sublot.

ii. Each lot of pavement will be accepted, with respect to density, when the average field density is equal to or greater than 92 percent of the average maximum theoretical density as determined in accordance with ASTM D2041, and when no individual determination is less than 91.0 percent of the average maximum theoretical density. Four field density determinations will be made for each lot. Cores or sawed samples taken from the pavement will be used to determine the field density. The density of the cored or sawed samples shall be determined in accordance with ASTM D2726.

iii. The same specimen shall be used for determining both the maximum theoretical density and field density. Specimens used for field density determination shall be carefully crumbled, using heat if necessary, and maximum theoretical density determined in accordance with ASTM D2041. If heating is necessary, the specimen shall be heated to the lowest temperature required for proper preparation of the sample.

iv. The use of nuclear field density determination shall not be used as the basis for acceptance with respect density.

Table 8
Sliding Scale Pay Factors
(Density Based on Percent of Maximum Theoretical)

Average Percent Density*	Recommended Percent Payment
92 or above	100
91.0 - 91.9	90
Below 91.0	Reject **

* Average of 4 samples.
** If the Owner agrees to accept densities below 91.0%, the pay factor for density shall be 50%.

h. Surface Tests:

i. Tests for conformity with the specified crown and grade shall be made by the Contractor immediately after final rolling. Any variation exceeding the specified tolerances shall immediately be corrected by removing the defective work and replacing with new material, as directed by the Engineer. Any correction required shall be at the sole expense of the Contractor.

ii. For surface course, the finished surface shall not vary more than ¼ inch (6.35 mm) when tested with a 16-foot straightedge applied parallel with, or at right angles to, the centerline.

iii. The finished surfaces of hot mix asphaltic concrete shall not vary from the grade line, elevations and cross sections shown on the plans by more than ½ inch (12.7 mm). The Contractor shall correct pavement areas varying in excess of this amount

by removing and replacing the defective work. Skin patching shall not be permitted for correction of low areas nor shall planning be permitted for correction of high areas.

i. Sampling Pavement:

i. Samples for determination of thickness and density of completed pavements shall be obtained by the Contractor at no extra cost. The size, number and locations of the samples will be as directed by the Engineer. Samples shall be neatly cut with a saw, core drill or other approved equipment. The Contractor shall furnish all tools, labor and materials for cutting samples and replacing pavement.

ii. All tests necessary to determine conformance with the specified requirements will be performed without cost to the Contractor; however, any required retests shall be performed at the Contractor's cost.

END OF SECTION

Section 02741

ASPHALTIC CONCRETE PAVEMENT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Surface courses of compacted mixture of coarse and fine aggregates and asphaltic material.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for asphaltic concrete pavement is on square yard basis. Separate pay items reused for each different required thickness of pavement.

2. Payment for asphaltic concrete pavement includes payment for associated work performed in accordance with Section 02743 - Tack Coat.

3. Payment for asphaltic concrete in miscellaneous areas is on a square yard basis. Miscellaneous areas include tie-in to existing driveways.

4. No separate payment will be made under this section for asphaltic concrete provided for Section 02744-Pavement Repair.

5. Refer to Section 01270 - Measurement and Payment for unit price procedures.

6. Refer to Paragraph 3.08 for unit price adjustments.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

A. ASTM C 33 - Standard Specification for Concrete Aggregates.

B. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

C. ASTM C 136 - Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

D. TxDOT Tex-126-E - Molding, Testing, and Evaluation of Bituminous Black Base Material.

E. TxDOT Tex-106-E - Method of Calculating the Plasticity Index of Soils.

F. TxDOT Tex-203-F - Sand Equivalent Test.

G. TxDOT Tex-204-F - Design of Bituminous Mixtures.

H. TxDOT Tex-207-F - Determination of Density of Compacted Bituminous Mixtures.

I. TxDOT Tex-208-F - Test for Stabilometer Value of Bituminous Mixtures.

J. TxDOT Tex-217-F - Determination of Deleterious Material and Decantation Test for Coarse Aggregates.

K. TxDOT Tex-227-F - Theoretical Maximum Specific Gravity of Bituminous Mixtures

1.04 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

B. Submit certificates that asphaltic materials and aggregates meet requirements of Article 2.01, Materials, of this Section.

C. Submit proposed design mix and test data for each type and strength of surface course in Work.

D. Submit manufacturer's description and characteristics of mixing plant for approval.

D. Submit manufacturer's description and characteristics of spreading and finishing machine for approval.

PART 2 P R O D U C T S

2.01 MATERIALS

A. Coarse Aggregate: Gravel or crushed stone, or combination thereof, that is retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic or other injurious matter occurring either free or as coating on aggregate. Aggregate shall conform to ASTM C 33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed 40 percent by weight when tested in accordance with ASTM C 131.

B. Fine Aggregate: Sand or stone screenings or combination of both passing No. 10 sieve. Aggregate shall conform to ASTM C 33 except for gradation. Use sand composed of sound, durable stone particles free from loams or other injurious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Plasticity index of that part of fine aggregate passing No. 40 sieve shall be not more than 6 when tested by Tex-106-E. Sand equivalent shall have a minimum value of 45 when tested by Tex-203-F.

C. Composite Aggregate: Conform to following limits when graded in accordance with ASTM C 136.

GRADUATION OF COMPOSITE AGGREGATE	
Sieve Size	**Percent Passing**
1/2"	100
3/8”	85 to 100
#4	50 to 70
#10	32 to 42
#40	11 to 26
#80	4 to 14
#200	1 to 6*
*2 to 8 when Test Method Tex – 200 - F, Part II (Washed Sieve Analysis) is used	

D. Asphaltic Material: Moisture-free homogeneous material which will not foam when heated to 347 degrees F, meeting following requirements:

VISCOSITY GRADE				
	AC-10		**AC-20**	
TEST	**Min.**	**Max.**	**Min.**	**Max.**
Viscosity, 140º F stokes	1000	± 200	2000	± 400
Viscosity, 275º F stokes	1.9	-	2.5	-
Penetration, 77º F, 100g, 5 sec.	85	-	55	-
Flash Point, C.O.C., F.	450	-	450	-
Solubility in trichloroethylene, percent	99.0	-	99.0	-
Tests on residues from thin film oven tests:				
Viscosity, 140º F stokes		3000	-	6000
Ductility, 77º F, 5 cms per min., cms	100	-	70	-
Spot tests	Negative for all grades			

1. Material shall not be cracked.

2.02 EQUIPMENT

A. Mixing Plant: Weight-batching or drum mix plant with capacity for producing Continuously mixtures meeting specifications. Plant shall have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins, and dust collectors. Provide equipment to supply materials adequately in accordance with rated capacity of plant and produce finished material within specified tolerances. Following equipment is essential:

1. Cold aggregate bins and proportioning device.
2. Dryer.
3. Screens.
4. Aggregate weight box and batching scales.
5. Mixer.
6. Asphalt storage and heating devices.
7. Asphalt measuring devices.
8. Truck scales.

B. Bins: Separate aggregate into minimum of four bins to produce consistently uniform grading and asphalt content in completed mix.

2.03 MIXES

A. Employ a certified testing laboratory to prepare design mixes. Test in accordance with Tex-126-E or Tex-204-F and Tex-208-F.

B. Density and Stability Requirements:

Percent Density		Percent	HVEEM Stability Percent
Min.	Max.	Optimum	Not Less Than
94.5	97.5	96	35

C. Proportions for Asphaltic Material: Provide 4 to 8 percent of mixture by weight. Aggregate by weight shall not contain more than 1.0 percent by weight of fine dust, clay-like particles, or silt when tested in accordance with Tex-217-F, Part II.

PART 3 E X E C U T I O N

3.01 EXAMINATION

A. Verify compacted base course is ready to support imposed loads.

B. Verify lines and grades are correct.

3.02 PREPARATION

A. Prime Coat: If indicated on the Drawings, apply a prime coat conforming to requirements of Section 02742 - Prime Coat. Do not apply a tack coat until primed base has cured to satisfaction of Resident Project Representative.

B. Tack Coat: Conform to requirements of Section 02743 - Tack Coat.

C. Prepare subgrade in advance of asphaltic concrete paving operation.

D. Do not use cutback asphalt during the period of April 16 to September 15.

3.03 PLACEMENT

A. Do not place asphaltic mixture when air temperature is below 50 degrees F and falling. Mixture may be placed when air temperature taken in shade and away from artificial heat is above 40 degrees F and rising.

B. Haul prepared and heated asphaltic concrete mixture to the project in tight vehicles previously cleaned of foreign material. Mixture shall be at temperature between 250 degrees F and 325 degrees F when laid.

C. Spread material into place with approved mechanical spreading and finishing machine of screening or tamping type.

D. Surface Course Material: Surface course 2 inches or less in thickness may be spread in one lift. Spread lifts in such manner that, when compacted, finished course will be smooth, of uniform density, and will be to section, line and grade as shown. Place construction joints on surface courses to coincide with lane lines or as directed by Resident Project Representative.

E. Place courses as nearly continuously as possible. Pass roller over unprotected ends of Freshly laid mixture only when mixture has cooled. When work is resumed, cut back laid material to produce slightly beveled edge for full thickness of course. Remove old material which has been cut away and lay new mix against fresh cut.

F. When new asphalt is laid against existing or old asphalt, existing or old asphalt shall be saw cut full depth to provide straight smooth joint.

G. In restricted areas where use of paver is impractical, spread and finish asphalt by Mechanical compactor. Use wood or steel forms, rigidly supported to assure correct grade and cross section. Carefully place materials to avoid segregation of mix. Do not broadcast material. Remove any lumps that do not break down readily. Place asphalt courses in same sequence as if placed by machine.

3.04 COMPACTION

A. Begin rolling while pavement is still hot and as soon as it will bear roller without undue displacement or hair cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water.

B. Compress surface thoroughly and uniformly, first with power-driven, 3-wheel, or tandem rollers weighing from 8 to 10 tons. Obtain subsequent compression by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and rolling marks are eliminated. Complete rolling before mixture temperature drops below 175 degrees F.

C. Use tandem roller for final rolling. Double coverage with approved pneumatic roller on asphaltic concrete surface is acceptable after flat wheel and tandem rolling has been completed.

D. Along walls, curbs, headers and similar structures, and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.

E. Compact binder course and surface course to density not less than 94 percent nor more than 98 percent of the maximum possible density of voidless mixture composed of same materials in like proportions.

3.05 TOLERANCES

A. Furnish templates for checking surface in finished sections. Maximum deflection of templates, when supported at center, shall not exceed 1/8 inch.

B. Completed surface, when tested with 10-foot straightedge laid parallel to center line of pavement, shall show no deviation in excess of 1/8 inch in 10 feet. Correct any surface not meeting this requirement.

3.06 FIELD QUALITY CONTROL

A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.

B. Minimum of one core will be taken at random locations per 1000 feet per lane of roadway or 500 square yards of base to determine in-place depth and density.

C. In-place density will be determined in accordance with Tex-207-F and Tex-227-F from cores or sections. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by Engineer.

D. Contractor may, at his own expense, request three additional cores in vicinity of cores indicating nonconforming in-place depths. In-place depth at these locations shall be average depth of four cores.

E. Fill cores and density test sections with new compacted asphaltic concrete.

3.07 NONCONFORMING PAVEMENT

A. Remove and replace any non – conforming pavement.

B. Remove and replace areas of asphalt found deficient in thickness by more than 10 percent. Use new asphaltic base of thickness shown on Drawings.

C. Replace nonconforming pavement sections.

3.08 UNIT PRICE ADJUSTMENT

A. Unit price adjustments shall be made for in-place depth determined by cores as follows:

1. Adjusted Unit Price shall be ratio of average thickness as determined by cores to thickness bid upon, times unit price bid.

2. Adjustment shall apply to lower limit of 90 percent and upper limit of 105 percent of unit price.

3. Average depth below 90 percent may be rejected by Engineer.

3.09 PROTECTION

A. Do not open pavement to traffic until 12 hours after completion of rolling, or as shown on Drawings.

B. Maintain asphaltic concrete pavement in good condition until completion of Work.

C. Repair defects immediately by replacing asphaltic concrete pavement to full depth.

END OF SECTION

SECTION 02742

PRIME COAT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Prime coat for asphaltic concrete paving

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for prime coat under this Section. Include payment in unit price for material being primed.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

B. Submit product data for proposed prime coat.

C. Submit report of recent calibration of distributor.

PART 2 P R O D U C T S

A. Cutback Asphalt

B. Provide moisture-free homogeneous material which will not foam when heated to 347 degrees F and which meets following requirements:

C. Asphalt material for prime coat shall be MC-30 or MC-70 and shall meet following requirements:

PROPERTIES	**TYPE - GRADE**			
	MC-30		**MC-70**	
	MIN.	**MAX.**	**MIN.**	**MAX.**
Water, Percent	---	0.2	---	0.2
Flash Point, T.O.C., °F	100	---	100	---
Kinematic Viscosity at 140°F, cst	30	60	70	140

2. Distillate shall be as follows, expressed as percent by volume of total distillate to 680 degrees F:

TEMPERATURE	TYPE-GRADE			
	MC-30		MC-70	
	MIN.	MAX.	MIN.	MAX.
to 437°F	---	25	---	20
to 500°F	40	70	20	60
to 600°F	75	93	65	90
Residue from 680ºF Distillation, Volume, Percent	50	---	55	---

3. Tests on Distillation Residue:

TEST	TYPE-GRADE			
	MC-30		MC-70	
	MIN.	MAX.	MIN.	MAX.
Penetration at 77°F, 100g, 5 sec., cm	120	250	120	250
Ductility at 77°F, 5 cm/min., cm	100*	---	100*	---
Solubility in Trichloroethylene, %	99	---	99	---
Spot Test	All Negative			

*If penetration of residue is more than 200 and ductility at 77 degrees F is less than 100 cm, material will be acceptable if its ductility at 60 degrees F is more than 100 cm.

2.02 EMULSIFIED PETROLEUM RESIN

A. EPR-1 Prime: Slow curing emulsion of petroleum resin and asphalt cement conforming to the following requirements:

PROPERTIES	MIN.	MAX.
Fural Viscosity at 77°F, Sec	14	40
Residue by Evaporation, % by Weight	60	-
Sieve Test, %	-	0.1
Particle Charge Test	Positive	
Tests on the Distillation Residue:		
Flash Point, COC (F)	400	-
Kinematic Viscosity @ 140 F (cst)	190	350

B. For use, EPR-1 may be diluted with water up to a maximum three parts water to one part EPR-1 in order to achieve desired concentration of residual resin/asphalt to facilitate application.

PART 3 E X E C U T I O N

3.01 EXAMINATION

A. Verify base is ready to support imposed loads.

B. Verify lines and grades are correct.

3.02 PREPARATION

A. Thoroughly clean base course surface of loose material by brooming prior to application of prime coat.

B. Prepare sufficient base in advance of paving for efficient operations.

3.03 APPLICATION, BASIC

A. Apply prime coat with approved type of self-propelled pressure distributor. Distribute prime coat evenly and smoothly under pressure necessary for proper distribution.

B. Keep storage tanks, piping, retorts, booster tanks, and distributors used in handling asphaltic materials clean and in good operating condition. Conduct operations so that asphaltic material does not become contaminated.

C. If yield of asphaltic material appears to be in error, recalibrate distributor prior to continuing work.

D. Maintain the surface until Work is accepted by Owner.

3.04 APPLICATION, CUTBACK ASPHALT

A. Do not place prime coat when air temperature is below 60 degrees F and falling. Materials may be placed when air temperature taken in shade and away from artificial heat is above 50 degrees F and rising.

B. Distribute at rate of 0.25 to 0.35 gallons per square yard.

C. Equipment shall be capable of reporting temperature of asphaltic material in heating equipment and in distributor, for determining rate of application, and for obtaining uniformity at junction of two distributor loads. Maintain in accurate working order, including recording thermometer at storage heating unit at all times.

D. Temperature of application shall be based on temperature-viscosity relationship that will permit application of asphalt with viscosity of 100 to 125 centistokes. Maintain asphalt within 15 degrees F of temperature required to meet viscosity. Selected temperature shall be within following range.

Prime Coat Type	Minimum (°F)	Maximum (°F)
MC-30	70	150
MC-70	125	175

E. Do not allow temperature of MC-30 to exceed 175 degrees F at any time.

F. Do not allow temperature of MC-70 to exceed 200 degrees F at any time.

3.05 APPLICATION, EMULSIFIED PETROLEUM RESIN

A. Do not place prime coat when air temperature is below 36 degrees F and falling.

B. Distribute at rate of 0.15 to 0.25 gallons per square yard.

3.06 PROTECTION

A. Prevent traffic or placement of subsequent courses over freshly applied prime coat until authorized by Resident Project Representative.

END OF SECTION

Section 02743

TACK COAT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Tack coat for asphaltic concrete paving.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for tack coat under this Section. Include payment in unit price for asphaltic pavements.

2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

A. ASTM D 244 - Standard Test Methods for Emulsified Asphalts.

1.04 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

B. Submit product data for proposed tack coat.

C. Submit report of recent calibration of distributor.

PART 2 P R O D U C T S

2.01 CUTBACK ASPHALT

A. Provide moisture-free homogeneous material which will not foam when heated to 347 degrees F and which meets following requirements:

1. Asphalt material for tack coat: RC-250 and meet following:

PROPERTIES	RC – 250	
	MIN.	MAX.
Water, Percent	---	0.2
Flash Point, T.O.C.,°F	80	---
Kinematic Viscosity at 140°F, cst	250	400

2. Distillate: Expressed as percent by volume of total distillate to 680 F:

TEMPERATURE	RC – 250	
	MIN.	MAX.
to 437°F	40	75
to 500°F	65	90
to 600°F	85	---
Residue from 680°F Distillation, Volume, Percent	70	---

3. Tests on Distillation Residue:

PROPERTIES	RC – 250	
	MIN.	MAX.
Penetration at 77°F, 100g, 5 sec.	100	150
Ductility at 77°F, 5 cm/min. cms	100	---
Solubility in Trichloroethylene, %	99	---
Spot Test	All Negative	

2.02 EMULSION

A. Provide homogeneous material which shall show no separation of asphalt after mixing and shall meet the viscosity requirements at any time within 30 days after delivery.

1. Emulsion material for tack coat: SS-1 and meet following:

PROPERTIES	SS – 1	
	MIN.	MAX.
Furol Viscosity at 77°F, sec.	30	100
Residue by Distillation, %	60	---
Oil Portion of Distillate, %	---	2
Sieve Test, %	---	0.1
Miscibility (Standard Test)	Passing	Passing
Cement Mixing, %	---	2.0
Storage Stability, 1 Day, %	---	1
Test on Residue: Penetration at 77°F, 100g, 5 sec. Solubility in Trichloroethylene, % Ductility at 77°F, 5 cm/min., cms	 120 97.5 100	 160 --- ---

PART 3 E X E C U T I O N

3.01 EXAMINATION

A. Verify compacted base is ready to support imposed loads.

B. Verify lines and grades are correct.

3.02 PREPARATION

A. Thoroughly clean base course or concrete surface of loose material by brooming prior to application of tack coat.

3.03 APPLICATION

A. Apply tack coat uniformly by use of approved distributor at rate not to exceed 0.05 gallons per square yard of surface.

B. Paint contact surfaces of curbs and structures, and joints with thin uniform coat of tack coat.

C. Cutback Asphalt:

1. Do not place tack coat when air temperature is below 50 degrees F and falling. Materials may be placed when air temperature taken in shade and away from artificial heat is above 40 degrees F and rising.

2. Temperature of tack coat shall be between 125 degrees F and 180 degrees F when applied.

3. Do not heat tack coat above 200 degrees F at any time.

3.04 PROTECTION

A. Prevent traffic or placement of subsequent courses over freshly applied tack coat until authorized by Resident Project Representative.

END OF SECTION

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SECTION 02744

PAVEMENT REPAIR

PART 1 - GENERAL

1.01 GENERAL DESCRIPTION OF WORK:

A. This item shall consist of repairing the existing pavement, scarifying, removing existing asphalt and base material, adding new base, prime coat and application of asphalt overlay as herein specified and in conformity with typical sections, lines and grades shown in the plans and established by the Engineer.

PART 2 - PRODUCTS

2.01 GENERAL:

A. All materials provided under this item shall be new and meet or exceed the requirements of the item for which they are part of.

B. Additional materials to meet the intent of this item shall be provided as required.

2.02 MATERIALS:

A. FLEXIBLE BASE

1. The flexible base shall be crushed limestone as specified in Specification CL1 based upon Texas Department of Transportation Item 247.

B. HOT MIX ASPHALTIC CONCRETE

1. H.M.A.C. surfacing shall be “Type D” (Fine graded surface course) (Modified) as described elsewhere in these specifications.

C. PRIME COAT

1. Prime coat shall be CSS-IH liquid asphalt.

PART 3 - EXECUTION

3.01 SCARIFY AND RESHAPE SURFACE AND BASE:

A. The existing base and asphaltic mat to be scarified shall first be cleansed of all dirt, vegetation or other objectionable materials, and then scarified to a minimum depth of 8 inches.

B. The asphaltic mat and base shall be removed and disposed of by the Contractor.

C. New flexible base shall be added to bring the surface to a finished shape and grade as shown on the plans.

D. The reshaped surface and base shall be sprinkled as required and rolled as directed until a uniform compaction is secured.

E. Throughout this entire operation, the shape of the course shall be maintained by blading and the surface upon completion shall be smooth and in conformity with the typical sections shown on plans and to the established lines and grades.

F. In that area on which pavement is to be placed, any deviation in excess of 1/4 inch in cross section in a length of 12 feet measured longitudinally shall be corrected by loosening, adding and rolling, all irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding suitable material as required, re-shaping and re-compacting by sprinkling and rolling.

G. The Contractor shall “proof roll” the finish surface as directed by the Engineer to determine any weak spots.

H. “Scarify and reshape surface and base” is specified based on the assumption that the underlying courses have not failed and have adequate strength to support the loads applied to them during construction.

I. The Contractor may “proof roll” the area designated for “scarify and reshape surface and base” before beginning work.

J. If such “proof rolling” indicates failure in the underlying courses, the unstable material is to be removed, and replaced with Lime Stabilized Subgrade Material.

K. The replacing of the underlying material shall be measured and paid for by the square yard of Lime Treated Subgrade (8” thick).

L. Once work has begun on an area, the Contractor shall be responsible for any failures in the underlying courses.

M. Should the areas of “scarified and reshaped surface and base”, due to any reason or cause, lose the required stability, density and finish before the surfacing is complete, it shall be re-compacted and refinished at the sole expense of the Contractor.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT:

A. No bid item is established for these items, this work shall be considered subsidiary to the contract and no direct payment will be made.

END OF SECTION

Section 02752

CONCRETE PAVEMENT JOINTS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Joints for concrete paving; concrete sidewalks; concrete driveways, curbs, and curb and gutters.

B. Saw-cutting existing concrete or asphalt pavements for new joints.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for saw-cutting existing concrete or asphalt pavement for new joints is on linear foot basis. Saw-cutting existing standard concrete curb will be measured as 1-1/2 linear feet and existing standard concrete curb and gutter will be measured as 3 linear feet.

2. No separate payment will be made for expansion joints, formed or sawed street pavement contraction joints and longitudinal weakened plane joints. Include payment in unit price for Concrete Paving.

3. No separate payment will be made for joints for Curb, Curb and Gutter, Saw-tooth Curb, Concrete Sidewalks, and Concrete Driveways. Include payment in unit price for Curb and Gutter, Concrete Sidewalks, and Concrete Driveways.

4. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

A. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

B. ASTM D 994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

C. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

D. ASTM D 3405 - Standard Specification for Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements.

1.04 SUBMITTALS

A. Submit product data and samples in accordance with requirements of Section 01330 - Submittal Procedures.

B. Submit product data for joint sealing compound and proposed sealing equipment for approval.

C. Submit samples of dowel cup, metal supports, and deformed metal strip for approval.

PART 2 P R O D U C T S

2.01 MATERIALS

A. Board Expansion Joint Material: Filler board of selected stock. Use wood of density and type as follows:

1. Clear, all-heart cypress weighing no more than 40 pounds per cubic foot, after being oven dried to constant weight.

2. Clear, all-heart redwood weighing no more than 30 pounds per cubic foot, after being oven dried to constant weight.

B. Preformed Expansion Joint Material: Bituminous fiber and bituminous mastic composition material conforming to ASTM D 994 and ASTM D 1751.

C. Joint Sealing Compound: Hot-poured rubber-asphalt compound conforming to ASTM D 3405.

D. Load Transmission Devices:

1. Smooth, steel dowel bars conforming to ASTM A 615, Grade 60. When indicated on Drawings, encase one end of dowel bar in approved cap having inside diameter 1/16 inch greater than diameter of dowel bar.

2. Deformed steel tie bars conforming to ASTM A 615, Grade 60.

E. Metal Supports for Reinforcing Steel and Joint Assembly: Employ metal supports of approved shape and size that will secure reinforcing steel and joint assembly in correct position during placing and finishing of concrete.

PART 3 E X E C U T I O N

3.01 PLACEMENT

A. When new work is adjacent to existing concrete, place joints at same location as existing joints in adjacent pavement.

B. If the limit of removal of existing concrete or asphaltic pavement does not fall on existing joint, saw cut existing pavement minimum of 2 inches deep to provide straight, smooth joint surface without chipping, spalling or cracks.

3.02 CONSTRUCTION JOINTS

A. Place transverse construction joint wherever concrete placement must be stopped for more than 30 minutes. Place longitudinal construction joints at interior edges of pavement lanes using No. 6 deformed tie bars, 30 inches long and spaced 18 inches on centers.

3.03 EXPANSION JOINTS

A. Place 3/4-inch expansion joints at radius points of curb returns for cross street intersections, or as located in adjacent pavement but no further than 80 feet apart. Use no boards shorter than 6 feet. When pavement is 24 feet or narrower, use not more than 2 lengths of board. Secure pieces to form straight joint. Shape board filler accurately to cross section of concrete slab. Use load transmission

devices of type and size shown on Drawings unless otherwise specified or shown as “No Load Transfer Device”. Seal with joint sealing compound.

3.04 CONTRACTION JOINTS

A. Place contraction joints at same locations as in adjacent pavement or at spaces indicated on Drawings. Place smoothed, painted and oiled dowels accurately and normal to joint. Seal groove with joint sealing compound.

3.05 LONGITUDINAL WEAKENED PLANE JOINTS

A. Place longitudinal weakened plane joints at spaces indicated on Drawings. Seal groove with joint sealing compound.

3.06 SAWED JOINTS

A. Use sawed joints as an alternate to contraction and weakened plane joints. Circular cutter shall be capable of cutting straight line groove minimum of 1/2 inch wide. Depth shall be one quarter of pavement thickness plus 1/2 inch. Commence sawing as soon as concrete has hardened sufficiently to permit cutting without chipping, spalling or tearing and prior to initiation of cracks. Once sawing has commenced, it shall be continued until completed. Make saw cut with one pass. Complete sawing within 24 hours of concrete placement. Saw joints at required spacing consecutively in sequence of concrete placement.

B. Concrete Saw: Provide sawing equipment adequate in power to complete sawing to required dimensions and within required time. Provide at least one standby saw in good working order. Maintain an ample supply of saw blades at work site at all times during sawing operations. Sawing equipment shall be on job at all times during concrete placement.

3.07 JOINTS FOR CURB, CURB AND GUTTER

A. Place 3/4-inch preformed expansion joints through curb and gutters at locations of expansion and contraction joints in pavement; at end of radius returns at street intersections and driveways; and at curb inlets. Maximum spacing shall be 120-foot centers.

3.08 JOINTS FOR CONCRETE SIDEWALKS

A. Provide 3/4-inch expansion joints conforming to ASTM A 1751 along and across sidewalk at back of curbs, at intersections with driveways, steps, and walls; and across walk at intervals not to exceed 36 feet. Provide expansion joint material conforming to ASTM D 994 for small radius curves and around fire hydrants and utility poles. Extend the expansion joint material full depth of the slab.

3.09 JOINTS FOR CONCRETE DRIVEWAYS

A. Provide 3/4-inch expansion joints conforming to ASTM D 1751 across driveway in line with street face of sidewalks, at existing concrete driveways, and along intersections with sidewalks and other structures. Extend expansion joint material full depth of slab.

3.10 JOINT SEALING

A. Seal joints only when surface and joints are dry, ambient temperature is above 50 degrees F and less than 85 degrees F, and weather is not foggy or rainy.

B. Joint sealing equipment shall be in like new working condition throughout the joint sealing operation, and be approved by Resident Project Representative. Use concrete grooving machine or power-

operated wire brush and other equipment such as plow, brooms, brushes, blowers or hydro or abrasive cleaning as required to produce satisfactory joints.

C. Clean joints of loose scale, dirt, dust and curing compound. The term joint includes wide joint spaces, expansion joints, dummy groove joints or cracks, either preformed or natural. Remove loose material from concrete surfaces adjacent to joints.

D. Fill joints neatly with joint sealer to depth shown. Pour sufficient joint sealer into joints so that, upon completion, surface of sealer within joint will be 1/4 inch above level of adjacent surface or at elevation as directed.

3.11 PROTECTION

A. Maintain joints in good condition until completion of Work.

B. Replace damaged joints material with new material as required by this Section.

END OF SECTION

Section 02753

CONCRETE PAVEMENT CURING

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Curing of Portland cement concrete paving.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for concrete curing under this Section. Include payment in unit price for Concrete Paving, Concrete Sidewalks, Curbs, and Curb and Gutters.

2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

A. ASTM C 171 - Standard Specifications for Sheet Materials for Curing Concrete.

B. ASTM C 309 - Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.

1.04 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

B. Submit manufacturer's product data for cover materials and liquid membrane-forming compounds.

PART 2 P R O D U C T S

2.01 COVER MATERIALS FOR CURING

A. Curing materials shall conform to one of the following:

1. Polyethylene Film: Opaque pigmented white film conforming to requirements of ASTM C 171.

2. Waterproofed Paper: Paper conforming to requirements of ASTM C 171.

3. Cotton Mats: Single layer of cotton filler completely enclosed in cover of cotton cloth. Mats shall contain not less than 3/4 of a pound of uniformly distributed cotton filler per square yard of mat. Cotton cloth used for covering materials shall weigh not less than 6 ounces per square yard. Mats shall be stitched so that mat will contact surface of pavement at all points when saturated with water.

2.02 LIQUID MEMBRANE-FORMING COMPOUNDS

A. Liquid membrane-forming compounds shall conform to ASTM C 309. Membrane shall restrict loss of water to not more than 0.55 kg/m^2 of surface in 72 hours.

PART 3 E X E C U T I O N

3.01 CURING REQUIREMENT

A. Concrete pavement shall be cured by protecting it against loss of moisture for period of not less than 72 hours immediately upon completion of finishing operations. Do not use membrane curing for concrete pavement to be overlaid by asphaltic concrete.

B. Failure to provide sufficient cover material shall be cause for immediate suspension of concreting operations.

3.02 POLYETHYLENE FILM CURING

A. Immediately after finishing surface, and after concrete has taken its initial set, apply water in the form of a fine spray. Cover surface with polyethylene film so film will remain in direct contact with surface during specified curing period.

B. Cover entire surface and both edges of pavement slab. Joints in film sheets shall overlap minimum of 12 inches. Immediately repair tears or holes occurring during curing period by placing acceptable moisture-proof patches or by replacing.

3.03 WATERPROOFED PAPER CURING

A. Immediately after finishing surface, and after concrete has taken its initial set, apply water in form of fine spray. Cover surface with waterproofed paper so paper will remain in direct contact with surface during specified curing period.

B. Prepare waterproofed paper to form blankets of sufficient width to cover entire surface and both edges of pavement slab, and not be more than 60 feet in length. Joints in blankets caused by joining paper sheets shall lap not less than 5 inches and shall be securely sealed with asphalt cement having melting point of approximately 180 degrees F. Place blankets to secure an overlap of at least 12 inches. Tears or holes appearing in paper during curing period shall be immediately repaired by cementing patches over defects.

3.04 COTTON MAT CURING

A. Immediately after finishing surface, and after concrete has taken its initial set, completely cover surface with cotton mats, thoroughly saturated before application, in such manner that they will contact surface of pavement equally at all points.

B. Mats shall remain on pavement for specified curing period. Keep mats saturated so that, when lightly compressed, water will drip freely from them. Keep banked earth or cotton mat covering edges saturated.

3.05 LIQUID MEMBRANE-FORMING COMPOUNDS

A. Immediately after finishing surface, and after concrete has taken its initial set, apply liquid membrane-forming compound in accordance with manufacturer's instructions.

END OF SECTION

Section 02771

CURB, CURB AND GUTTER, AND HEADERS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Reinforced concrete curb, reinforced monolithic concrete curb and gutter, and mountable curb.

B. Paving headers and railroad headers poured monolithically with concrete base or pavement.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for curbs and for curbs and gutter is on linear foot basis measured along face of curb. Item is subsidiary to other items, if it is incidental to the project.

2. Payment for headers is on linear foot basis measured between lips of gutters adjacent to concrete base and measured between backs of curbs adjacent to streets.

3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

B. Submit details of proposed formwork for approval.

PART 2 P R O D U C T S

2.01 MATERIALS

A. Concrete: Conform to material and proportion requirements for concrete of Section 02751 - Concrete Paving.

B. Reinforcing Steel: Conform to material requirements for welded wire fabric of Section 02751 - Concrete Paving.

C. Grout: Nonmetallic, nonshrink grout containing no chloride producing agents conforming to the following requirements.

1. Compressive strength

   a. at 7 days: 3500 psi

   b. at 28 days: 8000 psi

2. Initial set time: 45 minutes

3. Final set time: 1.5 hours

D. Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 02752 - Concrete Pavement Joints.

E. Expansion Joint Filler: Conform to material requirements for expansion joint filler of Section 02752 - Concrete Pavement Joints.

F. Mortar: Mortar finish composed of one part Portland cement and 1-1/2 parts of fine aggregate. Use only when approved by Resident Project Representative.

PART 3 E X E C U T I O N

3.01 PREPARATION

A. Prepare subgrade in accordance with applicable portions of sections on excavation and fill, embankment, and subgrade and roadbed.

3.02 PLACEMENT

A. Guideline: Set to follow top line of curb. Attach indicator to provide constant comparison between top of curb and guideline. Ensure flow lines for monolithic curb and gutters conform to slopes indicated on Drawings.

B. Forms: Brace to maintain position during pour. Use metal templates cut to section shown on Drawings.

C. Reinforcement: Secure in position so that steel will remain in place throughout placement. Reinforcing steel shall remain at approximate center of base or pavement as indicated on Drawings.

D. Joints: Place in accordance with Section 02752 - Concrete Pavement Joints. Place dummy groove joints at 6-foot centers at right angles to curb lines. Cut dummy grooves 1/4 inch deep using an approved edging tool.

E. Place concrete in forms to required depth. Consolidate thoroughly. Do not permit rock pockets in form. Entirely cover top surfaces with mortar.

3.03 MANUAL FINISHING

A. After concrete is in place, remove front curb forms. Form exposed portions of curb, and of curb and gutter, using mule which conforms to curb shape, as shown on Drawings.

B. Thin coat of mortar may be worked into exposed face of curb using mule and two-handled wooden darby at least 3 feet long.

C. Before applying final finish move 10-foot straightedge across gutter and up curb to back form of curb. Repeat until curb and gutter are true to grade and section. Lap straightedge every 5 feet.

D. Steel trowel finish surfaces to smooth, even finish. Make face of finished curb true and straight.

E. Edge outer edge of gutter with 1/4-inch edger. Finish edges with tool having 1/4-inch radius.

F. Finish visible surfaces and edges of finished curb and gutter free from blemishes, form marks and tool marks. Finished curb or curb and gutter shall have uniform color, shape and appearance.

3.04 MECHANICAL FINISHING

A. Mechanical curb forming and finishing machines may be used instead of, or in conjunction with, previously described methods. Use of mechanical methods shall provide specified curb design and finish.

3.05 CURING

A. Immediately after finishing operations, cure exposed surfaces of curbs and gutters in accordance with Section 02753 - Concrete Pavement Curing.

3.06 TOLERANCES

A. Top surfaces of curb and gutter shall have uniform width and shall be free from humps, sags or other irregularities. Surfaces of curb top, curb face and gutter shall not vary more than 1/8 inch from edge of straightedge laid along them.

3.07 PROTECTION

A. Maintain curbs and gutters in good condition until completion of the Work.

B. Replace damaged curbs and gutters to comply with this Section.

END OF SECTION

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SECTION 02775

CONCRETE SIDEWALKS

PART 1 – G E N E R A L

1.1 SECTION INCLUDES

A. Reinforced concrete sidewalks.

1.2 MEASUREMENT AND PAYMENT

A. Unit prices.

1. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.3 REFERENCES

A. ASTM D698 - Standard Test Methods for Moisture - Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-Pound Rammer and 12-inch Drop.

B. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 SUBMITTALS

A. Submittals shall conform to requirements of Section 01300 - Submittals.

PART 2 –PRODUCTS

2.1 MATERIALS

A. Concrete: Conform to material and proportion requirements for concrete of Section 02731 - Concrete Paving.

B. Reinforcing steel: Conform to material requirements for welded wire fabric of Section 02731 - Concrete Paving.

C. Preformed expansion joint material: Conform to material requirements for preformed expansion joint material of Section 02752 - Concrete Paving Joints.

D. Expansion joint filler: Conform to material requirements for expansion joint material of Section 02752 – Concrete Paving Joints.

E. Sand bed: Conform to material requirements for bank run sand of Section 02320 – Utility Backfill Materials.

PART 3 –EXECUTION

3.1 REPLACEMENT

A. Replace sidewalks which are removed or damaged during construction with sidewalk of thickness and width equivalent to one removed or damaged.

B. Provide replaced and new sidewalks with wheelchair ramps if sidewalk intersects curb at street or

driveway intersection.

3.2 PREPARATION

A. Identify and protect utilities which are to remain.

B. Protect living trees, other plant growth, and features designated to remain.

C. Clear and grub area.

D. Excavate subgrade 6 inches beyond outside lines of sidewalk. Shape to the line, grade and cross section. For soils with plasticity index above 40 percent, stabilize soil with lime. Compact subgrade to minimum of 90 percent maximum dry density at optimum to 3 percent above optimum moisture content, as determined by ASTM D698.

E. Immediately after subgrade is prepared, cover with 2-inch-thick compacted sand bed. Lay concrete when sand is moist but not saturated.

3.3 PLACEMENT

A. Forms: Straight, unwarped wood or metal forms with nominal 4-inch depth. Securely stake forms to line and grade, and maintain in true position during concrete placement.

B. Reinforcement: Install 6x6, W2.9 x W2.9 welded wire fabric or No. 3 reinforcing steel bars on 18-inch centers longitudinally and transversely. Lay longitudinal bars in walk continuously, except through expansion joints. Support reinforcement in manner to maintain reinforcement in center of slab vertically during placement.

C. Expansion Joints: Install expansion joints in accordance with Section 02752.

D. Colored concrete: Not Applicable.

E. Place concrete in forms to specified depth and tamp thoroughly with "jitterbug" tamp, or other acceptable method. Bring mortar to surface.

F. Strike off to smooth finish with wood strike board. Finish smoothly with wood hand float. Brush across sidewalk lightly with fine-haired brush.

G. Unless otherwise indicated on Drawings, mark off joints 1/8 inch deep, at spacing equal to width of walk. Use joint tool equal in width to edging tool.

H. Finish edges with tool having 1/4-inch radius.

I. After concrete has set sufficiently, refill space along sides of sidewalk to top of walk with suitable material. Tamp unit firm and solid. Dispose of excess material in accordance with Section 01564.

3.4 CURING

A. Conform to requirements of Section 03370.

3.5 PROTECTION

A. Maintain sidewalks in good condition until completion of Work.

B. Replace damaged sidewalks in accordance with the Paragraph in this Section on REPLACEMENT.

END OF SECTION

Section 02911

TOPSOIL

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Furnishing and placing topsoil for finish grading and for seeding, sodding, and planting.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for topsoil under this Section. Include payment in Section 02922 - Hydromulch Seeding.

2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

PART 2 P R O D U C T S

2.01 TOPSOIL

A. Topsoil shall be fertile, friable, natural sandy loam surface soil obtained from excavation or borrow operations having the following characteristics:

1. pH value of between 5.5 and 6.5

2. Liquid limit: 50 or less

3. Plasticity index: 20 or less.

4. Gradation: maximum of 10 percent passing the No. 200 sieve.

B. Topsoil shall be reasonably free of subsoil, clay lumps, weeds, non-soil materials, and other litter or contamination. Topsoil shall not contain roots, stumps, and stones larger than 2 inches.

C. Obtain topsoil from naturally well-drained areas where topsoil occurs at a minimum depth of 4 inches and has similar characteristics to that found at the placement site. Do not obtain topsoil from areas infected with a growth of, or reproductive parts of nut grass or other noxious weeds.

PART 3 E X E C U T I O N

3.01 EXAMINATION

A. Verify that excavation and embankment operations have been completed to correct lines and grades.

3.02 TOPSOIL EXCAVATION

A. Strip off topsoil from the area to be excavated to a minimum depth of 6-inches, unless indicated otherwise on the Drawings.

B. Place Topsoil in stockpile for reuse. Cover stockpile to prevent erosion.

3.03 PLACEMENT

A. For areas to be seeded or sodded, scarify or plow existing material to a minimum depth of 4 inches, or as indicated on the Drawings. Remove vegetation and foreign inorganic material. Place 4 inches of topsoil on loosened material and roll lightly with an appropriate lawn roller to consolidate topsoil.

B. Increase depth of topsoil to 6 inches when placed over sand bedding and backfill materials specified in Section 02320 - Utility Backfill Material.

C. For areas to receive shrubs or trees, excavate existing material and place topsoil to the depth and dimensions shown on the Drawings.

D. Remove spilled topsoil from curbs, gutters, and, paved areas and dispose of excess topsoil in accordance with requirements of Section 01576 - Waste Material Disposal.

3.04 PROTECTION

A. Protect topsoil from wind and water erosion until planting is completed.

END OF SECTION

SECTION 02920

TOPSOILING AND FINISHED GRADING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnish all labor, materials, tools, equipment, and services for all topsoiling and finished grading, as indicated, in accord with provisions of contract documents.

B. Completely coordinate with work of all other trades.

C. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.02 LOCATION OF WORK

A. All areas within limits of construction, areas of surplus material disposal, and all areas which are disturbed in the course of the work.

1.03 RELATED SECTIONS

A. Section 02200 - Earthwork and Site Grading

B. Section 02100 – Site Clearing

1.4 QUALITY ASSURANCE

A. Finish Grading Tolerance:

1. 0.1 ft. (30 mm) plus/minus from required elevations.

1.5 JOB CONDITIONS:

A. Verify amount of topsoil stockpiled and determine amount of additional topsoil, if necessary to complete work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil:

1. Original fertile, friable surface soil typical of the area, capable of supporting native plant growth, reasonably free of subsoil, clay, weeds, roots, and stones larger than 1 inch.

a. Use existing topsoil stockpiled under Section 02100.

b. If amount of topsoil stockpiled is less than amount necessary for the work, furnish all additional topsoil required at no additional cost to the Owner.

c. Contractor may import topsoil to the site with prior review and approval by the Owner's Representative.

B. Surplus Material:

1. Legally dispose of surplus material offsite.

PART 3 - EXECUTION

3.1 ROUGH GRADE REVIEW

A. Rough grading shall be inspected and approved by owner's representative before site work proceeds.

3.2 PREPARATION

A. Correct, adjust and/or repair rough graded areas.

1. Cut off mounds and ridges.
2. Fill gullies and depressions.
3. Perform other necessary repairs.
4. Bring all sub-grades to specified contours, even and properly compacted.

B. Remove all stones and debris over 2 in. (50 mm) in any dimension.

3.3 PLACING TOPSOIL

A. Do not place topsoil when subgrade is either wet or frozen enough to cause clodding.

B. Spread topsoil to minimum compacted depth of 6 in. (100 mm) for all disturbed earth areas.

C. Make finished surface free of stones, sticks, dirt clods or other material 1 in. (25 mm) or more in any dimension.

D. Drag finish with harrow (or hand rake) to insure smooth finish to the lines and grades indicated.

E. Restore areas occupied by stockpiles to condition of rest of finished work.

3.4 ACCEPTANCE

A. Upon completion of topsoiling, obtain owner's representative acceptance of grade and surface.

END OF SECTION

Section 02922

HYDRO MULCH SEEDING

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Seeding, fertilizing, mulching, and maintenance of areas indicated on Drawings.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for hydro mulch seeding is on an acre basis. Item is subsidiary when it is incidental and should be part other main pay items.

2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit certification from supplier that each type of seed conforms to these specifications and requirements of Texas Seed Law. Certification shall accompany seed delivery.

C. Submit certificate stating that fertilizer complies with these specifications and requirements of Texas Fertilizer Law.

PART 2 P R O D U C T S

2.01 MATERIALS

A. Topsoil: Conform to material requirements of Section 02911 - Topsoil.

B. Seed: Conform to U.S. Department of Agriculture rules and regulations of Federal Seed Act and Texas Seed Law. Seed shall be certified 90 percent pure and furnish 80 percent germination and meet following requirements:

1. Rye: Fresh, clean, Italian rye grass seed (lollium multi-florum), mixed in labeled proportions. As tested, minimum percentages of impurities and germination must be labeled. Deliver in original unopened containers.

2. Bermuda: Extra-fancy, treated, lawn type common bermuda (Cynodon dactylon). Deliver in original, unopened container showing weight, analysis, name of vendor, and germination test results.

3. Wet, moldy, or otherwise damaged seed will not be accepted.

4. Seed requirements, application rates, and planting dates are:

TYPE	APPLICATION RATE POUNDS/A	PLANTING DATE
Hulled Common Bermuda Grass 98/88 Unhulled Common Bermuda Grass 98/88	40 40	Jan 1 to Mar 31
Hulled Common Bermuda Grass 98/88	40	Apr 1 to Sep 30
Hulled Common Bermuda Grass 98/88 Unhulled Common Bermuda Grass 98/88 Annual Rye Grass (Gulf)	40 40 30	Oct 1 to Dec 31

C. Fertilizer: Dry and free flowing, inorganic, water-soluble commercial fertilizer, which is uniform in composition. Deliver in unopened containers, which bear manufacturers guaranteed analysis. Caked, damaged, or otherwise unsuitable fertilizer will not be accepted. Fertilizer shall contain minimum percentages of following elements:

1. Nitrogen: 10 Percent

2. Phosphoric Acid: 20 Percent

3. Potash: 10 Percent

D. Mulch:

1. Virgin wood cellulose fibers from whole wood chips having minimum of 20 percent fibers 0.42 inches in length and 0.01 inches in diameter.

2. Cellulose fibers manufactured from recycled newspaper and meeting same fiber content and size as for cellulose fibers from wood chips.

3. Dye mulch green for coverage verification purposes.

E. Soil Stabilizer: "Terra Tack 1" or approved equal.

F. Weed control agent: Pre-emergent herbicide for grass areas, such as "Benefin," or approved equal.

PART 3 E X E C U T I O N

3.01 PREPARATION

A. Place and compact topsoil in accordance with requirements of Section 02911 - Topsoil.

B. Dispose of Objectionable and Waste Materials in accordance with Section 01576 - Waste Material Disposal.

3.02 APPLICATION

A. Seed: Apply uniformly at rates given in Paragraph 2.01 B for type of seed and planting date.

B. Fertilizer: Apply uniformly at rate of 500 pounds per acre.

B. Mulch: Apply uniformly at rate of 50 pounds per 1000 square feet.

D. Soil Stabilizer: Apply uniformly at rate of 40 pounds per acre.

E. Weed Control Agent: Apply at manufacturer's recommended rate prior to hydro mulching.

F. Sod: Lay single row of sod along perimeter where topsoil and pavement intersect.

G. Suspend operations under conditions of drought, excessive moisture, high winds, or extreme or prolonged cold. Obtain Engineer approval before resuming operations.

3.03 MAINTENANCE

A. Maintain grassed areas minimum of 90 days, or as required to establish an acceptable lawn. For areas seeded in fall, continue maintenance following spring until acceptable lawn is established.

B. Maintain grassed areas by watering, fertilizing, weeding, and trimming.

C. Repair areas damaged by erosion by regrading, rolling and replanting.

D. Reseed small, sparse grass areas. When sparse areas exceed 20 percent of planted area, reseed by hydro mulch.

E. Mow grass when height reaches 32 inches or greater on average before final acceptance. Mow to height of 22 inches.

END OF SECTION

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SECTION 03100

CONCRETE FORMWORK

PART 1 –GENERAL

1.1 SECTION INCLUDES

A. Design, construction, erection and removal of structural concrete formwork.

1.2 MEASUREMENT AND PAYMENT

A. Unit prices.

1. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.3 REFERENCE STANDARDS

A. ACI 117 - Standard Tolerances for Concrete Construction and Materials.

B. ACI 347 - Recommended Practice for Concrete Formwork.

C. U.S. Product Standard PS1 Construction & Industrial Plywood.

D. U.S. Product Standard PS20 American Softwood Lumber Standard.

1.4 SUBMITTALS

A. Conform to Section 01300 - Submittals.

B. Shop Drawings: Show location, member size and loading of shoring. When reshoring is permitted, submit plans showing locations and member size of reshoring.

C. Product Data and Samples:

1. Corrugated Fiberboard Carton Forms: Submit certification of compliance with design criteria, description of forms, and one-foot-long sample.

2. Form-coating Materials: Submit trade or brand names of manufacturers and complete description of products.

3. Form ties and related accessories, including taper tie plugs, if taper ties are used.

4. Form gaskets.

D. Detailed Layout for Slip-forming: Submit detailed layout of proposed slipforming, including description of equipment, rate of progress, and other data to show suitability of method. Show provisions for ensuring attainment of required concrete surface finish.

PART 2 –PRODUCTS

2.1 MATERIAL

A. Smooth Forms: New plywood, metal, plastic, tempered concrete-form hardboard, dressed lumber faced with plywood or fiberboard lining, or metal-framed plywood-faced panel material, to provide continuous, straight, smooth surfaces. Form material shall be free of raised grain, torn surfaces, worn edges, patches, dents or other defects. Furnish material in largest practical sizes to minimize number of joints and, when indicated on Drawings, conform to joint system indicated. Form material shall have sufficient strength and thickness to withstand pressure of newly placed concrete without bow or deflection.

B. Rough Forms: Plywood, metal, dressed or undressed lumber free of knots, splits or other defects, or other material acceptable to Engineer of sufficient strength and thickness to withstand pressure of newly placed concrete without bow or deflection.

C. Plywood: Conform to PS 1, Class 1.

D. Lumber: Conform to PS 20.

E. Edge Forms and Intermediate Screed Strips: Type and strength compatible with the screed equipment and methods used.

F. Plastic Forms: One-piece forms for domes, beams and pan joists. Single lengths for columns not exceeding height of 7'-6". For columns over 7'-6", use 7'-6" sections and filler sections as needed. To facilitate removal of pan joist forms, taper sides 1 inch per foot.

G. Metal Pan Joist Forms: Removable type; fabricated of minimum 14-gage steel; one piece between end closures. Adjustable forms not allowed. Taper sides 1 inch per foot to facilitate removal.

H. Earth Cuts for Forms:

1. Use earth cuts for forming unexposed sides of grade beams cast monolithically with slabs on grade.

2. Where sides of excavations are stable enough to prevent caving or sloughing, following surfaces may be cast against neat-cut excavations:

a. Sides of footings.

b. Inside face of perimeter grade beams not monolithic with slab on grade. When inside face is cast against earth, increase beam width indicated on Drawings by 1 inch.

c. Both faces of interior grade beams not monolithic with slab on grade. When grade beam is cast against earth, increase beam width indicated on Drawings by 2 inches.

I. Corrugated Fiberboard Carton Forms:

1. Corrugated fiberboard carton forms, when called for, are intended to form a void space beneath pile-supported and pier-supported slabs and other structural elements as shown.

2. Provide products of a reputable manufacturer regularly engaged in commercial production of double-faced corrugated fiberboard carton forms, constructed of waterproof paper and

laminated with waterproof adhesive.

3. Fiberboard forms: Capable of supporting required dead load plus construction loads, and designed to lose their strength upon prolonged contact with moisture and soil bacteria.

4. Seal cuts and ends of each form section by dipping in waterproof wax, unless liners and flutes are completely impregnated with waterproofing.

5. Size forms as indicated on Drawings. Assemble as recommended by manufacturer, either with steel banding at 4'-0" maximum on centers, or, where liners and flutes are impregnated with waterproofing, with adequate stapling.

J. Circular Forms:

1. Form round-section members with paper or fiber tubes, constructed of laminated plies using water-resistant adhesive with wax-impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation. Provide manufacturer's seamless units to minimize spiral gaps and seams.

2. Fiberglass or steel forms may be used for round-section members.

K. Shores: Wood or adjustable metal, with bearing plates; with double wedges at lower end.

L. Form Ties:

1. Use commercially-manufactured ties, hangers and other accessories for embedding in concrete. Do not use wire not commercially fabricated for use as a form accessory.

2. Fabricate ties so ends or end fasteners can be removed without causing spalling of concrete faces. Depth from formed concrete face to the embedded portion: At least 1 inch, or twice the minimum dimension of tie, whichever is greater.

3. Provide waterstop feature for form ties used on liquid-containing structures and on concrete walls which will have earth backfill on one side.

4. Removable ties: Taper ties may be used when approved by the Owner. In the hole left by the removal of the taper tie, insert a preformed neoprene or polyurethane plug sized to seat at the center of the wall.

M. Form Coating: Commercial formulation of form oil or form-release agent having proven satisfactory performance. Coating shall not bond with, stain or otherwise adversely affect concrete surfaces, or impair their subsequent treatment, including application of bonding agents, curing compounds, paint, protective liners and membrane waterproofing.

N. Coating for Plastic Forms: Alkali-resistant gel-coat.

O. Chamfer Strips: Unless otherwise indicated on Drawings, provide 3/4 inch chamfer strips in corners of forms to produce beveled edges where required by Part 3, Execution.

P. Form Gaskets: Polyethylene rod, closed cell, 1-inch diameter.

2.2 DESIGN OF FORMWORK

A. Conform to ACI 117, ACI 347 and Owner building codes, unless more restrictive requirements are specified or shown on Drawings. Contractor shall design and engineer concrete formwork, including shoring and bracing. Design formwork for applicable gravity loads, lateral pressure, wind loads and allowable stresses. Camber formwork to compensate for anticipated deflection during placement of concrete when required to maintain specified tolerances. Design formwork to be readily removed without impact, shock or damage to concrete surfaces and adjacent materials.

B. Slip Forming: Permitted on written approval of Owner. Contractor shall demonstrate suitability of method proposed.

PART 3 –EXECUTION

3.1 INSTALLATION

A. Formwork Construction

1. Construct and maintain formwork so that it will maintain correct sizes of members, shape, alinement, elevation and position during concrete placement and until concrete has gained sufficient strength. Provide for required openings, offsets, sinkages, keyways, recesses, moldings, anchorages and inserts.

2. Construct forms for easy removal without damage to concrete surfaces.

3. Make formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins. Provide gaskets for wall forms to prevent concrete paste leakage at their base.

4. Place chamfer strips in forms to bevel edges and corners permanently exposed to view, except top edges of walls, and slabs which are indicated on Drawings to be tooled. Do not bevel edges of formed joints and interior corners unless indicated on Drawings. Form beveled edges for vertical and horizontal corners of equipment bases. Unless otherwise indicated on Drawings, make bevels 3/4 inch wide.

5. Provide temporary openings at bases of column and wall forms and other points as required for observation and cleaning immediately before concrete is placed.

6. Where runways are required for moving equipment, support runways directly on the formwork or structural members. Do not allow runways or supports to rest on reinforcing steel.

7. Use smooth forms on formed concrete surfaces required to have smooth form finish or rubbed finish as specified in Section 03345 - Concrete Finishing.

8. Rough forms may be used on formed concrete surfaces indicated to have rough form finish as specified in Section 03345 - Concrete Finishing.

B. Forms for Surfaces Requiring Smooth Form Finish:

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Uniformly space form ties and align in horizontal and vertical rows. Install taper ties, if used, with the large end on the wet face of the wall.

2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back up joints with extra studs or girts to maintain true, square intersections.

3. Form molding shapes, recesses and projections with smooth-finish materials and install in forms with sealed joints to prevent displacement.

4. Form exposed corners of beams and columns to produce square, smooth, solid, unbroken lines.

5. Provide exterior exposed edges with 3/4-inch chamfer or 3/4-inch radius.

6. Arrange facing material in orderly and symmetrical fashion. Keep number of joints to practical minimum. Support facing material adequately to prevent deflection in excess of allowable tolerances.

7. For flush surfaces exposed to view in completed structure, overlap previously- placed hardened concrete with form sheathing by approximately 1 inch. Hold forms against hardened concrete to maintain true surfaces, preventing offsets or loss of mortar.

C. Forms for Surfaces Requiring Rubbed Finish: Provide forms as specified in paragraph 3.01B, Smooth Form Finish. Use smooth plywood or fiberboard linings or forms, in as large sheets as practicable, and with smooth, even edges and close joints.

D. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure supports for types of screeds required.

E. Circular Forms: Set forms in one piece for full height of member.

F. Surfaces to Receive Membrane Waterproofing: Coordinate surface finish, anchors, reglets and similar requirements with membrane waterproofing applicator.

G. Fireproofing Steel Member: Construct forms to provide not less than the concrete thickness necessary, measured from face of steel member, to provide the required fire rating. Forms for concealed surfaces may be unlined.

H. Tolerances:

1. Unless noted otherwise on Drawings, construct formwork so concrete surfaces will conform to tolerance limits listed in Tables 03100A and 03100B at end of this Section.

2. Establish sufficient control points and bench marks as references for tolerance checks. Maintain these references in undisturbed condition until final completion and acceptance of the Work.

I. Adjustment of Formwork:

1. Use wedges or jacks to provide positive adjustment of shores and struts. After final inspection and before concrete placement, fasten in position wedges used for final adjustment of forms.

2. Brace forms securely against lateral deflections. Prepare to compensate for settling during concrete placement.

3. For wall openings, construct wood forms that facilitate necessary loosening to counteract

swelling of forms.

J. Corrugated Fiberboard Carton Forms:

1. Place on smooth firm bed of suitable material to prevent vertical displacement; set tight to prevent horizontal displacement. Exercise care to avoid buckling of forms. Install in accordance with manufacturer's directions and recommendations.

2. Fit carton forms tightly around piles and piers; completely fill the space between subgrade and concrete placement with carton forms to form a void space.

3. Protect carton forms from moisture and maintain in a dry condition until concrete is placed on them. If they become wet before placement of concrete, allow them to dry and carefully inspect for strength before concrete is placed.

4. Before concrete placement, replace damaged or deteriorated forms which are incapable of supporting concrete dead load plus construction live loads.

3.2 PREPARATION OF FORM SURFACES

A. Clean surfaces of forms and embedded materials before placing concrete. Remove accumulated mortar, grout, rust and other foreign matter.

B. Coat forms for exposed or painted concrete surfaces with form oil or form-release agent before placing reinforcement. Cover form surfaces with coating material in accordance with manufacturer's printed instructions. Do not allow excess coating material to accumulate in forms or to contact hardened concrete against which fresh concrete will be placed. Remove coating material from reinforcement before placing concrete.

C. Forms for unexposed surfaces, other than retained-in-place metal forms, may be wet with water immediately before concrete placement in lieu of coating. When possibility of freezing temperatures exists, however, the use of coating is mandatory.

3.3 REMOVAL OF FORMS

A. Time Limits:

1. When repair of surface defects or finishing is required before concrete is aged, forms on vertical surfaces may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations.

2. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging. Loosen wood forms for wall openings as soon as this can be accomplished without damage to concrete. Leave formwork for water-retaining structures in place for at least 2 days. Formwork for non-water-retaining columns, walls, sides of beams and other formwork components not supporting weight of concrete may be removed after 12 hours, provided concrete has hardened sufficiently to resist damage from removal operations, and provided removal of forms will not disturb members supporting weight of concrete.

3. Forms and shoring supporting weight of concrete or construction loads: Leave in place until concrete has reached minimum strength specified for removal of forms and shoring. Do not remove such forms in less than 4 days.

B. Circular Paper or Spiral Tube Forms: Follow manufacturer's directions for form removal. Take necessary precautions to prevent damage to concrete surface. When removal is done before

completion of curing time, replace form, tie in place and seal to retard escape of moisture.

C. Removal Strength:

1. Control Tests: Suitable strength-control tests will be required as evidence that concrete has attained specified strength for removal of formwork or shoring supporting weight of concrete in beams, slabs and other structural members. Furnish test cylinders and data to verify strength for early form removal.

   a. Field-cured Test Cylinders: When field-cured test cylinders reach specified removal strength, formwork or shoring may be removed from respective concrete placements.

   b. Laboratory-cured Test Cylinders: When concrete has been cured as specified for structural concrete for same time period required by laboratory-cured cylinders to reach specified strength, formwork or shoring may be removed from respective concrete placements. Determine length of time that concrete has been cured by totaling the days or fractions of days, not necessarily consecutive, during which air temperature surrounding concrete is above 50 degrees F and concrete has been damp or thoroughly sealed against evaporation and loss of moisture.

2. Compressive Strengths: The minimum concrete compressive strength for removal of formwork supporting weight of concrete is 75 percent of specified minimum 28-day strength for class of concrete involved.

3.4 RESHORING

A. When reshoring is permitted, plan operations in advance and obtain Owner approval of such operations. While reshoring is under way, keep live load off new construction. Do not permit concrete in any beam, slab, column or other structural member to be subjected to combined dead and construction loads in excess of loads permitted for developed concrete strength at time of reshoring.

B. Place reshores as soon as practicable after form-stripping operations are complete but in no case later than end of day on which stripping occurs. Tighten reshores to carry required loads without overstressing construction. Leave reshores in place until tests representative of concrete being supported have reached specified strength at time of removal of formwork supporting weight of concrete.

C. Floors supporting shores under newly-placed concrete: Leave original supporting shores in place, or re-shore. Locate reshores directly under shore position above. Extend reshoring over a sufficient number of stories to distribute weight of newly-placed concrete, forms and construction live loads in such manner that design superimposed loads of floors supporting shores are not exceeded.

3.5 FORM REUSE

A. Do not reuse forms that are worn or damaged beyond repair. Thoroughly clean and recoat forms before reuse. For wood and plywood forms to be used for exposed smooth finish, sand or otherwise dress concrete contact surface to original condition or provide form liner facing material. For metal forms, straighten, remove dents and clean to return forms to original condition.

[Tables 03100A and 03100B: See following pages.]

TABLE 03100A
TOLERANCES FOR FORMED SURFACES
CONCRETE IN BUILDINGS**

VARIATION FROM	VARIATION IN	FOR ANY 10-FOOT LENGTH	FOR ANY 20-FOOT LENGTH OR ANY BAY	MAXIMUM FOR ENTIRE DIMENSION
PLUMB OR SPECIFIED BATTER	LINES AND SURFACES OF COLUMNS, PIERS, WALLS AND ARRISES	1/4"	---	1"
	EXPOSED CORNER COLUMNS, CONTROL JOINT GROOVES, AND OTHER CONSPICUOUS LINES	---	1/4"	1/2"
LEVEL OR SPECIFIED GRADE	SLAB SOFFITS, CEILINGS, BEAM SOFFITS, AND ARRISES (MEASURED BEFORE REMOVAL OF SHORES)	1/4"	3/8"	3/4"
	EXPOSED LINTELS, SILLS, PARAPETS, HORIZONTAL GROOVES AND OTHER CONSPICUOUS LINES	---	1/4"	1/2"
DRAWING DIMENSIONS	POSITION OF LINEAR BUILDING LINES, COLUMNS, WALLS, AND PARTITIONS	---	1/2"	1"
	SIZE AND LOCATION OF SLEEVES, FLOOR OPENINGS AND WALL OPENINGS	---	---	±1/4"
	CROSS SECTION OF COLUMNS, BEAMS, SLABS, AND WALLS	---	---	+1/2", -1/4"
	FOOTINGS* IN PLAN	---	---	+2", -1/2"
	FOOTING MISPLACEMENT OR ECCENTRIOWNER IN DIRECTION OF ERROR (THE LESSER OF)	---	---	2% OF WIDTH OR 2"
	FOOTING THICKNESS DECREASE	---	---	5%
	FOOTING THICKNESS INCREASE	---	---	NO LIMIT
	STEP RISE IN FLIGHT OF STAIRS	---	---	±1/8"
	STEP TREAD IN FLIGHT OF STAIRS	---	---	±1/4"
	CONSECUTIVE STEP RISE	---	---	±1/16"
	CONSECUTIVE STEP TREAD	---	---	±1/8"

* Footing tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.

** Includes water and wastewater process structures.

TABLE 03100B
TOLERANCES FOR FORMED SURFACES
CONCRETE IN BRIDGES, WHARVES AND MARINE STRUCTURES

VARIATION FROM	VARIATION IN	MAXIMUM
PLUMB OR SPECIFIED BATTER	SURFACES OF COLUMNS, PIERS AND WALLS	1/2" in 10'
LEVEL OR SPECIFIED GRADE	TOP SURFACES OF SLABS	See Section 03345
	TOP SURFACES OF CURBS AND RAILINGS	3/16" in 10'
DRAWING DIMENSIONS	CROSS SECTION OF COLUMNS, CAPS, WALLS, BEAMS AND SIMILAR MEMBERS	+1/2", -1/4"
	THICKNESS OF DECK SLABS	+1/4", - 1/8"
	SIZE AND LOCATION OF SLAB AND WALL OPENINGS	± 1/2"
	FOOTINGS IN PLAN	+2", -1/2"
	FOOTING MISPLACEMENT OR ECCENTRIOWNER IN DIRECTION OF ERROR (THE LESSER OF)	2% of WIDTH OR 2"
	FOOTING THICKNESS DECREASE	5%
	FOOTING THICKNESS INCREASE	NO LIMIT
	STEP RISE IN FLIGHT OF STAIRS	±1/8"
	STEP TREAD IN FLIGHT OF STAIRS	±1/4"
	CONSECUTIVE STEP RISE	±1/16"
	CONSECUTIVE STEP TREAD	±1/8"

END OF SECTION

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SECTION 03210

REINFORCING STEEL

PART 1 – G E N E R A L

1.1 SECTION INCLUDES

A. Structural concrete reinforcement and grouting of reinforcement dowel bars into hardened concrete.

1.2 MEASUREMENT AND PAYMENT

A. Unit prices.

1. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.3 REFERENCES

A. ACI 315 - Details and Detailing of Concrete Reinforcement.

B. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. ASTM A36 - Standard Specification for Structural Steel.

D. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

E. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

F. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.

G. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

H. ASTM A675 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties.

I. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

J. ASTM C881 - Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

K. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

L. WRI - Manual of Standard Practice for Welded Wire Fabric.

M. CRSI MSP-1 - Manual of Standard Practice.

1.4 SUBMITTALS

A. Conform to Section 01300 - Submittals.

B. Shop Drawings:

1. Submit shop drawings detailing reinforcement fabrication, bar placement location, splices, spacing, bar designation, bar type, length, size, bending, number of bars, bar support type and other pertinent information, including dimensions. Provide sufficient detail for placement of reinforcement without use of Contract Drawings. Information shall correspond directly to data listed on bill of materials.

2. Use of reproductions of Contract Drawings by Contractor, Subcontractor, erector, fabricator or material supplier in preparation of shop drawings (or in lieu of preparation of shop drawings) signifies acceptance by that party of information shown thereon as correct, and acceptance of obligation to pay for any job expense, real or implied, arising due to errors that may occur thereon. Remove references to Design Engineer, including seals, when reproductions of Contract Drawings are used as shop drawings.

3. Detail shop drawings in accordance with ACI 315, Figure 6.

4. Submit shop drawings showing location of proposed additional construction joints as required under Section 03250 - Joints in Concrete Structures, and obtain approval of Owner, prior to submitting reinforcing steel shop drawings.

C. Bill of Materials: Submit with shop drawings.

D. Product Data:

1. Mechanical Bar Splices: Submit manufacturer's technical literature, including specifications and installation instructions.

2. Epoxy grout proposed for anchoring reinforcing dowels to hardened concrete: Submit manufacturer's technical literature including recommended installation procedures.

E. Certificates:

1. Submit steel manufacturer's certificates of mill tests giving properties of steel proposed for use. List manufacturer's test number, heat number, chemical analysis, yield point, tensile strength and percentage of elongation. Identify proposed location of steel in work.

2. Foreign-manufactured reinforcing bars shall be tested for conformance to ASTM requirements by a certified independent testing laboratory located in United States. Certification from any other source is not acceptable. Submit test reports for review. Do not begin fabrication of reinforcement until material has been approved.

1.5 HANDLING AND STORAGE

A. Store steel reinforcement above ground on platforms, skids or other supports. Protect reinforcing from mechanical injury, surface deterioration and formation of excessive, loose or flaky rust caused by exposure to weather. Protect epoxy-coated reinforcing from formation of any amount of rust.

1.6 QUALITY CONTROL

A. Notify Owner at least 24 hours before concrete placement so that reinforcement may be inspected, and errors corrected, without delaying Work.

PART 2 –PRODUCTS

2.1 MATERIAL

A. Reinforcing Bars: Deformed bars conforming to ASTM A615, grade as indicated on Drawings, except column spirals and those shown on Drawings to be smooth bars. Where grade is not shown on Drawings, use Grade 60.

B. Smooth Bars: Where indicated on Drawings, use smooth bars conforming to ASTM A36; ASTM A615, Grade 60; or ASTM A675, Grade 70.

C. Column Spirals: Bars conforming to ASTM A615, Grade 60, or wire conforming to ASTM A82.

D. Epoxy-Coated Deformed Bars, Column Spirals and Smooth Bars: Conform to ASTM A775/A775M.

E. Welded Wire Fabric:

1. Welded Smooth Wire Fabric: Conform to ASTM A185.

2. Welded Deformed Wire Fabric: Conform to ASTM A497.

3. Provide wire size, type and spacing as shown. Where type is not shown on Drawings, use welded smooth wire fabric.

4. Furnish welded wire fabric in flat sheets only.

F. Tie Wire: 16-1/2 gage or heavier annealed steel wire. Use plastic-coated tie wire with epoxy-coated reinforcing steel.

G. Bar Supports: Provide chairs, riser bars, ties and other accessories made of plastic or metal, except as otherwise specified. Use bar supports and accessories of sizes required to provide required concrete cover. Where concrete surfaces are exposed to weather, water or wastewater, provide plastic accessories only; do not use galvanized or plastic-tipped metal in such locations. Provide metal bar supports and accessories rated Class 1 or 2 conforming to CRSI MSP-1 Manual of Standard Practice. Use epoxy-coated bar supports with epoxy-coated reinforcing bars.

H. Slabs on Grade: Provide chairs with sheet metal bases or provide precast concrete bar

supports 3 inches wide, 6 inches long, and thick enough to allow required cover. Embed tie wires in 3-inch by 6-inch side.

I. Mechanical Bar Splices:

1. Conform to ACI 318; use where indicated on Drawings.

   a. Compression splices shall develop ultimate stress of reinforcing bar.

   b. Tension splices shall develop 125 percent of minimum yield point stress of reinforcing bar.

2. Regardless of chemical composition of steel, any heat effect shall not adversely affect performance of reinforcing bar.

J. Welded Splices:

1. Provide welded splices where shown and where approved by the Owner. Welded splices of reinforcing steel shall develop a tensile strength exceeding 125 percent of the yield strength of the reinforcing bars connected.

2. Provide materials for welded splices conforming to AWS D1.4.

K. Epoxy Grout: High-strength rigid epoxy adhesive, conforming to ASTM C881, Type IV, manufactured for purpose of anchoring dowels into hardened concrete and the moisture condition, application temperature and orientation of the hole to be filled. Unless otherwise shown, depth of embedment shall be as required to develop the full tensile strength (125 percent of yield strength) of dowel, but not less than 12 diameters.

2.2 FABRICATION

A. Bending: Fabricate bars to shapes indicated on Drawings by cold bending. Bends shall conform to minimum bend diameters specified in ACI 318. Do not straighten or rebend bars. Fabricate epoxy-coated reinforcing steel to required shapes in a manner that will not damage epoxy coating. Repair any damaged epoxy coating with patching material conforming to Item 4.4 of ASTM A775/A775M.

B. Splices:

1. Locate splices as indicated on Drawings. Do not locate splices at other locations without approval of Engineer. Use minimum number of splices located at points of minimum stress. Stagger splices in adjacent bars.

2. Length of lap splices: As shown on Drawings.

3. Prepare ends of bars at mechanical splices in accordance with splice manufacturer's requirements.

C. Construction Joints: Unless otherwise shown, continue reinforcing through construction joints.

D. Bar Fabrication Tolerances: Conform to tolerances listed in ACI 315, Figures 4 and 5.

E. Standard Hooks: Conform to the requirements of ACI 318.

F. Marking: Clearly mark bars with waterproof tags showing number of bars, size, mark, length and yield strength. Mark steel with same designation as member in which it occurs.

PART 3 –EXECUTION

3.1 PREPARATION

A. Clean reinforcement of scale, loose or flaky rust and other foreign material, including oil, mud or coating that will reduce bond to concrete.

3.2 INSTALLATION

A. Placement Tolerances: Place reinforcement within tolerances of Table 03210A at the end of this Section. Bend tie wire away from forms to maintain the specified concrete coverage.

B. Interferences: Maintain 2-inch clearance from embedded items. Where reinforcing interferes with location of other reinforcing steel, conduit or embedded items, bars may be moved within specified tolerances or one bar diameter, whichever is greater. Where greater movement of bars is required to avoid interference, notify Owner. Do not cut reinforcement to install inserts, conduit, mechanical openings or other items without approval of Owner.

C. Concrete Cover: Provide clear cover measured from reinforcement to face of concrete as listed in Table 03210B at the end of this Section, unless otherwise indicated on Drawings.

D. Placement in Forms: Use spacers, chairs, wire ties and other accessory items necessary to assemble, space and support reinforcing properly. Provide accessories of sufficient number, size and strength to prevent deflection or displacement of reinforcement due to construction loads or concrete placement. Use appropriate accessories to position and support bolts, anchors and other embedded items. Tie reinforcing bars at each intersection, and to accessories. Blocking reinforcement with concrete or masonry is prohibited.

E. Placement for Concrete on Ground: Support bar and wire reinforcement on chairs with sheet metal bases or precast concrete blocks spaced at approximately 3 feet on centers each way. Use minimum of one support for each 9 square feet. Tie supports to reinforcing bars and wires.

F. Vertical Reinforcement in Columns: Offset vertical bars by at least one bar diameter at splices. Provide accurate templates for column dowels to ensure proper placement.

G. Splices:

1. Do not splice bars, except at locations indicated on Drawings or reviewed shop drawings, without approval of Owner.

2. Lap Splices: Unless otherwise shown or noted, Class B, conforming to ACI 318-89, Section 12.15.1. Tie securely with wire prior to concrete placement, to prevent displacement of splices during concrete placement.

3. Mechanical Bar Splices: Use only where indicated on Drawings. Install in accordance with manufacturer's instructions.

a. Couplers located at a joint face shall be of a type which can be set either flush or recessed from the face as shown. Seal couplers prior to concrete placement to

completely eliminate concrete or cement paste from entering.

b. Couplers intended for future connections: Recess 1/2inch minimum from concrete surface. After concrete is placed, plug coupler and fill recess with sealant to prevent contact with water or other corrosive materials.

c. Unless noted otherwise, match mechanical coupler spacing and capacity to that shown for the adjacent reinforcing.

H. Construction Joints: Place reinforcing continuous through construction joints, unless noted otherwise.

I. Welded Wire Fabric: Install wire fabric in as long lengths as practicable. Unless otherwise indicated on Drawings, lap adjoining pieces at least 6 inches or one full mesh plus 2 inches, whichever is larger. Lace splices with wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps. Conform to WRI - Manual of Standard Practice for Welded Wire Fabric.

J. Field Bending: Shape reinforcing bent during construction operations to conform to Drawings. Bars shall be cold-bent; do not heat bars. Closely inspect reinforcing for breaks. When reinforcing is damaged, replace, Cadweld, or otherwise repair, as directed by Owner. Do not bend reinforcement after it is embedded in concrete.

K. Epoxy-coated Reinforcing Steel: Install in accordance with Paragraph 3.02 J, Field Bending, and in a manner that will not damage epoxy coating. Repair damaged epoxy coating with patching material as specified in Paragraph 2.02 A, Bending.

L. Field Cutting: Cut reinforcing bars by shearing or sawing. Do not cut bars with cutting torch.

M. Welding of reinforcing bars is prohibited, except where shown on Drawings.

3.3 GROUTING OF REINFORCING AND DOWEL BARS

A. Use epoxy grout for anchoring reinforcing and dowel steel to existing concrete in accordance with epoxy manufacturer's instructions. Drill hole not more than 1/4 inch larger than steel bar diameter (including height of deformations for deformed bars) in existing concrete. Just before installation of steel, blow hole clean of all debris using compressed air. Partially fill hole with epoxy, using enough epoxy so when steel bar is inserted, epoxy grout will completely fill hole around bar. Dip end of steel bar in epoxy and twist bar while inserting into partially-filled hole.

[Tables 03210A and 03210B: See following pages]

TABLE 03210A
REINFORCEMENT PLACEMENT TOLERANCES

PLACEMENT	TOLERANCE IN INCHES
Clear Distance -	
To formed soffit:	-1/4
To other formed surfaces:	□1/4
Minimum spacing between bars:	-1/4
Clear distance from unformed surface to top reinforcement -	
Members 8 inches deep or less:	□1/4
Members more than 8 inches deep but less than 24 inches deep:	-1/4, +1/2
Members 24 inches deep or greater:	-1/4, +1
Uniform spacing of bars (but the required number of bars shall not be reduced):	□2
Uniform spacing of stirrups and ties (but the required number of stirrups and ties shall not be reduced):	□1
Longitudinal locations of bends and ends of reinforcement -	
General:	□2
Discontinuous ends of members:	□1/2
Length of bar laps:	-1-1/2
Embedded length -	
For bar sizes No. 3 through 11:	-1
For bar sizes No. 14 and 18:	-2

TABLE 03210B
MINIMUM CONCRETE COVER FOR REINFORCEMENT

SURFACE	MINIMUM COVER IN INCHES
Slabs and Joists -	
Top and bottom bars for dry conditions -	
No. 14 and No. 18 bars:	1-1/2
No. 11 bars and smaller:	1
Formed concrete surfaces exposed to earth, water or weather; over, or in contact with, sewage; and for bottoms bearing on work mat, or slabs supporting earth cover -	
No. 5 bars and smaller:	1-1/2
No. 6 through No. 18 bars:	2
Beams and Columns -	

For dry conditions -	
Stirrups, spirals and ties:	1-1/2
Principal reinforcement:	2
Exposed to earth, water, sewage or weather -	
Stirrups and ties:	2
Principal reinforcement:	2-1/2
Walls -	
For dry conditions -	
No. 11 bars and smaller:	1
No. 14 and No. 18 bars:	1-1/2
Formed concrete surfaces exposed to earth, water, sewage or weather, or in contact with ground -	
Circular tanks with ring tension:	2
All others:	2
Footings and Base Slabs -	
At formed surfaces and bottoms bearing on concrete work mat:	2
At unformed surfaces and bottoms in contact with earth:	3
Over top of piles:	2
Top of footings -- same as slabs	

END OF SECTION

SECTION 03250

JOINTS IN CONCRETE STRUCTURES

PART 1 – G E N E R A L

1.1 SECTION INCLUDES

A. Waterstops and similar joints in concrete structures intended to retain water or withstand hydrostatic pressure.

1.2 MEASUREMENT AND PAYMENT

A. Unit prices.
   1. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.3 REFERENCES

A. Federal Specification TT-S-0227E(3) Sealing Compound, Elastomeric Type, Multi-Component, for Caulking, Sealing and Glazing Buildings and Other Structures.

B. U.S. Army Corps of Engineers Specification CRD-C572 PVC Waterstop.

C. ASTM A775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

D. ASTM C920 - Specification for Elastomeric Joint Sealants.

E. ASTM D412 - Test Methods for Rubber Properties in Tension.

F. ASTM D624 - Test Method for Rubber Property -- Tear Resistance.

G. ASTM D638 - Test Method for Tensile Properties of Plastics.

H. ASTM D746 - Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

I. ASTM D747 - Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam.

J. ASTM D1056 - Specification for Flexible Cellular Materials -- Sponge or Expanded Rubber.

K. ASTM D1752 - Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

L. ASTM D2000 - Specification for Rubber Products in Automotive Applications.

M. ASTM D2240 - Test Method for Rubber Property -- Durometer Hardness.

N. ASTM D2241 - Specification for PVC Tubing.

1.4 DEFINITIONS

A. The following definitions refer to concrete joints in water-retaining structures. Unless otherwise indicated, all such joints shall have a waterstop or sealant groove to prevent water penetration

at the joint.

B. Construction Joint: The joint or surface between two concrete pours, produced by placing fresh concrete in contact with a hardened concrete surface.

1. A bond breaker may or may not be used, as indicated.

2. Reinforcing steel is continuous through the joint, unless otherwise indicated.

C. Contraction Joint: A joint similar to a construction joint, but intended to accommodate concrete shrinkage and similar movement.

1. A bond breaker is always used.

2. Reinforcing steel is held back 4-1/2 inches from the joint surface, and sleeved dowels are used so pours can move apart, unless otherwise indicated.

D. Expansion Joint: A joint similar to a construction or contraction joint, but intended to accommodate both expansion and contraction.

1. Compressible joint filler is placed against the hardened concrete, to form and separate the second pour so pours can move together or apart.

2. A centerbulb waterstop and joint sealant are used to fill the gap, unless otherwise indicated.

3. Reinforcing steel is held back, and sleeved dowels are used to allow and control movement, unless otherwise indicated.

E. Control Joint: A groove cut or formed in the face of a single pour, producing a weaker plane more likely to crack; used in an attempt to control locations of normal shrinkage cracks.

1. Joint sealant is used to fill the groove.

2. Reinforcing steel is continuous, since the pour is monolithic.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300 - Submittals.

B. Product Data: Information sufficient to indicate compliance with Contract Documents, including manufacturer's descriptive literature and specifications.

C. Shop Drawings: Indicate type, size and location of each joint in each structure, and installation details.

D. Samples: For extrusions, submit 6-inch lengths. For molded or fabricated items, submit whole items. Submit 6-inch beads for sealants and 6-inch square samples for coatings, on appropriate substrates.

E. Quality Control Submittals: Submit manufacturer's instructions and recommendations for storage, handling and installation including material safety data sheets, and, where specified, test reports certified by an independent testing laboratory or the manufacturer, and manufacturer's certification that products furnished comply with Contract Documents.

1.6 QUALITY CONTROL

A. Waterstop Inspection: Notify Engineer to schedule inspection at least 24 hours prior to work involving waterstop installation or fabrication of waterstop field joints.

B. Defects include but are not limited to the following:
   1. Offsets at joints greater at any point than 1/16 inch or 15 percent of material thickness, whichever is less.

   2. Exterior cracks at joints due to incomplete bond, which are deeper at any point than 1/16 inch or 15 percent of material thickness, whichever is less.

   3. At any point, any combination of offsets or exterior cracks resulting in a net reduction in the cross-sectional area of the waterstop greater than 1/16 inch or 15 percent of material thickness at any point, whichever is less.

   4. Misalignment of joint resulting in misalignment of the waterstop in excess of 1/2 inch in 10 feet.

   5. Porosity in the welded joint as evidenced by visual inspection.

   6. Bubbles or inadequate bond which can be detected with a pen knife. If, while probing the joint with the point of a pen knife, the knife breaks through the outer portion of the weld into a bubble, the joint is defective.

C. Field Joint Samples: Prior to use of the waterstop material in the field, fabricate and submit for review a sample of a fabricated mitered cross and a tee constructed of each size or shape of material to be used. Fabricate samples so material and workmanship represent fittings to be furnished. Field samples of fabricated fittings (crosses, tees, etc.) will be selected at random by the Owner for testing by a laboratory at Owner's expense; they shall have a tensile strength across the joints equal to at least 600 psi when tested in accordance with ASTM D638. Contractor shall pay cost of failed tests and retesting required by failures.

D. Construction Joint Sealant: Prepare adhesion and cohesion test specimens, as specified, at intervals of 5 working days while sealants are being installed.

E. Sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure in laboratory and field tests:

   1. Prepare sealant specimen between 2 concrete blocks (1 inch by 2 inches by 3 inches); spacing between the blocks shall be 1 inch. Use coated spacers (2 inches by 1-1/2 inches by 1/2 inch) to ensure sealant cross-sections of 1/2 inch by 2 inches with a width of 1 inch.

   2. Cast and cure sealant according to manufacturer's recommendations except that curing period shall be not less than 24 hours.

   3. Following curing period, widen the gap between blocks to 1-1/2 inches. Use spacers to maintain this gap for 24 hours prior to inspection for failure.

F. Sealant Installer: A competent waterproofing specialty contractor, approved by sealant manufacturer, having a record of successful performance in similar installations. Before beginning work, sealant manufacturer's representative shall instruct installer's crew in proper method of application.

1.7 WARRANTY

A. Provide a written warranty covering entire sealant installation against faulty and incompatible

materials and workmanship, and agreeing to repair or replace defective work at no additional cost to the Owner, for a period of 5 years.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials in accordance with manufacturer's printed instructions.

B. Store waterstops to permit free circulation of air around waterstop material.

PART 2 –PRODUCTS

2.1 EPA POTABLE CLASSIFICATION

A. All joint materials shall be materials that reach acceptability for use in potable water systems no later than 30 days after installation, as classified by the Environmental Protection Agency.

2.2 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: As detailed, and as manufactured by: Kirkhill Rubber Co., Brea, California; Water Seals, Inc., Chicago, Illinois; Progress Unlimited, Inc., New York, New York; Greenstreak Plastic Products Co., St. Louis, Missouri; or equal acceptable to the Engineer, provided that at no place shall waterstop thickness be less than 3/8 inch.

C. Multi-Rib Waterstops: As detailed, and as manufactured by Water Seals, Inc., Chicago, Illinois; Progress Unlimited, Inc., New York, New York; Greenstreak Plastic Products Co., St. Louis, Missouri; or equal acceptable to the Engineer. Use prefabricated joint fittings at intersections of ribbed-type waterstops.

D. Other Waterstops: When types of waterstops not listed above are indicated on the Drawings, they are subject to these specifications.

E. Waterstop Properties: When tested in accordance with specified standards, waterstop material shall meet or exceed the following requirements:

Physical Property, Sheet Material	Value	ASTM Standard
Tensile Strength-min (psi):		1750 D638, Type IV
Ultimate Elongation-min (percent):	350	D638, Type IV
Low Temp Brittleness-max (degrees F):	-35	D746
Stiffness in Flexure-min (psi):		400 D747
Accelerated Extraction (CRD-C572) -		
Tensile Strength-min (psi):		1500 D638, Type IV
Ultimate Elongation-min (percent):	300	D638, Type IV
Effect of Alkalies (CRD-C572) -		
Change in Weight (percent):		+0.25/-0.10 ------
Change in Durometer, Shore A:		+5 D2240
Finished Waterstop -		
Tensile Strength-min (psi):		1400 D638, Type IV
Ultimate Elongation-min (percent):	280	D638, Type IV

2.3 JOINT SEALANT

A. Material: Polyurethane polymer designed for bonding to concrete which is continuously submerged in water. Use no material with an unsatisfactory history of bond or durability when used in joints of liquid-retaining structures.

B. Sealant Properties at 73 degrees F, 50 percent relative humidity:

1. Work Life: 45 - 180 minutes

2. Time to Reach 20 Shore A Hardness (at 77 degrees F, 200 gr quantity): 24 hours, maximum

3. Ultimate Hardness (ASTM D2240): 20 - 45 Shore A

4. Tensile Strength (ASTM D412): 200 psi, minimum

5. Ultimate Elongation (ASTM D412): 400 percent, minimum

6. Tear Resistance (Die C ASTM D624): 75 pounds per inch of thickness, minimum

7. Color: Light Gray

C. Polyurethane Sealants for Waterstop Joints in Concrete:

1. Sealant: 2-part polyurethane; when cured, sealant shall meet or exceed ANSI/ASTM C920 or Federal Specification TT-S-0227 E(3) for 2-part material.

2. Vertical and overhead horizontal joints: Use only "non-sag" compounds meeting ANSI/ASTM C920, Class 25, Grade NS, or Federal Specification TT-S-0227 E(3), Type II, Class A.

3. Plane horizontal joints: Self-leveling compounds meeting ANSI/ASTM C920, Class 25, Grade P, or Federal Specification TT-S-0227 E(3), Type I. For joints subject to either pedestrian or vehicular traffic, use a compound providing non-tracking characteristics and having a Shore A hardness range of 35 to 45.

4. Primer: Use only compatible materials manufactured or recommended for the application by the sealant manufacturer, in accordance with the printed instructions and recommendations of the sealant manufacturer.

D. Acceptable Products: Polymeric Systems Inc. "PSI-270"; Pacific Polymers "Elastothane 227R"; Sika Corporation "Sikaflex 2C", or equal acceptable to the Engineer.

2.4 MISCELLANEOUS MATERIALS

A. Bearing Pad: ASTM D2000 neoprene, Grade 2 or 3, Type BC, tensile strength 1450 psi, 60 durometer hardness, unless otherwise indicated.

B. Neoprene Sponge: ASTM D1056, Type 2C3-E1 closed-cell expanded neoprene.

C. Preformed Joint Filler: ASTM D1752 Type I non-extruding type; neoprene sponge or polyurethane of firm texture, except as otherwise specified. Bituminous fiber type will not be permitted.

D. Control Joint Former: Continuous plastic insert strips with anchorage ribs located at the bottom

and an enlarged upper portion that is readily removable without damage to the concrete, and is sized to form sealant groove. Size to extend to at least 1/4 slab depth.

E. Backing Rod: Extruded closed-cell polyethylene foam rod, compatible with joint sealant materials used, with a tensile strength not less than 40 psi, and compression deflection approximately 25 percent at 8 psi. Size: 1/8-inch larger in diameter than joint width, except use one-inch diameter rod for 3/4-inch wide joints.

F. Bond Breaker: "Super Bond Breaker" manufactured by Burke Company, San Mateo, California; "Select Cure CRB", manufactured by Select Products Co., Upland, California, or equal acceptable to the Engineer. Bond breaker shall contain a fugitive dye so areas of application will be readily distinguishable.

G. Slip Dowels: Smooth epoxy-coated bars conforming to ASTM A775.

H. PVC Tubing: ASTM D2241, Schedule SDR 13.5.

2.5 BENTONITE WATERSTOP

A. Material: 75 percent bentonite, mixed with butyl rubber-hydrocarbon containing less than 1.0 percent volatile matter, and free of asbestos fibers or asphaltics.

B. Manufacturer's rated temperature ranges: For application, 5 to 125 degrees F; in service, -40 to 212 degrees F.

C. Cross-sectional dimensions, unexpanded waterstop: One inch by 3/4 inch.

D. Provide with adhesive backing capable of producing excellent adhesion to concrete surfaces.

PART 3 –EXECUTION

3.1 INSTALLATION

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.

3.2 SPLICES IN WATERSTOPS

A. Splice waterstops by heat-sealing adjacent waterstop sections in accordance with the manufacturer's printed instructions.

1. Do not damage material by heat sealing.

2. Splice tensile strength: At least 60 percent of unspliced material tensile strength.

3. Maintain continuity of waterstop ribs and tubular center axis.

B. Butt end-to-end joints of 2 identical waterstop sections may be made in the forms during placement of waterstop material.

C. Prior to placement in formwork, prefabricate all waterstop joints involving more than 2 ends to be joined together, an angle cut, an alignment change, or the joining of 2 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. Where a centerbulb waterstop intersects and is joined to a non-centerbulb waterstop, take care to seal the end of the centerbulb, using additional PVC material if needed.

3.3 JOINT CONSTRUCTION

A. Setting Waterstops:

1. Correctly position waterstops during installation. Support and anchor waterstops during progress of the work to ensure proper embedment in concrete. 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. Flat-strip waterstop: Prevent folding over by concrete during placement. Unless otherwise shown, hold waterstops in place with wire ties on 12-inch centers passed through the waterstop edge and tied to reinforcing steel.

   a. Horizontal waterstops (with flat face in vertical plane): Hold in place by fastening upper waterstop edge to continuous supports.

   b. Horizontal waterstops (with flat face in horizontal plane): Work concrete under waterstops by hand to eliminate air and rock pockets.

3. Place centerbulb waterstops in expansion joints centered on joint filler material.

4. 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.

B. Joint Location: Unless specifically noted otherwise, provide construction joints at 25-foot maximum spacing for concrete construction. Where joints are shown spaced greater than 40 feet apart, provide additional joints to maintain the 25-foot maximum spacing. Submit joint locations for review by the Engineer.

C. Joint Preparation: Prepare surfaces in accordance with Section 03310 - Structural Concrete. Unless otherwise indicated, bonding is required at horizontal concrete joints in walls. Except on horizontal wall construction joints, wall-to-slab joints, or where otherwise shown or specified, at joints where waterstops are required, coat the joint face of the first pour with bond breaker as specified.

D. 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 with Contract Documents.

E. Construction Joint Sealant:

1. In water-bearing floor slabs and elsewhere where indicated, provide construction joints with tapered grooves filled with construction joint sealant. Leave groove- forming material in place until time grooves are cleaned and filled with joint sealant. After removing groove

forms, remove laitance and fins and sand-blast the grooves. Allow grooves to dry thoroughly, then blow out, immediately prime surfaces, place bond-breaker tape in bottom of groove and fill with construction joint sealant. Use no sealant without a primer. Completely fill sealant grooves. Thoroughly clean areas designated to receive sealant, as specified for tapered grooves, prior to sealant application.

2. Mix and install primer and sealant in accordance with manufacturer's printed instructions and recommendations. Do not coat sides of sealant groove with bond breaker, curing compound or other substance which would interfere with proper sealant bond. Allow at least 7 days for sealant to achieve final cure before filling structure with water.

3. Thoroughly and uniformly mix 2-part catalyst-cured material.

4. Remove and replace improperly cured sealants after the manufacturer's recommended curing time; thoroughly sandblast the groove to remove all traces of uncured or partially-cured sealant and primer, then re-prime and re-seal with specified sealant.

F. Bentonite Waterstop:

1. Install bentonite waterstop in accordance with manufacturer's instructions and recommendations except as otherwise indicated and specified.

2. When requested by the Owner, provide technical assistance by manufacturer's representative in the field at no additional cost to the Owner.

3. Use bentonite waterstop only where complete confinement by concrete is provided; do not use in expansion or contraction joints.

4. 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.

5. Where thickness of the concrete member to be placed on the 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 the concrete. Minimum distance from edge of waterstop placed in groove to face of member: 2.5 inches.

6. Where bentonite waterstop is used in combination with PVC waterstop, lap bentonite waterstop over PVC waterstop a minimum of 6 inches and place in contact with the PVC waterstop.

7. 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.

8. 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.

9. 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.

G. Control Joints:

1. Where indicated, form in slabs by sawcutting, preformed plastic inserts or other means acceptable to Owner. Minimum insert or sawcut: 1/4 slab depth.

2. Perform sawcutting during the curing period as soon as possible after concrete has reached its final set, has attained sufficient strength to support sawcutting operations without damage, and while it remains fully saturated.

3. Leave the removable portion of plastic inserts in place and protect sawcuts against damage and intrusion of foreign material until the end of the curing period and until concrete has dried sufficiently to allow sealant installation.

4. Sealant Installation: Blow foreign material from formed or sawcut space. Insert a foam backer rod to form a sealant depth equal to the width of the space but not less than 3/8 inch. Install sealant as specified elsewhere in the Contract Documents.

END OF SECTION

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SECTION 03300

CONCRETE

PART 1 G E N E R A L

1.01 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.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No payment will be made for concrete for utility construction under this Section. Include cost in applicable utility structure.

2. Obtain services of and pay for certified testing laboratory to prepare design mixes.

3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 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 - Guide for Concrete Plant Inspection and Field Testing of Ready-Mix Concrete.

H. ACI 315 - Details and Detailing of Concrete Reinforcement.

I. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary.

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) Steel Bars for Concrete Reinforcement.

O. ASTM A 775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

P. ASTM A 820 - Standard Specification for 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 Test Method for 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.

AB. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

AC. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.

AD. ASTM C 309 - Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.

AE. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

AF. ASTM C 595 - Standard Specification for Blended Hydraulic Cements.

AG. ASTM C 685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

AH. ASTM C 1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.

AI. ASTM C 1077 - Standard Practice for Laboratory Testing of Concrete and Concrete Aggregate for Use in Construction and Criteria for Laboratory Evaluation.

AJ. CRSI MSP-1 - Manual of Standard Practice.

AK. CRSI - Placing Reinforcing Bars.

AL. Federal Specification SS-S-210A - Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints

AM. NRMCA - Concrete Plant Standards.

1.04 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit proposed mix design and test data for each type and strength of concrete in Work.

C. Submit laboratory reports prepared by 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 Engineer.

E. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Specification.

F. 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.

1.05 HANDLING AND STORAGE

A. Cement: Store cement off of ground in 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 coating.

PART 2 P R O D U C T S

2.01 CONCRETE MATERIALS

A. Cementitious Material:

1. Portland Cement: ASTM C 150, Type II, unless use of Type III is authorized by 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 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 following ASTM standard sizes: No. 357 or No. 467; No. 57 or No. 67, No. 7. Maximum size: Not larger than 1/5 of 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 potential reactivity of fine and coarse aggregate in accordance with 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 A884. Supply 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 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.

2.02 FORM WORK 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 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. Form work 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 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 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 smooth surface and which line up properly.

2.03 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.

2.04 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.

2.05 DESIGN MIX

A. Use design mixes prepared by 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 Engineer for review.

C. Proportioning on basis of field experience or trial mixtures in accordance with requirements at Section 5.3 of ACI 318 may be used, when approved by Engineer.

D. Classification:

Class	Cement Sks Per CY	Minimum Strength, psi (MPa)		Maximum W/C Ratio[1]	Air Entrain.
		28 Days	7 Days		
A	5.0 (280 kg/m^3)	3000 (20.6)	2100 (14.5)	0.6	Yes
B	4.0 (225 kg/m^3)	2000 (13.8)	1400 (9.7)	0.6	No
C	6.0 (335 kg/m^3)	3600(24.8)	2520 (17.4)	0.45	Yes
D	4.5 (252 kg/m^3)	2500 (17.2)	1750 (12.1)	0.6	No
H	6.0 (335 kg/m^3)	As indicated	As Indicated	0.45	Yes
I	5.5 (308 kg/m^3)	3500 (24.1)	2450 (16.9)	0.45	Yes
J	2.0 (112 kg/m^3)	800 (5.5)	560 (3.9)	N/A	No
S	6.0 (335 kg/m^3)	4000 (27.6)	2800 (19.3)	0.45	Yes

E. Add steel or polypropylene fibers only when called for on 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 Drawings and other Specifications. Use Class B for unreinforced concrete used for plugging pipes, seal slabs, thrust blocks, trench dams, tunnel inverts and concrete fill unless indicated otherwise. Use Class A for all other applications.

2.06 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 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.

PART 3 E X E C U T I O N

3.01 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 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 clean out 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 form work with sufficient number of studs and wales to prevent deflection.

E. Re-oil or lacquer liner on 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 concrete is placed, wet surface of forms which will come in contact with concrete.

3.02 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 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 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 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.

3.03 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.

3.04 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 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 though 8.

C. Maintain concrete workability without segregation of material and excessive bleeding. Obtain approval of Engineer before adjustment and change of mix proportions.

D. Ready-mixed concrete delivered to site shall be accompanied by batch tickets providing information required by ASTM C 94, Section 16. Concrete produced by continuous mixing shall be accompanied by batch tickets providing information required by ASTM C 685, Section 14.

E. 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 shade, away from artificial heat. Protect concrete from temperatures below 32 degrees F until concrete has cured for minimum of 3 days at 70 degrees F or 5 days at 50 degrees F.

F. Clean, maintain and operate equipment so that it thoroughly mixes material as required.

G. Hand-mix only when approved by Engineer.

3.05 PLACING CONCRETE

A. Give sufficient advance notice to 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 Engineer's approval.

B. Schedule concrete placing to permit completion of finishing operations in daylight hours. However, when necessary to continue after daylight hours, light site as required. When rainfall occurs after placing operations are started, provide covering to protect 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 initial set; do not place 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. Place concrete in continuous horizontal layers approximately 12 inches thick. Place each layer while layer below is still plastic.

G. Compact each layer of concrete with concrete spading implements and mechanical vibrators of approved type and adequate number for size of placement. When immersion vibrators cannot be used, use form vibrators. Apply vibrators to concrete immediately after depositing. Move vibrator vertically through 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.

H. Handling and Placing Concrete: Conform to ACI 302.1R, ACI 304R and ACI 309R.

3.06 WATERSTOPS

A. Embed waterstops in concrete across joints as shown. Waterstops shall be continuous for extent of joint; make splices necessary to provide 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 next pour. When waterstop will remain exposed for 2 days or more, shade and protect exposed waterstop from direct rays of sun during entire exposure and until exposed portion of waterstop is embedded in concrete.

3.07 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.

3.08 CURING

A. Comply with ACI 308. Cure by preventing loss of moisture, rapid temperature change and mechanical injury for 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 concrete surface after placing and finishing. A curing day is any calendar day in which temperature is above 50 degrees F for at least 19 hours. Colder days may be counted when 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 end of calendar days equal to twice required number of curing days. However, leave soffit forms and shores in place until

concrete has reached specified 28 day strength, unless directed otherwise by Engineer.

B. Cure formed surfaces not requiring rubbed-finished surface by leaving forms in place for full curing period. Keep wood forms wet during 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. Rubbed Finish:

1. At formed surfaces requiring rubbed finish, remove forms as soon as practicable without damaging surface.

2. 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 final finish and surplus water sheen has disappeared, immediately seal surface with uniform coating of approved curing compound, applied at rate of coverage recommended by manufacturer or as directed by 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 compound.

2. Thoroughly agitate 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 dry surface. When concrete surface has become dry, thoroughly moisten surface immediately prior to application. At locations where coating shows discontinuities, pinholes or other defects, or when rain falls on newly coated surface before film has dried sufficiently to resist damage, apply additional coat of compound at specified rate of coverage.

3.09 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 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 specified 28-day

strength, unless directed otherwise by Engineer.

3.10 DEFECTIVE WORK

A. Immediately repair defective work discovered after forms have been removed. When concrete surface is bulged, uneven, or shows excess honeycombing or form marks which cannot be repaired satisfactorily through patching, remove and replace entire section.

3.11 FINISHING

A. Patch honeycomb, minor defects and form tie holes in concrete surfaces with cement mortar mixed one part cement to two parts fine aggregate. 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 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 surface.

B. Apply rubbed finish to exposed surfaces of formed concrete structures as noted on Drawings. After pointing has set sufficiently, wet surface with 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 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 surface to reset; then wash surface with clean water. Leave structure with clean, neat and uniform-appearing finish.

C. Apply wood float finish to concrete slabs.

3.12 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Section 01454 - Testing Laboratory Services.

B. Unless otherwise directed by Engineer, following minimum testing of concrete is required. Testing shall be performed by qualified individuals employed by approved independent testing agency, and conform to requirements of ASTM C 1077.

1. Take concrete samples in accordance with ASTM C 172.

2. Make one set of four compression test specimens for each mix design at least once per day and for each 150 cubic yards or fraction thereof. Make, cure and test

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, specified 7 day and 28 day compressive strengths shall be applicable at 3 and 7 days, respectively.

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. When additional curing fails to produce required strength, strengthening or replacement of portions of structure which fail to develop required strength may be required by Engineer, at no additional cost to Owner.

3.13 PROTECTION

A. Protect concrete against damage until final acceptance by Owner.

B. Protect fresh concrete from damage due to rain, hail, sleet, or snow. Provide protection while concrete is still plastic, and whenever precipitation is imminent or occurring.

C. Do not backfill around concrete structures or subject them to design loadings until components of structure needed to resist loading are complete and have reached specified 28 day compressive strength, except as authorized otherwise by Engineer.

END OF SECTION

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SECTION 03310

STRUCTURAL CONCRETE

PART 1 – G E N E R A L

1.1 SECTION INCLUDES

A. Cast-in-place normal-weight structural concrete and mass concrete.

1.2 MEASUREMENT AND PAYMENT

A. Unit prices.

1. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.3 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 304.2R - Placing Concrete by Pumping Methods

C. ACI 305R - Hot Weather Concreting.

D. ACI 306.1 - Standard Specification for Cold Weather Concreting.

E. ACI 309R - Guide for Consolidation of Concrete.

F. ACI 318 - Building Code Requirements for Reinforced Concrete.

G. ACI 350R - Environmental Engineering Concrete Structures.

H. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

I. ASTM C33 - Standard Specification for Concrete Aggregates.

J. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

K. ASTM C42 - Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

L. ASTM C88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

M. ASTM C94 - Standard Specifications for Ready-Mixed Concrete.

N. ASTM C127 - Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.

O. ASTM C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

P. ASTM C136 - Sieve Analyses of Fine and Coarse Aggregates.

Q. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.

R. ASTM C150 - Standard Specification for Portland Cement.

S. ASTM C157 - Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.

T. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.

U. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

V. ASTM C192 - Method of Making and Curing Concrete Test Specimens in the Laboratory.

W. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

X. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

Y. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.

Z. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

AA. ASTM C535 - Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

AB. ASTM C567 - Standard Test Method for Unit Weight of Structural Lightweight Concrete.

AC. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.

AD. Concrete Plant Manufacturer's Bureau (CPMB), Plant Mixer Manufacturers Division: Concrete Plant Mixer Standards.

AE. National Ready-Mixed Concrete Association (NRMCA): Certification of Ready-Mixed Concrete Production Facilities (checklist with instructions).

AF. John Wiley and Sons, Interscience Publishers Division, "Encyclopedia of Industrial Chemical Analysis," Vol. 15, Page 230 (alkalinity test procedure).

1.4 DEFINITIONS

A. Mass Concrete: Concrete sections 4 feet or more in least dimension.

B. Hot Weather: Any combination of high air temperature, low relative humidity and wind velocity tending to impair quality of fresh or hardened concrete or otherwise resulting in abnormal properties.

C. Cold Weather: Period when, for more than 2 successive days, mean daily temperature is below 40 degrees F.

1.5 SUBMITTALS

A. Conform to Section 01300 - Submittals.

B. Mill Certificates: Required for bulk cement.

C. Design Mixes:

1. Submit test data on proposed design mixes for each type of concrete in the Work, including each class, and variations in type, source or quantity of material. Include type, brand and amount of cementitious materials; type, brand and amount of each admixture; slump; air content; aggregate sources, gradations, specific gravity and absorption; total water (including moisture in aggregate); water/cement ratio; compressive strength test results for 7 and 28 days; and shrinkage tests for Class C and D concrete at 21 or 28 days of drying.

2. Submit abrasion loss and soundness test results for limestone aggregate.

3. Testing of aggregates, including sieve analysis, shall be performed by a certified independent testing laboratory. Tests shall have been performed no earlier than 3 months before Notice to Proceed.

4. Provide standard deviation data for plant producing concrete. Data shall include copies of laboratory test results and standard deviation calculated in accordance with ACI 318, Item 5.3.1. Laboratory tests shall have been performed within past 12 months. When standard deviation data is not available, comply with ACI 318, Table 5.3.2.2.

5. Review and acceptance of mix design does not relieve Contractor of responsibility to provide concrete of quality and strength required by these Specifications.

D. Admixtures: Submit manufacturer's technical information, including following:

1. Air-Entraining Admixture: Give requirements to control air content under all conditions, including temperature variations and presence of other admixtures.

2. Chemical Admixtures: Give requirements for quantities and types to be used under various temperatures and job conditions to produce uniform, workable concrete mix. Submit evidence of compatibility with other admixtures and cementitious materials proposed for use in design mix.

E. High-Range Water Reducer (Superplasticizer): When proposed for use, submit manufacturer's technical information and instructions for use of superplasticizer. State whether superplasticizer will be added at ready-mix plant or job site. When superplasticizer will be added at job site, submit proposed plan for measuring and adding superplasticizer to concrete mix at job site, and establish dosing area on site with holding tanks and metering devices. When superplasticizer is to be added at ready-mix plant, submit contingency plans for adding additional superplasticizer at job site when required due to delay in placing concrete. Identify portions of Work on which superplasticizer is proposed for use.

F. Hot and Cold Weather Concreting: Submit, when applicable, proposed plans for hot and cold weather concreting. Review and acceptance of proposed procedure will not relieve Contractor of responsibility for quality of finished product.

G. Project Record Drawings: Accurately record actual locations of embedded utilities and components which are concealed from view.

1.6 QUALITY CONTROL

A. Provide necessary controls during evaluation of materials, mix designs, production and delivery of concrete, placement and compaction to assure that the Work will be accomplished in accordance with Contract Documents. Maintain records of concrete placement. Record dates, locations, quantities, air temperatures, and test samples taken.

B. Code Requirements: Concrete construction for buildings shall conform to ACI 318. Concrete construction for water and wastewater treatment and conveying structures shall conform to ACI 318 with modifications by ACI 350R, Item 2.6. Where this Specification conflicts with ACI 318 or ACI 350R, this Specification governs.

C. Testing and Other Quality Control Services:

1. Concrete testing required in this section, except concrete mix design, limestone aggregate test data, and testing of deficient concrete, will be performed by an independent commercial testing laboratory employed and paid by the Owner in accordance with Section 01454 - Testing Laboratory Services.

2. Provide material for and cooperate fully with Owner's testing laboratory technician in obtaining samples for required tests.

3. Standard Services: The following testing and quality control services will be provided by Owner in accordance with Section 01454, Testing Laboratory Services:

a. Verification that plant equipment and facilities conform to NRMCA "Certification of Ready-Mix Concrete Production Facilities".

b. Testing of proposed materials for compliance with this Specification.

c. Review of proposed mix design submitted by Contractor.

d. Obtaining production samples of materials at plants or stockpiles during work progress and testing for compliance with this Specification.

e. Strength testing of concrete according to following procedures:

(1) Obtaining samples for field test cylinders from every 100 cubic yards and any portion less than 100 cubic yards for each mix design placed each day, according to ASTM C172, with each sample obtained from a different batch of concrete on a representative, random basis. Selecting test batches by any means other than random numbers chosen before concrete placement begins is not allowed.

(2) Molding four specimens from each sample according to ASTM C31, and curing under standard moisture and temperature conditions as specified in Sections 7(a) and (b) of ASTM C31.

(3) Testing two specimens at 7 days and two specimens at 28 days according to ASTM C39, reporting test results averaging strengths of two specimens. However, when one specimen evidences improper sampling, molding or testing, it will be discarded and remaining cylinder considered test result. When high-early-strength concrete is used, specimens will be tested at 3 and 7 days.

f. Air content: For each strength test, determination of air content of normal weight concrete according to ASTM C231.

g. Slump: For each strength test, and whenever consistency of concrete appears to vary, conducting slump test in accordance with ASTM C143.

h. Temperature: For each strength test, checking concrete temperature in accordance with ASTM C1064.

i. Lightweight concrete: For each strength test, or more frequently when requested by Engineer, determination of air content by ASTM C567 and unit weight by ASTM C567.

j. Monitoring of current and forecasted climatic conditions to determine when rate of evaporation, as determined by Figure 2.1.5 of ACI 305R, will produce loss of 0.2 pounds of water, or more, per square foot per hour. Testing lab representative will advise Contractor to use hot weather precautions when such conditions will exist during concrete placement, and note on concrete test reports when Contractor has been advised that hot weather conditions will exist.

k. Class A and D Concrete Shrinkage Tests: Performance of drying shrinkage tests for trial batches as follows:

(1) Preparation and Testing of Specimens: Compression and drying shrinkage test specimens will be taken in each case from the same concrete sample; shrinkage tests will be considered a part of the normal compression tests for the project. 4-inch by 4-inch by 11-inch prisms with an effective gage length of 10 inches, fabricated, cured, dried and measured in accordance with ASTM C157, modified as follows:

(a) Wet curing: Remove specimens from molds at an age of 23 hours ☐1 hour after trial batching and immediately immerse in water at 70 degrees F ☐3 degrees F for at least 30 minute

(b) Measure within 30 minutes after first 30 minutes of immersion to determine original length (not to be confused with "base length");

(c) Then submerge in saturated limewater, at 73 degrees F ☐3 degrees for 7 days;

(d) Then measure at age 7 days to establish "base length" for drying shrinkage calculations ("zero" days drying age);

(e) Calculate expansion (base length expressed as a percentage of original length);

(f) Immediately store specimens in a temperature- and humidity-controlled room maintained at 73 degrees F, $\pm$3 degrees F and 50 percent $\pm$4 percent relative humidity, for the remainder of the test.

(g) Measure to determine shrinkage, expressed as percentage of base length. Compute the drying shrinkage deformation of each specimen as the difference between the base length (at zero (0) days drying age) and the length after drying at each test age. Compute the average drying shrinkage deformation of the specimens to the nearest 0.0001 inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004 inch, disregard the results obtained from that specimen. Report results of shrinkage tests to the nearest 0.001 percent of shrinkage.

(h) Report shrinkage separately for 7, 14, 21, and 28 days of drying after 7 days of moist curing.

4. Additional Testing and Quality Control Services: The following will be performed by an independent commercial testing laboratory employed and paid by the Owner in

accordance with Section 01410, Testing Laboratory Services, when requested by Owner.

a. Checking of batching and mixing operations.

b. Review of manufacturer's report of each cement shipment and conducting laboratory tests of cement.

c. Molding and testing reserve 7-day cylinders or field cylinders.

d. Conducting additional field tests for slump, concrete temperature and ambient temperature.

e. Alkalinity Tests: For concrete used in sanitary structures, one test for each structure. Perform alkalinity tests on concrete covering reinforcing steel on the inside of the pipe or structure in accordance with "Encyclopedia of Industrial Chemical Analysis," Vol. 15, page 230.

5. Contractor shall provide the following testing and quality control services:

a. Employ an independent commercial testing laboratory, acceptable to Owner, to prepare and test design mix for each class of concrete for which material source has been changed.

b. Notify commercial testing laboratory employed by Owner 24 hours prior to placing concrete.

6. Testing of deficient concrete in place:

a. When averages of three consecutive strength test results fail to equal or exceed specified strength, or when any individual strength test result falls below specified strength by more than 500 psi, strength of concrete shall be considered potentially deficient and core testing, structural analysis or load testing may be required by Owner.

b. When concrete in place proves to be deficient, Contractor shall pay costs, including costs due to delays, incurred in providing additional testing and analysis services provided by the Owner, or the independent commercial testing laboratory selected by the Owner.

c. Replace concrete work judged inadequate by core tests, structural analysis or load tests at no additional cost to the Owner.

d. Core Tests:

(1) Obtain and test cores in accordance with ASTM C42. Where concrete in structure will be dry under service conditions, air dry cores (temperature 60 to 80 degrees F, relative humidity less than 60 percent) for 7 days before test; test dry. Where concrete in structure will be more than superficially wet under service conditions, test cores after moisture conditioning in accordance with ASTM C42.

(2) Take at least three representative cores from each member or area of concrete in place that is considered potentially deficient. Location of cores shall be determined by Owner so as to least impair strength of structure. When, before testing, one or more cores shows evidence of having been damaged during or after removal from structure, replace the damaged cores.

(3) Concrete in area represented by core test will be considered adequate when average strength of cores is equal to at least 85 percent of specified strength, and when no single core is less than 75 percent of specified strength.

(4) Patch core holes in accordance with Section 03345 - Concrete Finishing.

e. Structural Analysis: When core tests are inconclusive or impractical to obtain, Owner may perform additional structural analysis at Contractor's expense to confirm safety of structure.

f. Load Tests: When core tests and structural analysis do not confirm safety of structure, load tests may be required, and their results evaluated, in accordance with ACI 318.

g. Testing by impact hammer, sonoscope, probe penetration tests (Windsor probe), or other nondestructive device may be permitted by Owner to determine relative strengths at various locations in structure, to evaluate concrete strength in place, or for selecting areas to be cored. However, such tests, unless properly calibrated and correlated with other test data, shall not be used as basis for acceptance or rejection of structure's safety.

1.7 STORAGE AND HANDLING OF MATERIALS

A. Cement: Store cement in weathertight buildings, bins or silos to provide protection from dampness and contamination and to minimize warehouse set. When there is any doubt as to expansive potential of shrinkage-compensating cements because of method or length of storage and exposure, laboratory test cement before use.

B. Aggregate: Arrange and use aggregate stockpiles to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates. Build stockpiles in successive horizontal layers not exceeding 3 feet in thickness. Complete each layer before next is started.

C. Fine Aggregate: Before using, allow fine aggregate to drain until uniform moisture content is reached.

D. Admixtures: Store admixtures to avoid contamination, evaporation or damage. For those used in form of suspensions or nonstable solutions, provide suitable agitating equipment to assure uniform distribution of ingredients. Protect liquid admixtures from freezing and other temperature changes which would adversely affect their characteristics.

E. Lightweight Aggregates: Uniformly predampen lightweight aggregates as necessary to prevent excessive variations in moisture content. Allow predampened aggregates to remain in stockpiles, under continuous fog spray, for minimum of 24 hours before use. Provide adequate drainage in stockpile areas to eliminate excess water and accumulation of contaminated fines.

PART 2 –PRODUCTS

2.1 MATERIALS

A. Cement:

1. Use same brand of cement used in concrete mix design. Use only one brand of each type in each structure, unless otherwise indicated on Drawings.

2. Portland Cement: ASTM C150, Type I or Type II, gray in color. Use Type III only when specifically authorized by Owner in writing. Use Type II, including the requirements of

Table 2, in construction of liquid-containing structures and cooling towers, unless shown otherwise on Drawings.

B. Admixtures:

1. Do not use calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions.

2. Air-Entraining Admixtures: ASTM C260, compatible with other admixtures used.

3. Chemical Admixtures: Polymer type, nonstaining, chloride-free admixtures conforming to ASTM C494, Type A, C, D or E.

4. High-Range Water Reducer (Superplasticizer): ASTM C494, Type F or G, compatible with and by the same manufacturer as other admixtures.

C. Mixing Water: Use clean, potable water, free from harmful amounts of oils, acids, alkalis or other deleterious substances, meeting requirements of ASTM C94.

D. Aggregates: Use coarse aggregate from only one source, and fine aggregate from only one source, for exposed concrete in any single structure.

1. Coarse Aggregate: Gravel, crushed gravel or crushed limestone conforming to ASTM C33. For wastewater treatment and conveying structures, provide only crushed limestone.

2. Fine Aggregate: Natural sand complying with ASTM C33, except provide only crushed limestone for wastewater treatment and conveying structures.

3. Limestone aggregate shall conform to ASTM C33 and the following additional requirements: Clean, hard, strong and durable particles free of chemicals and coatings of silt, clay, or other fine materials that may affect hydration and bond of cement paste. Select crushed limestone: High-calcium limestone (minimum 95 percent $CaCO_3$ and maximum 3.5 percent $MgCO_3$) with maximum Los Angeles Abrasion loss of 38 percent, when tested in accordance with ASTM C131 or ASTM C535. Test aggregate for soundness in accordance with ASTM C88; maximum loss shall not exceed 18 percent after 5 cycles of magnesium sulfate test.

4. Maximum size of coarse aggregate:

a. Normal weight concrete, except as noted below: 1-1/2 inches.

b. Formed members 6 inches or less in least dimension: 1/5 least dimension.

c. Slabs: 1/3 depth of slab.

d. Drilled shafts: 1/3 clearance between reinforcing steel, but not greater than 3/4 inch.

e. Concrete fill, seal slabs and bonded concrete topping in clarifiers: 3/8 inch.

5. Coarse aggregate for lightweight concrete: ASTM C330. Grading limits: 3/4 inch to No. 4.

6. Abrasive Aggregate: Conform to requirements of Section 03345 - Concrete Finishing.

E. Calcium Chloride: Not permitted.

F. Evaporation Retardant: Masterbuilders "Confilm", Euclid "Eucobar", or equal.

G. Miscellaneous Materials:

1. Bonding Agent: Two-component modified epoxy resin.
2. Vapor barrier: 6 mil clear polyethylene film of type recommended for below-grade aplication.
3. Non-shrink grout: premixed compound consisting of non-metallic aggregate, cement and water-reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.2 CONCRETE MIX

A. Objective: Select proportions of ingredients to produce concrete having proper placability, durability, strength, appearance and other specified properties.

B. Mix Design: Employ and pay an independent commercial testing laboratory, acceptable to Owner, to prepare and test mix designs for each type of concrete specified. Proportion mix design ingredients by weight. Submit mix designs and test results for approval.

1. During the trial batches, aggregate proportions may be adjusted by the testing laboratory using two coarse aggregate size ranges to obtain the required properties. If one size range produces an acceptable mix, a second size range need not be used. Such adjustments shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor. Concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the Contractor's preliminary mix design, or whether the proportions have been adjusted during the trial batch process. Prepare trial batches using the aggregates, cement and admixtures proposed for the project. Make trial batches large enough to obtain 3 drying shrinkage test specimens and 6 compression test specimens from each batch. Shrinkage testing is required only for Class C and D concrete.

2. Determine compressive strength by testing 6-inch diameter by 12-inch high cylinders, made, cured and tested in accordance with ASTM C192 and ASTM C39. Test 3 compression test cylinders at 7 days and 3 at 28 days. Average compressive strength for the 3 cylinders tested at 28 days for any given trial batch shall be not less than 125 percent of the specified compressive strength.

3. Perform sieve analysis of the combined aggregate for each trial batch according to of ASTM C136. Report percentage passing each sieve.

4. In mix designs for Class C and D concrete, fine aggregate shall not exceed 41 percent of total aggregate by weight.

C. Shrinkage Limitations, Class A and D Concrete

1. Maximum concrete shrinkage for specimens cast in the laboratory from the trial batch: 0.036 percent as measured at 21-day drying age, or 0.042 percent at 28-day drying age. Use for construction only mix designs that meet trial batch shrinkage requirements. Shrinkage limitations apply only to Class A and D concrete.

2. Maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than 25 percent.

3. If the required shrinkage limitation is not met during construction, take any or all of the following actions, at no additional cost to the Owner, for securing the specified shrinkage requirements: Changing the source or aggregates, cement or admixtures; reducing water content; washing of aggregate to reduce fines; increasing the number of construction

joints; modifying the curing requirements; or other actions designed to minimize shrinkage or its effects.

D. Selecting Ingredient Proportions for Concrete:

1. Proportion concrete mix according to ACI 301, Chapter 3.

2. Establish concrete mix design by laboratory trial batches prepared by independent testing laboratory, or on basis of previous field experience in accordance with provisions of ACI 318, Item 5.3; however, minimum cement content for each class of concrete shall not be less than specified.

3. Concrete mix design data submitted for review shall have average 28-day compressive strength calculated in accordance with ACI 318, Item 5.3.2.1. When data is not available to determine standard deviation in accordance with ACI 318, Item 5.3.1, average 28-day strength of mix design shall conform to ACI 318, Table 5.3.2.2.

E. Water-Cement Ratios:

1. Maximum allowable water-cement ratios shall be as follows:

a. Concrete for liquid-containing structures: 0.45.

b. Concrete subjected to brackish water, salt spray or deicers: 0.40.

c. All other concrete: 0.55.

2. Superplasticizer may be added to maintain specified maximum water-cement ratios. Include free water in aggregate in water-cement ratio computations.

F. Adjustment of Mix Proportions: After sufficient data becomes available during construction, mix may be adjusted upon approval of Engineer, in accordance with ACI 318, Item 5.5; however, minimum cement content for each class of concrete shall not be less than specified.

G. Entrained Air: Air-entrain all concrete except drilled shafts. Total air content in accordance with ASTM C173: 4 to 6 percent.

H. Consistency, Workability, and Slump:

1. The quantity of water in a batch of concrete shall be just sufficient, with a normal mixing period, to produce concrete which can be worked properly into place without segregation, and which can be compacted by vibratory methods as specified, to give the desired strength, density, impermeability and smoothness of surface. Change the quantity of water as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. Determine the consistency of the concrete in successive batches by slump tests in accordance with ASTM C 143. Slumps shall be as follows:

Concrete Type	Minimum Slump	Maximum Slump
Portland Cement Concrete:	2"	4"
Concrete to be dosed with superplasticizer:	1"	3"
Normal Weight Concrete after dosing with superplasticizer:	4"	9"
Lightweight Concrete after dosing with superplasticizer:	4"	7"
Drilled Shaft Concrete:	4"*	8"

* Minimum slump where drilled shafts are cast in temporary casings: 5 inches.

2. Specified slump shall apply at time when concrete is discharged at job site. Perform slump tests to monitor uniformity and consistency of concrete delivered to job site; however, do not use as basis for mix design. Do not exceed water-cement ratios specified.

I. Admixtures: Proportion admixtures according to manufacturer's recommendations. Use of accelerator is permitted when air temperature is less than 40 degrees F. Use of retarder is permitted when temperature of placed concrete exceeds 65 degrees F.

J. High-Range Water Reducers (Superplasticizers): Use superplasticizer to improve workability of concrete or delay hydration of cement, in accordance with requirements and recommendations of product manufacturer and approved submittals.

K. Concrete Classification and Strength:

1. Strength: Conform to values for class of concrete indicated on Drawings for each portion of Work. Requirements are based on 28-day compressive strength. If high early-strength concrete is allowed, requirements are based on 7-day compressive strength.

2. Classification:

Class (Normal-weight)	Minimum 28-Day Compressive Strength (psi)	Minimum Cement Content Pounds per Cubic Yard
Concrete for Structures Containing Water or Wastewater		
A	4000	564 (6 Sacks)
B	1500	423 (3-1/2 Sacks)
C	3000	470 (5 Sacks)
D	5000	658 (7 Sacks)
H	3000	610 (6-1/2 Sacks)

Concrete for Buildings, Slabs on Grade and Miscellaneous Structures

Class (Light-weight)	Minimum 28-Day Compressive Strength (psi)	Minimum Cement Content Pounds per Cubic Yard
AB	4000	Not Applicable
BB	1500	Not Applicable
CB	3000	Not Applicable
DB	5000	Not Applicable
E	3000	Not Applicable
F	4000	Not Applicable
G	5000	Not Applicable

3. Maximum size aggregate for Class H concrete: 3/8 inch. Maximum size aggregate for all other normal-weight concrete: 1-1/2 inches, except as specified in Paragraph 2.1D.4.

4. When required strength is not obtained with minimum cement content as specified, add cement, lower water-cement ratio or provide other aggregates as necessary.

5. In addition to conforming to specified strength, lightweight concrete must be within specified unit weight limits. Maximum air-dry unit weight is 118 pounds per cubic foot; minimum is 110 pounds per cubic foot unless shown otherwise on Drawings. Determine air-dry unit weight in accordance with ASTM C567. Correlate air-dry unit weight with fresh unit weight of the same concrete as a basis for acceptance during construction.

L. Use of Classes of Concrete:

1. Use classes of concrete as indicated on the Drawings and in other specifications.

2. Liquid-containing structures: If not otherwise indicated, use the following classes for structures containing water or wastewater and for utility applications in the locations described:

a. Class A: All reinforced concrete and where not otherwise defined.

b. Class B: Unreinforced concrete used for plugging pipes, seal slabs, thrust blocks and trench dams, unless indicated otherwise.

c. Class H: Fill and topping. Where concrete fill thickness exceeds 3 inches in the majority of a placement and is not less than 1.5 inches thick, Class A concrete may be used.

3. All other structures: If not otherwise indicated, use the following classes in the locations described:

a. Class AB: All reinforced concrete and where not otherwise defined.

b. Class CB: Duct banks;

c. Class BB: Unreinforced concrete fill under structures.

2.3 MIXING NORMAL WEIGHT CONCRETE

A. Conform to ACI 301, Chapter 7.
B. Ready-Mixed Concrete:

1. Measure, batch, mix and transport ready-mixed concrete according to ASTM C94. Plant equipment and facilities shall conform to NRMCA "Certification of Ready Mixed Concrete Production Facilities".

2. Provide batch tickets with information specified in ASTM C94. Deliver batch ticket with concrete and give to Owner's on-site testing laboratory representative.

C. Batch Mixing at Site:

1. Mix concrete in batch mixer conforming to requirements of CPMB "Concrete Plant Mixer Standards". Use mixer equipped with suitable charging hopper, water storage tank and water measuring device. Batch mixer shall be capable of mixing aggregates, cement and water into uniform mass within specified mixing time, and of discharging mix without segregation. Operate mixer according to rated capacity and recommended revolutions per minute printed on manufacturer's rating plate.

2. Charge batch into mixer so some water will enter before cement and aggregates. Keep water running until one-fourth of specified mixing time has elapsed. Provide controls to prevent discharging until required mixing time has elapsed. When concrete of normal weight is specified, provide controls to prevent addition of water during mixing. Discharge entire batch before mixer is recharged.

3. Mix each batch of 2 cubic yards or less for not less than 1 minute and 30 seconds. Increase minimum mixing time 15 seconds for each additional cubic yard or fraction of cubic yard.

4. Keep mixer clean. Replace pick-up and throw-over blades in drum when they have lost 10 percent of original depth.

D. Admixtures:

1. Charge air-entraining and chemical admixtures into mixer as solution using automatic dispenser or similar metering device. Measure admixture to accuracy within $\pm$ 3 percent. Do not use admixtures in powdered form.

2. Two or more admixtures may be used in same concrete, provided that admixtures in combination retain full efficiency and have no deleterious effect on concrete or on properties of each other. Inject admixtures separately during batching sequence.

3. Add retarding admixtures as soon as practicable after addition of cement.

E. Temperature Control:

1. When ambient temperature falls below 40 degrees F, keep as-mixed temperature above 55 degrees F to maintain concrete above minimum placing temperature.

2. When water or aggregate has been heated, combine water with aggregate in mixer before cement is added. Do not add cement to mixtures of water and aggregate when temperature of mixture is greater than 100 degrees F.

3. In hot weather, maintain temperature of concrete below maximum placing temperature. When necessary, temperature may be lowered by cooling ingredients, cooling mixer drum by fog spray, using chilled water or well-crushed ice in whole or part for added water, or arranging delivery sequence so that time of transport and placement does not generate unacceptable temperatures.

4. Submit hot weather and cold weather concreting plans for approval.

2.4 MIXING LIGHTWEIGHT CONCRETE

A. Determining Absorption of Aggregates: Mixing procedures vary according to total absorption by weight of lightweight aggregates. Determine total absorption by weight before predamping in accordance with ASTM C127.

B. Ten Percent or Less Absorption: Follow same requirements as for mixing normal-weight concrete when preparing concrete made with low-absorptive lightweight aggregates having 10 percent or less total absorption by weight. To be low-absorptive, aggregates must absorb less than 2 percent additional water in first hour after mixing.

C. More Than 10 Percent Absorption: Batch and mix concrete made with lightweight aggregates having more than 10 percent total absorption by weight, as follows:

1. Place approximately 80 percent of mixing water in mixer.

2. If aggregates are pre-dampened, add air-entraining admixture and all aggregates. Mix for minimum of 30 seconds, or 5 to 10 revolutions of truck mixer.

3. When aggregates have not been predampened, mix aggregates and water for minimum of 1 minute and 30 seconds, or 15 to 30 revolutions of truck mixer. Then add air-entraining admixture and mix for additional 30 seconds.

4. Then, in the following sequence, add specified or permitted admixtures (other than air-entraining agent), all cement, and mixing water previously withheld.

5. Complete mixing using procedures for normal-weight concrete.

2.5 MASS CONCRETE

A. Do not use high early-strength cement (Type III) or accelerating admixtures.

B. Use high-range water-reducing admixture (superplasticizer) to minimize water content and cement content.

C. Specified water-reducing retarding admixture may be required to prevent cold joints when placing large quantities of concrete, to permit revibration of concrete, to offset effects of high temperature in concrete or weather, and to reduce maximum temperature or rapid temperature rise.

2.6 EQUIPMENT

A. Select equipment of size and design to ensure continuous flow of concrete at delivery end. Conform to following equipment and operations requirements.

B. Truck mixers, agitators and manner of operation: Conform to ASTM C94. Use of non-agitating equipment for transporting concrete is not permitted.

C. Belt conveyors: Configure horizontally, or at a slope causing no segregation or loss. Use approved arrangement at discharge end to prevent separation. Discharge long runs without separation into hopper.

D. Chutes: Metal or metal-lined (other than aluminum). Arrange for vertical-to-horizontal slopes not more than 1 to 2 nor less than 1 to 3. Chutes longer than 20 feet or not meeting slope requirements may be used if concrete is discharged into hopper before distribution.

E. Do not use aluminum or aluminum-alloy pipe or chutes for conveying concrete.

PART 3 –EXECUTION

3.1 SPECIAL CONSIDERATIONS

A. Concreting Under Water: Not permitted except where shown otherwise on Drawings or approved by Owner. When shown or permitted, deposit concrete under water by methods acceptable to the Owner so fresh concrete enters mass of previously-placed concrete from within, causing water to be displaced with minimum disturbance at surface of concrete.

B. Protection from Adverse Weather: Unless adequate protection is provided or Owner's approval is obtained, do not place concrete during rain, sleet, snow or freezing weather. Do not permit rainwater to increase mixing water or to damage surface finish. If rainfall occurs after placing operations begin, provide adequate covering to protect Work.

3.2 PREPARATION OF SURFACES FOR CONCRETING

A. Earth Surfaces:

1. Under interior slabs on grade, install vapor barrier. Lap joints at least 6 inches and seal watertight with tape, or sealant applied between overlapping edges and ends. repair vapor barrier damaged during placement of reinforcing and inserts with vapor barrier material; lap over damaged areas at least 6 inches and seal watertight.

2. Other Earth Surfaces: Thoroughly wet by sprinkling prior to placing concrete, and keep moist by frequent sprinkling up to time of placing concrete thereon. Remove standing water. Surfaces shall be free from standing water, mud and debris at the time of placing concrete.

B. Construction Joints:

1. Definition: Concrete surfaces upon or against which concrete is to be placed, where the placement of the concrete has been interrupted so that, in the judgement of the Owner, new concrete cannot be incorporated integrally with that previously placed.

2. Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, use forms or other means to shape the working face to secure proper union with subsequent work. Make construction joints only where acceptable to the Owner.

3. Preparation: Give horizontal joint surfaces a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, clean joint surfaces of laitance, loose or defective concrete and foreign material by hydroblasting or sandblasting (exposing aggregate), roughen surface to expose aggregate to a depth of at least 1/4 inch and wash thoroughly. Remove standing water from the construction joint surface before new concrete is placed.

4. After surfaces have been prepared cover approximately horizontal construction joints with a 3-inch lift of a grout mix consisting of Class C concrete batched without coarse aggregate; place and spread grout uniformly. Place wall concrete on the grout mix immediately thereafter.

C. Set and secure reinforcement, anchor bolts, sleeves, inserts and similar embedded items in the forms where indicated on Contract Drawings, shop drawings and as otherwise required. Obtain Owner's acceptance before concrete is placed. Accuracy of placement is the sole responsibility of the Contractor.

D. Place no concrete until at least 4 hours after formwork, inserts, embedded items, reinforcement and surface preparation have been completed and accepted by the Owner. Clean surfaces of forms and embedded items that have become encrusted with grout or previously-placed concrete before placing adjacent concrete.

E. Casting New Concrete Against Old**:** Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), thoroughly clean and roughen the surface of the old concrete by hydro-blasting or sandblasting (exposing aggregate). Coat joint surface with epoxy bonding agent following manufacturer's written instructions, unless indicated otherwise. Unless noted otherwise, this provision does not apply to vertical wall joints where waterstop is installed.

F. Protection from Water: Place no concrete in any structure until water entering the space to be filled with concrete has been properly cut off or diverted and carried out of the forms, clear of the work. Deposit no concrete underwater. Do not allow still water to rise on any concrete until concrete has attained its initial set. Do not allow water to flow over the surface of any concrete in a manner and at a velocity that will damage the surface finish of the concrete. Pumping, dewatering and other necessary operations for removing ground water, if required, are subject to Owner's review.

G. Corrosion Protection**:** Position and support pipe, conduit, dowels and other ferrous items to be embedded in concrete construction prior to placement of concrete so there is at least a 2 inch clearance between them and any part of the concrete reinforcement. Do not secure such items in position by wiring or welding them to the reinforcement.

H. Where practicable, provide for openings for pipes, inserts for pipe hangers and brackets, and setting of anchors during placing of concrete.

I. Accurately set anchor bolts and maintain in position with templates while they are being embedded in concrete.

J. Cleaning**:** Immediately before concrete is placed, thoroughly clean dirt, grease, grout, mortar, loose scale, rust and other foreign substances from surfaces of metalwork to be in contact with concrete.

3.3 HANDLING, TRANSPORTING AND PLACING CONCRETE

A. Conform to applicable requirements of Chapter 8 of ACI 301 and this Section. Use no aluminum materials in conveying concrete.

B. Rejected Work**:** Remove concrete found to be defective or non-conforming in materials or workmanship. Replace rejected concrete with concrete meeting requirements of Contract Documents, at no additional cost to the Owner.

C. Unauthorized Placement**:** Place no concrete except in the presence of the Owner. Notify the Owner in writing at least 24 hours before placement of concrete.

D. Placement in Wall Forms**:**

1. Do not drop concrete through reinforcing steel or into any deep form.

2. Do not place concrete in any form so as to leave an accumulation of mortar on form surfaces above the concrete.

3. Use hoppers and, if necessary, vertical ducts of canvas, rubber or metal (other than aluminum) for placing concrete in forms so it reaches the place of final deposit without

separation. Free fall of concrete shall not exceed 4 feet below the ends of ducts, chutes or buggies. Uniformly distribute concrete during depositing.

4. Do not displace concrete in forms more than 6 feet in horizontal direction from place where it was originally deposited.

5. Deposit in uniform horizontal layers not deeper than 2 feet; take care to avoid inclined layers or inclined construction joints except where required for sloping members.

6. Place each layer while the previous layer is still soft. Rate of placement shall not exceed 5 feet of vertical rise per hour.

7. Provide sufficient illumination in form interior so concrete at places of deposit is visible from the deck or runway.

E. Conveyors and Chutes**:** Design and arrange ends of chutes, hopper gates and other points of concrete discharge in the conveying, hoisting and placing system so concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyors, if used, shall be of a type acceptable to the Owner. Do not use chutes longer than 50 feet. Slope chutes so concrete of specified consistency will readily flow. If a conveyor is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyors and chutes shall be covered.

F. Placement of Slabs**:** In hot or windy weather, conducive to plastic shrinkage cracks, apply evaporation retardant to slab after screeding in accordance with manufacturer's instructions and recommendations. Do not use evaporation retardant to increase water content of the surface cement paste. Place concrete for sloping slabs uniformly from the bottom of the slab to the top, for the full width of the placement. As work progresses, vibrate and carefully work concrete around slab reinforcement. Screed the slab surface in an up-slope direction.

G. Concrete Temperature**:** When placed, not more than 90 degrees F nor less than 55 degrees F for sections less than 12 inches thick, nor less than 50 degrees for all other sections. Do not heat concrete ingredients to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. When concrete temperature is 85 degrees F or above, do not exceed 60 minutes between introduction of cement to the aggregates and discharge. When the weather is such that the concrete temperature would exceed 90 degrees F, employ effective means, such as pre-cooling of aggregates and mixing water, using ice or placing at night, as necessary to maintain concrete temperature, as placed, below 90 degrees F.

H. Cold Weather Placement**:** Conform to ACI 306.1 - Standard Specification for Cold Weather Concreting, and the following.

1. Remove snow, ice and frost from surfaces, including reinforcement, against which concrete is to be placed. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6 inches. Warm reinforcement and embedded items to above 32 degrees F prior to concrete placement.

2. Maintain concrete temperature above 50 degrees F for at least 3 days after placement.

3.4 PUMPING OF CONCRETE

A. If pumped concrete does not produce satisfactory results, in the judgement of the Owner, discontinue pumping operations and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment**:** Use a 2-cylinder pump designed to operate with only one cylinder if one is

not functioning, or have a standby pump on site during pumping.

C. The minimum hose (conduit) diameter: Comply with ACI 304.2R.

D. Replace pumping equipment and hoses (conduits) that do not function properly.

E. Do not use aluminum conduits for conveying concrete.

F. Field Control**:** Take samples for slump, air content and test cylinders at the placement (discharge) end of the line.

3.5 CONCRETE PLACEMENT SEQUENCE

A. Place concrete in a sequence acceptable to the Owner. To minimize effects of shrinkage, place concrete in units bounded by construction joints shown. Place alternate units so each unit placed has cured at least 7 days for hydraulic structures, or 3 days for other structures, before contiguous unit or units are placed, except do not place corner sections of vertical walls until the 2 adjacent wall panels have cured at least 14 days for hydraulic structures and 7 days for other structures.

B. Level the concrete surface whenever a run of concrete is stopped. To ensure straight and level joints on the exposed surface of walls, tack a wood strip at least 3/4-inch thick to the forms on these surfaces. Carry concrete about 1/2 inch above the underside of the strip. About one hour after concrete is placed, remove the strip, level irregularities in the edge formed by the strip with a trowel and remove laitance.

3.6 TAMPING AND VIBRATING

A. Thoroughly settle and compact concrete throughout the entire depth of the layer being consolidated, into a dense, homogeneous mass; fill corners and angles, thoroughly embed reinforcement, eliminate rock pockets and bring only a slight excess of water to the exposed surface of concrete during placement. Use ACI 309R Group 3 immersion-type high-speed power vibrators (8,000 to 12,000 rpm) in sufficient number and with sufficient (at least one) standby units. Use Group 2 vibrators only when accepted by the Owner for specific locations.

B. Use care in placing concrete around waterstops. Carefully work concrete by rodding and vibrating to make sure air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, work concrete under waterstops by hand, making sure air and rock pockets have been eliminated. Give concrete surrounding the waterstops additional vibration beyond that used for adjacent concrete placement to assure complete embedment of waterstops in concrete.

C. Concrete in Walls: Internally vibrate, ram, stir, or work with suitable appliances, tamping bars, shovels or forked tools until concrete completely fills forms or excavations and closes snugly against all surfaces. Do not place subsequent layers of concrete until previously-placed layers have been so worked. Provide vibrators in sufficient numbers, with standby units as required, to accomplish the results specified within 15 minutes after concrete of specified consistency is placed in the forms. Keep vibrating heads from contact with form surfaces. Take care not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.7 PLACING MASS CONCRETE

A. Observe the following additional restrictions when placing mass concrete.

1. Use specified superplasticizer.

2. Maximum temperature of concrete when deposited: 70 degrees F.

3. Place in lifts approximately 18 inches thick. Extend vibrator heads into previously-placed layer.

3.8 REPAIRING SURFACE DEFECTS AND FINISHING

A. Conform to Section 03345 - Concrete Finishing.

3.9 CURING

A. Conform to Section 03370 - Concrete Curing.

3.10 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 all 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 Owner.

END OF SECTION

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Section 03315

CONCRETE FOR UTILITY CONSTRUCTION

PART 1 G E N E R A L

1.01 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.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No payment will be made for concrete for utility construction under this Section. Include cost in applicable utility structure.

2. Obtain services of and pay for certified testing laboratory to prepare design mixes.

3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 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 - Guide for Concrete Plant Inspection and Field Testing of Ready-Mix Concrete.

H. ACI 315 - Details and Detailing of Concrete Reinforcement.

I. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary.

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) Steel Bars for Concrete Reinforcement.

O. ASTM A 775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

P. ASTM A 820 - Standard Specification for 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 Test Method for 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.

AB. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

AC. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.

AD. ASTM C 309 - Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.

AE. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

AF. ASTM C 595 - Standard Specification for Blended Hydraulic Cements.

AG. ASTM C 685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

AH. ASTM C 1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.

AI. ASTM C 1077 - Standard Practice for Laboratory Testing of Concrete and Concrete Aggregate for Use in Construction and Criteria for Laboratory Evaluation.

AJ. CRSI MSP-1 - Manual of Standard Practice.

AK. CRSI - Placing Reinforcing Bars.

AL. Federal Specification SS-S-210A - Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints

AM. NRMCA - Concrete Plant Standards.

1.04 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit proposed mix design and test data for each type and strength of concrete in Work.

C. Submit laboratory reports prepared by 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 Engineer.

E. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Specification.

F. 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.

1.05 HANDLING AND STORAGE

A. Cement: Store cement off of ground in 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 coating.

PART 2 P R O D U C T S

2.01 CONCRETE MATERIALS

A. Cementitious Material:

1. Portland Cement: ASTM C 150, Type II, unless use of Type III is authorized by 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 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 following ASTM standard sizes: No. 357 or No. 467; No. 57 or No. 67, No. 7. Maximum size: Not larger than 1/5 of 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 potential reactivity of fine and coarse aggregate in accordance with 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 A884. Supply 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 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.

2.02 FORM WORK 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 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. Form work 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 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 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 smooth surface and which line up properly.

2.03 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.

2.04 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.

2.05 DESIGN MIX

A. Use design mixes prepared by 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 Engineer for review.

C. Proportioning on basis of field experience or trial mixtures in accordance with requirements at Section 5.3 of ACI 318 may be used, when approved by Engineer.

D. Classification:

Class	Cement Sks Per CY	Minimum Strength, psi (MPa)		Maximum W/C Ratio[1]	Air Entrain.
		28 Days	7 Days		
A	5.0 (280 kg/m^3)	3000 (20.6)	2100 (14.5)	0.6	Yes
B	4.0 (225 kg/m^3)	2000 (13.8)	1400 (9.7)	0.6	No
C	6.0 (335 kg/m^3)	3600(24.8)	2520 (17.4)	0.45	Yes
D	4.5 (252 kg/m^3)	2500 (17.2)	1750 (12.1)	0.6	No
H	6.0 (335 kg/m^3)	As indicated	As Indicated	0.45	Yes
I	5.5 (308 kg/m^3)	3500 (24.1)	2450 (16.9)	0.45	Yes
J	2.0 (112 kg/m^3)	800 (5.5)	560 (3.9)	N/A	No
S	6.0 (335 kg/m^3)	4000 (27.6)	2800 (19.3)	0.45	Yes

E. Add steel or polypropylene fibers only when called for on 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 Drawings and other Specifications. Use Class B for unreinforced concrete used for plugging pipes, seal slabs, thrust blocks, trench dams, tunnel inverts and concrete fill unless indicated otherwise. Use Class A for all other applications.

2.06 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 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.

PART 3 E X E C U T I O N

3.01 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 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 clean out 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 form work with sufficient number of studs and wales to prevent deflection.

E. Re-oil or lacquer liner on 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 concrete is placed, wet surface of forms which will come in contact with concrete.

3.02 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 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 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 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.

3.03 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.

3.04 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 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 though 8.

C. Maintain concrete workability without segregation of material and excessive bleeding. Obtain approval of Engineer before adjustment and change of mix proportions.

D. Ready-mixed concrete delivered to site shall be accompanied by batch tickets providing information required by ASTM C 94, Section 16. Concrete produced by continuous mixing shall be accompanied by batch tickets providing information required by ASTM C 685, Section 14.

E. 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 shade, away from artificial heat. Protect concrete from temperatures below 32 degrees F until concrete has cured for minimum of 3 days at 70 degrees F or 5 days at 50 degrees F.

F. Clean, maintain and operate equipment so that it thoroughly mixes material as required.

G. Hand-mix only when approved by Engineer.

3.05 PLACING CONCRETE

A. Give sufficient advance notice to 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 Engineer's approval.

B. Schedule concrete placing to permit completion of finishing operations in daylight hours. However, when necessary to continue after daylight hours, light site as required. When rainfall occurs after placing operations are started, provide covering to protect 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 initial set; do not place 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. Place concrete in continuous horizontal layers approximately 12 inches thick. Place each layer while layer below is still plastic.

G. Compact each layer of concrete with concrete spading implements and mechanical vibrators of approved type and adequate number for size of placement. When immersion vibrators cannot be used, use form vibrators. Apply vibrators to concrete immediately after depositing. Move vibrator vertically through 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.

H. Handling and Placing Concrete: Conform to ACI 302.1R, ACI 304R and ACI 309R.

3.06 WATERSTOPS

A. Embed waterstops in concrete across joints as shown. Waterstops shall be continuous for extent of joint; make splices necessary to provide 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 next pour. When waterstop will remain exposed for 2 days or more, shade and protect exposed waterstop from direct rays of sun during entire exposure and until exposed portion of waterstop is embedded in concrete.

3.07 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.

3.08 CURING

A. Comply with ACI 308. Cure by preventing loss of moisture, rapid temperature change and mechanical injury for 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 concrete surface after placing and finishing. A curing day is any calendar day in which temperature is above 50 degrees F for at least 19 hours. Colder days may be counted when 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 end of calendar days equal to twice required number of curing days. However, leave soffit forms and shores in place until concrete has reached specified 28 day strength, unless directed otherwise by Engineer.

B. Cure formed surfaces not requiring rubbed-finished surface by leaving forms in place for full curing period. Keep wood forms wet during 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. Rubbed Finish:

1. At formed surfaces requiring rubbed finish, remove forms as soon as practicable without damaging surface.

2. 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 final finish and surplus water sheen has disappeared, immediately seal surface with uniform coating of approved curing compound, applied at rate of coverage recommended by manufacturer or as directed by 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 compound.

2. Thoroughly agitate 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 dry surface. When concrete surface has become dry, thoroughly moisten surface immediately prior to application. At locations where coating shows discontinuities, pinholes or other defects, or when rain falls on newly coated surface before film has dried sufficiently to resist damage, apply additional coat of compound at specified rate of coverage.

3.09 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 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 specified 28-day strength, unless directed otherwise by Engineer.

3.10 DEFECTIVE WORK

A. Immediately repair defective work discovered after forms have been removed. When concrete surface is bulged, uneven, or shows excess honeycombing or form marks which cannot be repaired satisfactorily through patching, remove and replace entire section.

3.11 FINISHING

A. Patch honeycomb, minor defects and form tie holes in concrete surfaces with cement mortar mixed one part cement to two parts fine aggregate. 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 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 surface.

B. Apply rubbed finish to exposed surfaces of formed concrete structures as noted on Drawings. After pointing has set sufficiently, wet surface with 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 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 surface to reset; then wash surface with clean water. Leave structure with clean, neat and uniform-appearing finish.

C. Apply wood float finish to concrete slabs.

3.12 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Section 01454 - Testing Laboratory Services.

B. Unless otherwise directed by Engineer, following minimum testing of concrete is required. Testing shall be performed by qualified individuals employed by approved independent testing agency, and conform to requirements of ASTM C 1077.

1. Take concrete samples in accordance with ASTM C 172.

2. Make one set of four compression test specimens for each mix design at least once per day and for each 150 cubic yards or fraction thereof. Make, cure and test 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, specified 7 day and 28 day compressive strengths shall be applicable at 3 and 7 days, respectively.

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. When additional curing fails to produce required strength, strengthening or replacement of portions of structure which fail to develop required strength may be required by Engineer, at no additional cost to Owner.

3.13 PROTECTION

A. Protect concrete against damage until final acceptance by Owner.

B. Protect fresh concrete from damage due to rain, hail, sleet, or snow. Provide protection while concrete is still plastic, and whenever precipitation is imminent or occurring.

C. Do not backfill around concrete structures or subject them to design loadings until components of structure needed to resist loading are complete and have reached specified 28 day compressive strength, except as authorized otherwise by Engineer.

END OF SECTION

SECTION 03345

CONCRETE FINISHING

PART 1 – G E N E R A L

1.1 SECTION INCLUDES

A. Repairing surface defects.

B. Finishing concrete surfaces including both formed and unformed surfaces.

C. Sealing concrete surfaces.

D. Installation of concrete fill and installation of concrete topping in bottoms of clarifiers and thickeners.

1.2 MEASUREMENT AND PAYMENT

A. Unit prices.

1. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.3 REFERENCES

A. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

B. ASTM C881 - Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

C. ASTM C1059 - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

D. ASTM D4587 - Conducting Tests on Paint and Related Coatings and Materials Using a Fluorescent UV-Condensation Light-and Water-Exposure Apparatus.

E. ASTM E1155 - Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System.

1.4 SUBMITTALS

A. Conform to Section 01300 - Submittals.

B. Submit manufacturer's technical literature on the following products proposed for use. Include manufacturer's installation and application instructions and, where specified, manufacturer's certification of conformance to requirements and suitability for use in the applications indicated.

1. Floor hardener.
2. Sealer.
3. Epoxy floor topping.
4. Epoxy penetrating sealer.

5. Latex bonding agent.
6. Epoxy adhesive.
7. Abrasive aggregate.
8. Evaporation retardant.

PART 2 –PRODUCTS

2.1 MATERIALS

A. Sealer/Dustproofer (VOC Compliant): Water-based acrylic sealer; non-yellowing under ultraviolet light after 200-hour test in accordance with ASTM D4587. Conform to local, state and federal solvent emission requirements.

B. Epoxy Floor Topping: Two-component epoxy resin meeting ASTM C881 Type III, resistant to wear, staining and chemical attack, blended with granite, sand, trap rock or quartz aggregate, trowel-applied over concrete floor. Topping thickness, 1/8 inch; color, gray.

C. Abrasive Aggregate for Non-slip Finish: Fused aluminum oxide grit, or crushed emery aggregate containing not less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Material shall be factory graded, packaged, rustproof and non-glazing, and unaffected by freezing, moisture and cleaning materials.

D. Epoxy Penetrating Sealer: Low-viscosity, two-component epoxy system designed to give maximum penetration into concrete surfaces. Sealer shall completely seal concrete surfaces from penetration of water, oil and chemicals; prevent dusting and deterioration of concrete surfaces caused by heavy traffic; and be capable of adhering to floor surfaces subject to hydrostatic pressure from below. Color, transparent amber or gray; surface, non-slip.

E. Latex Bonding Agent: Non-redispersable latex base liquid conforming to ASTM C1059. When used in water and wastewater treatment structures, bonding agent shall be suitable for use under continuously submerged conditions. Conformance and suitability certification by manufacturer is required.

F. Bonding Grout: Prepare bonding grout by mixing approximately one part cement to one part fine sand meeting ASTM C144 but with 100 percent passing No. 30 mesh sieve. Mix with water to consistency of thick cream. At Contractor's option, a commercially prepared bonding agent used in accordance with manufacturer's recommendations and instructions may be used. When used in water and wastewater treatment structures, bonding agent shall be suitable for use under continuously submerged conditions. Conformance and suitability certification by manufacturer is required. Submit manufacturer's technical information on proposed bonding agent.

G. Patching Mortar:

1. Make patching mortar of same materials and of approximately same proportions as concrete, except omit coarse aggregate. Substitute white Portland cement for part of gray Portland cement on exposed concrete in order to match color of surrounding concrete. Determine color by making trial patch. Use minimum amount of mixing water required for handling and placing. Mix patching mortar in advance and allow to stand. Mix frequently with trowel until it has reached stiffest consistency that will permit placing. Do not add water.

2. Proprietary compounds for adhesion or specially formulated cementitious repair mortars may be used in lieu of or in addition to foregoing patching materials provided that properties of bond and compressive strength meet or exceed the foregoing and color of surrounding concrete can be matched where required. Use such compounds according

to manufacturer's recommendations. When used in water and wastewater treatment structures, material shall be suitable for use under continuously submerged conditions. Conformance and suitability certification by manufacturer is required.

H. Epoxy Adhesive: Two-component, 100 percent solids, 100 percent reactive compound developing 100 percent of strength of concrete, suitable for use on dry or damp surfaces. Epoxy used to inject cracks and as a binder in epoxy mortar shall meet ASTM C881, Type VI. Epoxy used as a bonding agent for fresh concrete shall meet ASTM C881, Type V.

I. Non-shrink Grout: See Section 03600 - Structural Grout.

J. Spray-Applied Coating: Acceptable products are Thoro System Products "Thoroseal Plaster Mix" or equal. Color: Gray.

K. Concrete Topping: Class H concrete with 3/8-inch maximum coarse aggregate size, as specified in Section 03310 - Structural Concrete.

L. Concrete Fill: Class H concrete with 3/8-inch maximum coarse aggregate size, (Class C where fill thickness exceeds 3 inches throughout a placement), as specified in Section 03310 - Structural Concrete.

M. Evaporation Retardant: Confilm, manufactured by Master Builders; Eucobar, manufactured by Euclid Chemical Company; or equal.

PART 3 –EXECUTION

3.1 AGGREGATE CONCEALMENT

A. Unless indicated otherwise on Drawings or approved by Owner, all surfaces to be finished shall be free of exposed aggregate.

3.2 REPAIRING SURFACE DEFECTS

A. Defective Areas: Repair immediately after removal of forms. Remove honeycombed and other defective concrete down to sound concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to concrete surface. Thoroughly work bonding grout into the surface with a brush as that the entire surface is covered. Alternatively, a proprietary bonding agent may be used. Use bonding agent in accordance with manufacturer's instructions. While bonding coat is still tacky, apply premixed patching mortar. Thoroughly consolidate mortar into place and strike off to leave patch slightly higher than surrounding surface. To permit initial shrinkage, leave undisturbed for at least 1 hour before final finishing. Keep patched area damp for 7 days. Alternatively, a proprietary cementitious repair mortar may be used and placed in accordance with manufacturer's instructions. Do not use metal tools in finishing patches in formed walls which will be exposed.

B. Tie Holes: Patch holes immediately after removal of forms. After cleaning and roughening with a wire brush on a rotary drill, thoroughly dampen tie hole and fill solid with patching mortar. Taper tie holes shall have the plug, specified in 03100 - Concrete Formwork, driven into the hole to the center of the wall before grouting. Completely fill taper tie holes with patching mortar except that non-shrink grout shall be used for all walls in contact with soil or liquid. On wall faces exposed to view, fill the outer 2 inches of the taper tie hole with patching mortar blended to match adjacent concrete.

C. Cracks: Repair cracks in excess of 0.01 inch by pressure injection of moisture-insensitive epoxy-resin system. Submit proposed material and method of repair for approval prior to making repairs.

D. Structural Repair: When required, make structural repairs after prior approval of Owner as to method and procedure, using specified epoxy adhesive or approved epoxy mortar.

3.3 FINISHING OF FORMED SURFACES

A. Unfinished Surfaces: Finish is not required on surfaces concealed from view in completed structure by earth, ceilings or similar cover, unless indicated otherwise on Drawings.

B. Rough Form Finish:

1. No form facing material is required on rough form finish surfaces.

2. Patch tie holes and defects. Chip off fins exceeding 1/4 inch in height.

3. Rough form finish may be used on concrete surfaces which will be concealed from view by earth in completed structure, except concealed surfaces required to have smooth form finish, as shown on Drawings.

C. Smooth Form Finish:

1. Form facing shall produce smooth, hard, uniform texture on concrete. Use plywood or fiberboard linings or forms in as large sheets as practicable, and with smooth, even edges and close joints.

2. Patch tie holes and defects. Rub fins and joint marks with wooden blocks to leave smooth, unmarred finished surface.

3. Provide smooth form finish on the wet face of formed surfaces of water-holding structures, and of other formed surfaces not concealed from view by earth in completed structure, except where otherwise indicated on Drawings. Walls that will be exposed after future construction, at locations indicated on Drawings, shall have smooth form finish. Smooth form finish on exterior face of exterior walls shall extend 2 feet below final top of ground elevation. Exterior face of all perimeter grade beams shall have smooth form finish for full depth of grade beam.

D. Rubbed Finish:

1. Use plywood or fiberboard linings or forms in as large sheets as practicable, and with smooth, even edges and close joints.

2. Remove forms as soon as practicable, repair defects, wet surfaces, and rub with No. 16 carborundum stone or similar abrasive. Continue rubbing sufficiently to bring surface paste, remove form marks and fins, and produce smooth, dense surface of uniform color and texture. Do not use cement paste other than that drawn from concrete itself. Spread paste uniformly over surface with brush. Allow paste to reset, then wash surface with clean water.

3. Use rubbed finish at locations indicated on Drawings, except where rubbed finish is indicated for a wall which will be containing a liquid, use spray-applied coating.

E. Spray-applied Coating: At Contractor's option, in lieu of rubbed finish, spray-applied coating may be applied after defects have been repaired and fins removed. Remove form oil, curing compound and other foreign matter that would prevent bonding of coating. Apply coating in uniform texture and color in accordance with coating manufacturer's instructions.

F. Related Unformed Surfaces: Tops of piers, walls, bent caps, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed. Float unformed surfaces to texture reasonably consistent with that of formed surfaces. Continue final treatment on formed surfaces uniformly across unformed surfaces.

3.4 HOT WEATHER FINISHING

A. When hot weather conditions exist, as defined by Section 03310 - Structural Concrete and as judged by the Owner, apply evaporation retardant to the surfaces of slabs, topping and concrete fill placements immediately after each step in the finishing process has been completed.

3.5 FINISHING SLABS AND SIMILAR FLAT SURFACES TO CLASS A, B AND C TOLERANCES

A. Apply Class A, B and C finishes at locations indicated on Drawings.

B. Shaping to Contour: Use strike-off templates or approved compacting-type screeds riding on screed strips or edge forms to bring concrete surface to proper contour. See Section 03100 - Concrete Formwork for edge forms and screeds.

C. Consolidation and Leveling: Concrete to be consolidated shall be as stiff as practicable Thoroughly consolidate concrete in slabs and use internal vibration in beams and girders of framed slabs and along bulkheads of slabs on grade. Consolidate and level slabs and floors with vibrating bridge screeds, roller pipe screeds or other approved means. After consolidation and leveling, do not permit manipulation of surfaces prior to finishing operations.

D. Tolerances for Finished Surfaces: Check tolerances by placing straightedge of specified length anywhere on slab. Gap between slab and straightedge shall not exceed tolerance listed for specified class.

Straightedge Class	Length in Feet	Tolerance in Inches
A	10	1/8
B	10	1/4
C	2	1/4

E. Raked Finish: After concrete has been placed, struck off, consolidated and leveled to Class C tolerance, roughen surface before final set. Roughen with stiff brushes or rakes to depth of approximately 1/4 inch. Notify Engineer prior to placing concrete requiring initial raked surface finish so that acceptable raked finish standard may be established for project. Protect raked, base-slab finish from contamination until time of topping. Provide raked finish for following:

1. Surfaces to receive bonded concrete topping or fill.

2. Steep ramps, as noted on Drawings.

3. Additional locations as noted on Drawings.

F. Float Finish:

1. After concrete has been placed, struck off, consolidated and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared, or when mix has stiffened sufficiently to permit proper operation of power-driven float. Consolidate surface with power-driven floats. Use hand floating with wood or cork-faced floats in locations inaccessible to power-driven machine and on small, isolated slabs.

2. After initial floating, re-check tolerance of surface with 10-foot straightedge applied at not less than two different angles. Cut down high spots and fill low spots to Class B tolerance. Immediately re-float slab to a uniform, smooth, granular texture.

3. Provide float finish at locations not otherwise specified and not otherwise indicated on Drawings.

G. Trowel Finish:

1. Apply float finish as previously specified. After power floating, use power trowel to produce smooth surface which is relatively free of defects but which may still contain some trowel marks. Do additional trowelings by hand after surface has hardened sufficiently. Do final troweling when ringing sound is produced as trowel is moved over surface. Thoroughly consolidate surface by hand troweling operations.

2. Produce finished surface free of trowel marks, uniform in texture and appearance and conforming to Class A tolerance. On surfaces intended to support floor coverings, remove defects which might show through covering by grinding.

3. Provide trowel finish for floors which will receive floor covering and additional locations indicated on Drawings.

H. Broom or Belt Finish:

1. Apply float finish as previously specified. Immediately after completing floated finish, draw broom or burlap belt across surface to give coarse transverse scored texture.

2. Provide broom or belt finish at locations indicated on Drawings.

3.6 FINISHING SLABS AND SIMILAR FLAT SURFACES TO "F-NUMBER SYSTEM" FINISH

A. Shaping to Contour: Use strike-off templates or approved compacting-type screeds riding on screed strips or edge forms to bring concrete surface to proper contour. Edge forms and screeds: Conform to Section 03100 - Concrete Formwork.

B. Consolidation and Leveling: Concrete to be consolidated shall be as dry as practicable. Thoroughly consolidate concrete in slabs and use internal vibration in beams and girders of framed slabs and along bulkheads of slabs on grade. Consolidate and level slabs and floors with vibrating bridge screeds, roller pipe screeds or other approved means. After consolidation and leveling, do not manipulate surfaces prior to finishing operations.

C. Tolerances for Finished Surfaces: Independent testing laboratory will check floor flatness and levelness in accordance with Paragraph 3.12, Field Quality Control.

D. Float Finish:

1. After concrete has been placed, struck off, consolidated and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared, or when mix has stiffened sufficiently to permit proper operation of power-driven float. Consolidate surface with power-driven floats. Use hand floating with wood or cork-faced floats in locations inaccessible to power-driven machine and on small, isolated slabs.

2. Check tolerance of surface after initial floating with a 10-foot straightedge applied at not less than two different angles. Cut down high spots and fill low spots. Immediately re-float slab to uniform, smooth, granular texture to F_F20/F_L17 tolerance, unless shown otherwise on Drawings.

3. Provide "F-Number System" float finish at locations indicated on Drawings.

E. Trowel Finish:

1. Apply float finish as previously specified. After power floating, use power trowel to produce smooth surface which is relatively free of defects but which may still contain some trowel marks. Do additional trowelings by hand after surface has hardened sufficiently. Do final troweling when ringing sound is produced as trowel is moved over surface. Thoroughly consolidate surface by hand troweling operations.

2. Produce finished surface free of trowel marks, uniform in texture and appearance and conforming to an F_F25/F_L20 tolerance for slabs on grade and F_F25/F_L17 for elevated slabs, unless shown otherwise on Drawings. On surfaces intended to support floor coverings, remove defects, which might show through covering, by grinding.

3. Provide "F-Number System" trowel finish at locations indicated on Drawings.

3.7 BONDED CONCRETE TOPPING AND FILL

A. Surface Preparation:

1. Protect raked, base-slab finish from contamination until time of topping. Mechanically remove oil, grease, asphalt, paint, clay stains or other contaminants, leaving clean surface.

2. Prior to placement of topping or fill, thoroughly dampen roughened slab surface and leave free of standing water. Immediately before topping or fill is placed, scrub coat of bonding grout into surface. Do not allow grout to set or dry before topping or fill is placed.

B. Concrete Fill:

1. Where concrete fill intersects a wall surface at an angle steeper than 45 degrees from vertical, provide a 1.5-inch deep keyway in the wall at the point of intersection; size keyway so that no portion of the concrete fill is less than 1.5 inches thick. Form keyway in new walls; create by sawcutting the top and bottom lines and chipping in existing walls.

2. Apply wood float finish to surfaces of concrete fill.

3. Provide concrete fill at locations shown on Drawings.

C. Bonded Concrete Topping in Bottom of Clarifiers and Thickeners:

1. Minimum thickness of concrete topping: 1 inch. Maximum thickness when swept in by clarifier and thickener equipment: 3 inches.

2. Compact topping and fill by rolling or tamping, bring to established grade, and float. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement. Coat surface with evaporation retardant as needed between finishing operations to prevent plastic shrinkage cracks.

3. Screed topping to true surface using installed equipment. Protect equipment from damage during sweeping-in process. Perform sweeping-in process under supervision of equipment manufacturer's factory representative. After topping has been screeded, apply wood float finish. During finishing, do not apply water, dry cement or mixture of dry cement and sand to the surface.

4. As soon as topping or fill finishing is completed, coat surface with curing compound. After the topping is set and sufficiently hard in clarifiers and where required by the Owner, fill the tank with sufficient water to cover the entire floor for 14 days.

5. Provide bonded concrete topping in bottom of all clarifiers and thickeners.

3.8 EPOXY PENETRATING SEALER

A. Surfaces to receive epoxy penetrating sealer: Apply wood float finish. Clean surface and apply sealer in compliance with manufacturer's instructions.

B. Rooms with concrete curbs or bases: Continue application of floor coating on curb or base to its juncture with masonry wall. Rooms with solid concrete walls or wainscots: Apply minimum 2-inch-high coverage of floor coating on vertical surface.

C. Mask walls, doors, frames and similar surface to prevent floor coating contact.

D. When coving floor coating up vertical concrete walls, curbs, bases or wainscots, use masking tape or other suitable material to keep a neat level edge at top of cove.

E. Provide epoxy penetrating sealer at locations indicated on Drawings.

3.9 EPOXY FLOOR TOPPING

A. Surfaces to receive epoxy floor topping: Apply wood float finish unless recommended otherwise by epoxy floor topping manufacturer. Clean surface and apply epoxy floor topping in compliance with manufacturer's recommendations and instructions. Thickness of topping: 1/8 inch.

B. Rooms with concrete curbs or bases: Continue application of floor coating on curb or base to its juncture with masonry wall. Rooms with solid concrete walls or wainscots: apply 2-inch-high coverage of floor coating on vertical surface.

C. Mask walls, doors, frames and similar surfaces to prevent floor coating contact.

D. When coving floor coating up vertical concrete walls, curbs, bases or wainscots, use masking tape or other suitable material to keep a neat level edge at top of cove.

E. Finished surface shall be free of trowel marks and dimples.

F. Provide epoxy floor topping at locations indicated on Drawings.

3.10 SEALER/DUSTPROOFER

A. Where sealer or sealer/dustproofer is indicated on Drawings, just prior to completion of construction, apply coat of specified clear sealer/dustproofing compound to exposed interior concrete floors in accordance with manufacturer's instructions.

3.11 NONSLIP FINISH

A. Apply float finish as specified. Apply two-thirds of required abrasive aggregate by method that ensures even coverage without segregation and re-float. Apply remainder of abrasive aggregate at right angles to first application, using heavier application of aggregate in areas not sufficiently covered by first application. Re-float after second application of aggregate and complete operations with troweled finish. Perform finishing operations in a manner that will allow the abrasive aggregate to be exposed and not covered with cement paste.

B. Provide non-slip finish at locations indicated on Drawings.

3.12 FIELD QUALITY CONTROL

A. Flatness and levelness of slabs and similar flat surfaces that are indicated on Drawings to receive "F-Number System" finish will be checked by independent testing laboratory employed by Owner in accordance with Section 01454 - Testing Laboratory Services.

B. Tolerances for "F-Number System" finished surfaces:

1. Floor tolerance shall be determined in accordance with ASTM E1155.

2. Floor flatness and levelness tolerances:

a. F_F defines maximum floor curvature allowed over 24 inches. Computed on the basis of successive 12-inch elevation differentials, F_F is commonly referred to as the "flatness F-Number."

F_F = 4.57
Maximum difference in elevation, in decimal inches, between successive 12" elevation differences.

b. F_L defines relative conformity of floor surface to horizontal plane as measured over 10-foot distance. F_L is commonly referred to as "levelness F-number."

F_L = 12.5
Maximum difference in elevation, in inches,
between two points separated by 10 feet.

3. Achieve specified overall slab tolerance. Minimum local tolerance (1/2 bay, unless otherwise designated by Engineer): 2/3 of specified tolerance.

4. Tolerance for floated finish: F_F20/F_L17, unless otherwise shown on Drawings.

5. Tolerance for troweled finish: F_F25/F_L20 for slabs on grade, and F_F25/F_L17 for elevated slabs, unless otherwise shown on Drawings.

3.13 CURING

A. Conform to requirements of Section 03370 - Curing Concrete.

END OF SECTION

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SECTION 03370

CONCRETE CURING

PART 1 – G E N E R A L

1.1 SECTION INCLUDES

A. Curing of structural concrete.

1.2 MEASURMENT AND PAYMENT

A. Unit prices.

1. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.3 REFERENCES

A. ACI 308 - Standard Practice for Curing Concrete.

B. ASTM C171 - Standard Specifications for Sheet Materials for Curing Concrete.

C. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

D. ASTM D44587 - Conducting Tests on Paint and Related Coatings and Materials Using a Fluorescent UV-Condensation Light-and Water-Exposure Apparatus.

1.4 DEFINITIONS

A. Mass Concrete: Concrete sections 4 feet or more in least dimension.

1.5 SUBMITTALS

A. Conform to Section 01300 - Submittals.

B. Product Data: Submit description of proposed curing method for concrete. When use of membrane-forming compound is proposed, submit manufacturer's technical information including material specifications, installation instructions and recommendations, and evidence that compound is satisfactory for intended application. State locations where curing compound will be used.

C. When membrane-forming compounds are to be used, submit certification by the manufacturer of compliance with specified requirements and compatibility with toppings, coatings, finishes, and adhesives to be applied.

PART 2 –PRODUCTS

2.1 MATERIALS

A. Membrane-forming Curing Compound: Conform to ASTM C309, Type 1D, and following

requirements.

1. Minimum solids content: 30 percent.

2. Compound shall not permanently discolor concrete. When used for liquid- containing structures, curing compound shall be white-pigmented.

3. When used in areas that are to be coated, or that will receive topping or floor covering, material shall not reduce bond of coating, topping, or floor covering to concrete. Curing compound manufacturer's technical information shall state conditions under which compound will not prevent bond.

4. Conform to local, state and federal solvent emission requirements.

B. Clear Curing and Sealing Compound (VOC Compliant): Conform to ASTM C309, Type 1, Class B, and the following requirements: 30 percent solids content minimum; non-yellowing under ultraviolet light after 500-hour test in accordance with ASTM D4587. Sodium silicate compounds are not permitted. Conform to local, state and federal solvent emission requirements.

C. Sheet Material for Curing Concrete: ASTM C171; waterproof paper, polyethylene film or white burlap-polyethylene sheeting.

D. Curing Mats (for use in Curing Method 2): Heavy shag rugs or carpets, or cotton mats quilted at 4 inches on center; 12 ounce per square yard minimum weight when dry.

E. Water for curing: Clean and potable.

PART 3 –EXECUTION

3.1 CURING PROCEDURES

A. Comply with ACI 308 and the requirements specified herein. Protect freshly-deposited concrete from premature drying and excessively hot or cold temperatures. Maintain minimal moisture loss and relatively constant temperature during time necessary for hydration of cement and proper hardening of concrete.

B. Unformed Surfaces: For concrete surfaces not in contact with forms, use one of following procedures immediately after completion of placement and finishing.

1. Ponding or continuous sprinkling.

2. Absorptive mat or fabric kept continuously wet.

3. Sand or other covering kept continuously wet.

4. Continuous steam bath (not exceeding 150 degrees F at surface of concrete).

5. Vapor mist bath.

6. Membrane-forming curing compound applied according to manufacturer's recommendations. After the curing compound has dried, wet slab surfaces and cover with waterproof paper, polyethylene film, or white burlap-polyethylene sheeting after the application of the curing compound. Tape sheet seams together and provide sufficient weights to keep the sheeting in place. Rewet the slab surface if the sheeting becomes dislodged, and replace the sheeting.

7. Other moisture-retaining coverings as approved by Owner.

C. Restrictions on Use of Curing Compounds: Unless curing compound manufacturer certifies that curing compound will not prevent bond to cured surface, do not use curing compound on surfaces that will be rubbed or receive additional concrete, mortar, topping, terrazzo or other cementitious finishing materials, on slabs under resilient floors or built-up roofing, or on surfaces to be waterproofed, sealed, hardened or painted.

D. Curing and Sealing Compounds: At locations indicated, cure exposed interior slabs and troweled slabs receiving mastic-applied adhesives with specified clear curing and sealing compound in accordance with manufacturer's recommendations. Do not store materials directly on curing membranes. Use plywood to protect curing membrane from damage. Immediately repair membranes damaged by foot traffic or other operations.

E. Duration of Curing: Continue curing until cumulative number of days or fractions of days during which ambient temperature is above 50 degrees F has totaled 7. Continue curing of water-retaining structures for a total of 14 days. When high-early-strength concrete has been used, continue curing for total of 3 days. Prevent rapid drying at end of curing period.

F. Formed Surfaces: During the curing period keep wet steel forms heated by sun and wood forms in contact with concrete. When forms are to be removed during curing period, employ curing materials or methods immediately. Continue such curing for remainder of curing period.

G. Temperature:

1. Cold Weather: When mean daily temperature of atmosphere is less than 40 degrees F, maintain temperature of concrete between 50 and 70 degrees F for required curing period. When necessary, make arrangements for heating, covering, insulating or housing concrete work in advance of placement to maintain required temperature and moisture conditions. Prevent damage or injury due to concentration of heat. When combustion heaters are necessary in enclosed or protected area where concrete slabs are being placed, vent heaters.

2. Hot Weather: In advance of placement make arrangements for shading, fog spraying, sprinkling, ponding or installation of windbreaks or wet covering of light color. Take such protective measures as quickly as concrete hardening and finishing operations will allow.

3. Temperature Changes: Control so rate of change in temperature of concrete is as uniform as possible. Do not permit temperature change to exceed 5 degrees F in any one hour or 50 degrees F in any 24-hour period.

H. Protection from Mechanical Injury: During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. Protect finished concrete surfaces from damage caused by construction equipment, materials or methods, and by rain or running water. Do not load self-supporting structures in a way that overstresses concrete.

3.2 CURING MASS CONCRETE

A. Observe the following additional restrictions when curing mass concrete.

1. Minimum curing period: 2 weeks.

2. When ambient air temperature falls below 32 degrees F, protect surface of concrete against freezing.

3. Do not use steam or other curing methods that will add heat to concrete.

4. Keep forms and exposed concrete continuously wet for at least the first 48 hours after placing, and whenever surrounding air temperature is above 90 degrees F during final curing period.

5. During 2-week curing period, provide necessary controls to prevent ambient air temperature immediately adjacent to concrete from falling more than 30 degrees F in 24 hours.

END OF SECTION

SECTION 03600

STRUCTURAL GROUT

PART 1 – G E N E R A L

1.1 SECTION INCLUDES

A. Non-shrink grout used wherever grout is shown in the Documents, unless another type is specifically referenced. Two classes of non-shrink grout (Class I and II) and areas of application are specified.

1.2 MEASUREMENT AND PAYMENT

A. Unit prices.

1. Refer to Section 01270 – Measurement and Payment, for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.3 REFERENCES

A. CRD-C621 - Corps of Engineers Specification for Non-shrink Grout

B. ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50-mm Cube Specimens)

C. ASTM C230 - Specifications for Flow Table for use in Tests of Hydraulic Cement

D. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

1.4 SUBMITTALS

A. Conform to Section 01300 - Submittals.

B. Quality Control:

1. The Contractor shall submit manufacturer's literature certifying compliance with the specified properties for Class I and II grouts.

2. The Contractor shall submit manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

C. The Contractor shall submit manufacturer's written warranty as specified.

1.5 QUALITY CONTROL

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Owner to ensure continued compliance with these Specifications. The specimens will be made by the Owner or its representative.

2. Compression tests and fabrication of specimens for non-shrink grout will be performed as specified in ASTM C109 at intervals during construction as selected by the Owner. A set of three specimens will be made for testing at 7 days, 28 days, and each additional time period as appropriate.

3. Grout already placed which fails to meet the requirements of these Specifications is subject to removal and replacement no additional cost to the Owner.

4. The cost of laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Owner in obtaining specimens for testing. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. The Contractor shall supply materials necessary for fabricating the test specimens.

B. Warranty:

1. Provide 1-year warranty for work provided under this Section.

2. Manufacturer's warranty shall not contain a disclaimer limiting responsibility to only the purchase price of products or materials furnished.

3. Manufacturer shall warrant participation with Contractor in replacing or repairing grout found to be defective due to faulty materials, as determined by industry standard test methods.

PART 2 –PRODUCTS

2.1 APPLICATION

The following is a listing of typical applications and the corresponding type of grout which is to be used. Unless indicated otherwise, grouts shall be provided as listed below whether or not called for on the Drawings.

Application:	Type of Grout
Structural member base plates	Non-shrink Class II
Storage tanks and other equipment	Non-shrink Class I
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-shrink Class II (Class I where placement time exceeds 15 minutes)
Under precast concrete elements	Non-shrink Class I
Toppings and concrete fill less than 3 inches thick	Concrete Topping per Section 03310 and Section 03345
Application:	Type of Grout
Toppings and concrete fill greater than 3 inches thick	Concrete Fill per Section 03310 and Section 03345
Any application not listed above, where grout is called for on the Drawings _____	Non-shrink Class I, unless noted otherwise _____

2.2 PREPACKAGED GROUTS

A. Basic Requirements for Cementitious Non-Shrink Grout

1. Provide prepackaged non-shrink grout that is inorganic, flowable, non-gas-liberating, non-metallic, and cement-based, requiring only the addition of water.

2. Deliver grout in original packaging with manufacturer's instructions printed on each container.

3. Select the specific formulation for each class of non-shrink grout specified to conform to that recommended by the manufacturer for the particular application.

4. Compressive strength at 28 days: 7000 psi minimum.

5. Do not use a grout for which the non-shrink property is based on a chemically generated gas or gypsum expansion.

B. Class I Non-Shrink Grout:

1. Supply Class I Grout conforming to these specifications and to CRD-C621 and ASTM C1107 Grade C and B (as modified below) when tested using the amount of water needed to achieve the following properties:

   a. Fluid consistency (20 to 30 seconds) per CRD-C611 at initial testing.

   b. Fluid consistency (45 seconds) per CRD-C611 at 30 minutes after mixing.

   c. At temperatures of 45, 73.4, and 95 degrees F.

2. To satisfy non-shrink requirements, the length change from placement to time of final set shall not have a shrinkage greater than the amount of expansion measured after final set at 3 and 14 days. The expansion at 3 and 14 days shall not exceed the 28-day expansion.

3. Fluid grout shall pass through the flow cone, with a continuous flow, 1 hour after mixing.

4. Demonstrate in tests that grout maintains contact with the baseplate to provide an minimum effective bearing area of 95 percent of the gross contact area after final set.

5. The grout packaging shall list weight, maximum amount of mixing water to be used, maximum usable working time (pot life) at flowable consistency, and temperature restrictions for preparation and placement within which grout will meet specified requirements.

C. Class II Non-Shrink Grout:

1. Supply Class II Grout confirming to ASTM C1107 and the following requirements when tested using the amount of water needed to achieve the following properties:

   a. Flowable consistency: 140 percent flow on ASTM C 230, five drops in 30 seconds.

   b. Fluid working time: 15 minutes, minimum.

   c. Flowable duration: 30 minutes, minimum.

2. When tested, the grout shall not bleed at maximum allowed water.

2.3 CURING MATERIALS

A. Curing materials: As specified in Section 03370 - Concrete Curing and as recommended by the manufacturer of prepackaged grouts.

2.4 CONSISTENCY

A. Mix grouts to the consistency necessary to completely fill the space to be grouted. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as specified herein for the particular application.

PART 3 –EXECUTION

3.1 PREPARATION

A. Verify that base concrete or masonry has attained design strength before grout is placed.

B. When cementitious grouts are used on concrete surfaces, saturate the concrete surface with water for 24 hours prior to placement of cement-based grout. Upon completion of saturation period remove excess water prior to grouting.

3.2 GROUTING PROCEDURES

A. Prepackaged Grouts: Perform mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts according to the written instructions of the manufacturer. Use prepackaged materials in the quantities and proportions as directed by the manufacturer unless there is certified test data verifying that the specified properties are attained by modified mix.

3.3 CONSOLIDATION

A. Place grout in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

END OF SECTION