



**CAMERON COUNTY
PURCHASING DEPARTMENT
REQUEST FOR PROPOSALS**

RFP NUMBER: # 250502

RFP TITLE: ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

DATE DUE: JULY 23RD, 2025

DUE NO LATER THAN 3:00 P.M.

RFP's will be opened at the Cameron County Courthouse, 1100 East Monroe Street, Brownsville, Texas in the Purchasing Department – **Basement floor, Suit #B17** at 3:01 p.m. (as per Purchasing Dept. time clock) on deadline due date. RFPs received later than the date and time above will not be considered.

Please return RFP **ORIGINAL (marked "ORIGINAL") AND ONE (1) COPY (marked "COPY")** sets and **an electronic copy on a flash drive (searchable PDF format file only)** of your RFP submittal for review by evaluation committee in a sealed envelope. Be sure that return envelope shows the RFP Number, Description and is marked "SEALED RFP".

RETURN RFP TO:

by U.S. mail or delivered to the office of Purchasing Dept., **County Courthouse (Dancy Bldg.)**
1100 E. Monroe St, Basement floor, Suit #B17, Brownsville, Texas 78520.

PRE-PROPOSAL MEETINGS SCHEDULE:

Thursday, July 10, 2025 at 10:00 A.M.

PRE-PROPOSAL MEETING LOCATION:

**PARKS DEPARTMENT ADMINISTRATION BUILDING,
33248 STATE PARK ROAD 100, SOUTH PADRE ISLAND, TX 78597**

CONTACT PERSON: Joe E. Vega, Parks Director at 956-761-3701

Proposal questions/clarifications must be submitted by: Monday, July 14, 2025 before 3:00P.M.

(e-mail to purchasing@co.cameron.tx.us or fax 956-550-7219 attention, Roberto C. Luna, Purchasing Agent)

Addendum to respond to questions/clarifications will be posted on July 16, 2025

For additional information or to request addendum email: Roberto C. Luna and/or Dalia Loera at roberto.luna@co.cameron.tx.us or dalia.loera@co.cameron.tx.us

YOU MUST SIGN BELOW IN INK. FAILURE TO SIGN WILL DISQUALIFY THE OFFER.

Company Name: _____

Company Address: _____

City, State, Zip Code: _____

Historically Underutilized Business (State of Texas) Certification VID Number: _____

Telephone No. _____ Fax No. _____ e-mail _____

SIGNATURE: _____ Print Name: _____

How did you find out about this RFP? _____ (ex: Newspaper, Web, and Mail)

Is Bidder's principal place of Business within Cameron County? ☐ Yes ☐ No

If yes what City: _____

Your signature attests to your offer to provide the goods and/or services in this RFQ according to the published provision of this RFP. When an award letter is issued, this RFP becomes the contract. If an RFP required specific Contract is to be utilized in addition to this RFP, this signed RFP will become part of that contract. When an additional Contract is required a RFP award does not constitute a contract award and RFP / Contract is not valid until contract is awarded by Commissioners Court (when applicable) signed by County Judge) and Purchase Order is issued.

Bidders must sign each bid page to ensure you have read each page's information, terms, conditions and/or required forms. Failure to sign or initial each bid page will disqualify the BID/PROPOSAL offer.

ACKNOWLEDGMENT OF RECEIPT

RFP # 250502 ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

Please submit this page upon receipt

For any clarifications, please contact Mr. Roberto C. Luna, Purchasing Agent and/or Dalia Loera, Bids & Proposals Coordinator at the Cameron County Purchasing Department office at: (956) 544-0871 or e-mail at: purchasing@co.cameron.tx.us

Please fax or e-mail this page upon receipt of RFP package no later than **Friday, July 18, 2025 before 3:00 p.m. CST**. All questions regarding this RFP should also be submitted no later than the stated date and time on RFP cover page.

Fax: (956) 550-7219 or E-mail: purchasing@co.cameron.tx.us

If you are unable to respond on this RFP solicitation, kindly indicate your reason for **“Not Responding/No-Participation”** below and fax or e-mail back to Cameron County Purchasing Department. This will insure you remain active on our vendor list.

Date: _____

☐ Yes, I will be able to submit an RFP submittal.

☐ No, I will not be able to submit an RFP submittal for the following reason:

_____.

Company Name: _____

Company Representative Name: _____

Company Address: _____

Phone #: _____

Fax #” _____

E-mail Address: _____

CHECK LIST

ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT RFP # 250502

Proposers are asked to review the package to be sure that all applicable parts are included. If any portion of the package is missing, notify the Purchasing Department immediately. It is the Proposer's responsibility to be familiar with all the Requirements and Specifications. Be sure you understand the following before you return your RFP packet.

- ☒ **Cover Sheet**
Your company name, address and your signature (**IN INK**) should appear on this page.
- ☒ **Instructions to Proposers**
You should be familiar with all of the Instructions to Proposers.
- ☒ **Special Requirements**
This section provides information you must know in order to make an offer properly.
- ☒ **Specifications / Scope of Work**
This section contains the detailed description of the product/service sought by the County.

Attachments

- ☒ **Addendum Acknowledgment Form, Attachment 1 (Page 22 of 51)**
- ☒ **Attachments A, B, C, D, E, F, G, H & I, J, K & L.**
Be sure to complete these forms and return with packet.
- ☒ **DRAWINGS & SPECIFICATIONS Separate attachment.**
Be sure to review all drawings and technical specs: EXHIBIT A & B (Pages including cover page).
- ☒ **Bid Guaranty & Performance Bond Information & Requirements**
This form applies only to certain bids/proposals. All public work contracts over \$25,000 require a Payment Bond and over \$100,00 must also have a Performance Bond in a form approved by the County. Please read carefully and fill out completely.
- ☒ **Minimum Insurance Requirements**
Included when applicable
- ☒ **Worker's Compensation Insurance Coverage Rule 110.110**
This requirement is applicable for a building or construction contract.
- ☐ **Financial Statement**
When this information is required, you must use this form.

Other - Final reminders to double check before submitting RFP

- ☐ Is your RFP sealed with RFP #, title, Proposer's Name, & return address, on outside?
- ☐ Did you complete, sign and submit page 1?
- ☐ Did you provide the number of copies as required on the cover page?
- ☐ Did you visit our website for any addendums?

<https://www.cameroncounty.us/purchasing-bids-rfpq-addms-tabs/>

If not interested in responding please let us know why e-mail to: Purchasing@co.cameron.tx.us

INSTRUCTIONS FOR SUBMITTING RFP'S
ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT
RFP # 250502

These General Instructions apply to all offers made to Cameron County, Texas (herein after referred to as "County") by all prospective vendors (herein after referred to as "Proposers") on behalf of Solicitations including, but not limited to, Invitations to RFP and Requests for Quotes.

Carefully read all instructions, requirements and specifications. Fill out all forms properly and completely. Submit your RFP with all appropriate supplements and/or samples. Prior to returning your sealed RFP response / submittal, all Addendums - if issued - should be reviewed and downloaded by entering the County Purchasing web <https://www.cameroncounty.us/purchasing-bids-rfpq-addms-tabs/>

Addendums Column (updated Addendums). These Addendums must be signed and returned with your RFP in order to avoid disqualification. All Tabulations can also be viewed and downloaded at this site. Annual RFP award information can be accessed at: <https://www.cameroncounty.us/purchasing-bids-rfpq-addms-tabs/>

Review this document in its entirety. Be sure your RFP is complete, and double check your RFP for accuracy.

Cameron County is an Equal Employment Opportunity Employer. Review this document in its entirety. Be sure your RFP is complete, and double check your RFP for accuracy.

GOVERNING FORMS: In the event of any conflict between the terms and provisions of these requirements and the specifications, the specifications shall govern. In the event of any conflict of interpretation of any part of this overall document, Cameron County's interpretation shall govern. Where substitutions are used, they must be of equivalent value or service, and specified by the Proposer as such, in the columns to the right on the "Minimum Specifications' Forms". The County's specifications may be exceeded and should be noted by the Vendor as such. Any RFP NOT MEETING the Minimum Requirements specified will be rejected.

GOVERNING LAW: This invitation to RFP is governed by the competitive RFP requirements of the County Purchasing Act, Texas Local Government Code, §262.021 et seq., as amended. Offerors shall comply with all applicable federal, state and local laws and regulations. Offeror is further advised that these requirements shall be fully governed by the laws of the State of Texas and that Cameron County may request and rely on advice, decisions and opinions of the Attorney General of Texas and the County Attorney concerning any portion of these requirements.

Questions requiring only clarification of instructions or specifications will be handled verbally. If any questions results in a change or addition to this RFP, the Change(s) and addition(s) will be forwarded to all vendors involved as quickly as possible in the form of a written addendum only.

Verbal changes to RFP's must be backed-up by written addendum or written Q/A clarifications which would be posted on County Purchasing Web site. Without written Addendum or written Q / A clarification, verbal changes to RFP will not apply.

Sign the Vendor's Affidavit Notice, complete answers to Attachments A,B, C, D, E, F, G, H, I & J and return all with your RFP.

The County of Cameron, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

MINORITY/WOMAN OWNED BUSINESS ENTERPRISE (M/WBE), DISADVANTAGED BUSINESS ENTERPRISE (DBE), AND HISTORICALLY UNDERUTILIZED BUSINESS (HUB):

Cameron County encourages and strives towards an ever-increasing expansion in opportunities for M/WBE's & HUB's in assisting the County for its Purchasing needs. Cameron County's policy is to increasingly involve qualified M/WBE & HUBs to the greatest extent feasible in the County's procurement process.

Objectives of County HUB Program

- Ongoing increase in procurement opportunities for M/WBE's & HUB's
- Assisting M/WBE's & HUB's with registration to Bidders List and Bid opportunities that may be of interest
- Directing M/WBE's & HUB's to various beneficial web links giving them additional opportunities

Certification Process: Federal, state, and local regulations determine the type of certification(s) available. Attached below are links to various Certification agencies which are available to assist you in obtaining your M/WBE's & HUB's Certification.

HUB Certification Sources:

- [State of Texas HUB Certification Process](#)

- [Register with State as a HUB Vendor](#)
- [HUB Certification Agreements](#)
- [HUB Minority & Women Organizations](#)

M/WBE's & HUB's Questions Cameron County contact:
Dalia Loera, Assistant Purchasing Agent
P: 956-544-0846 | Email: dalia.loera@co.cameron.tx.us

The County, its contractors, their suppliers and subcontractors, and vendors of goods, equipment services, and professional services shall not discriminate on the basis of race, color, religion, national origin, handicap, or sex in the award and/or performance of contracts. All vendors, suppliers, professionals, and contractors doing business or anticipating doing business with Cameron County shall support, encourage, and implement affirmative steps toward our common goal of establishing equal opportunity for all citizens of Cameron County.

REQUIREMENT OF ALL BIDDERS/PROPOSERS: Each firm responding to this solicitation shall be required to submit with their proposal information regarding minority/women business and HUB business participation in this project.

CONFLICT OF INTEREST QUESTIONNAIRE:

For vendor or other person doing business with local governmental entity

This questionnaire must be filed in accordance with chapter §176 of the Local Government Code by a person doing business with the governmental entity.

By law this questionnaire must be filed with the records administrator (County Clerk's Office) of the local government not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section §176.006, Local Government Code. A person commits an offense if the person violates Section §176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than September 1 of the year for which an activity described in Section §176.006(a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.

Please review this entire document, if for any reason there is any information to disclose, relative to any questions in this Conflict of Interest form, you must file with County Clerk's Office subject to above instructions.

can be downloaded at the following web site:

https://www.cameroncounty.us/wp-content/uploads/Purchasing/docs/Conflict_of_Interest_Questionnaire_New_2015_.pdf

DISCLOSURE OF INTERESTS:

This questionnaire must be filed with the records administrator (County Clerk's Office) of the local government and no later than the 7th business day after the person becomes aware of facts that require this statement to be filed. Cameron County, Texas requires all persons or firms seeking to do business with the County to **provide the following information if the person becomes aware of facts that require this statement to be filed.** Every question must be answered. If the question is not applicable, answer with "N/A."

Please review this entire document, if for any reason there is any information to disclose, relative to any questions in this disclosure of interest form, you must file with County Clerk's Office subject to above instructions.

can be downloaded at the following web site: <https://www.cameroncounty.us/wp-content/uploads/Purchasing/CIS.pdf>

TEXAS ETHICS COMMISSION FORM 1295

All RFPs prior to award or award of Contract by Commissioner's Court will require that the Texas Ethics Commission (TEC) Form 1295 Electronic (on line) Vendor filing procedure be completed by Vendor.

All Vendors being recommended to Commissioners Court for award or renewal of award on Agenda must register and obtain a TEC Certification for the specific award. This Certification Form 1295 must be electronically submitted and printed form must be emailed or delivered to County Purchasing Department making the request for form. This process must be completed prior to Commissioners Court Agenda for approval consideration of RFP award. There is no charge for this TEC online process.

Texas Ethics Commission (TEC) Form 1295 must be completed (by firm - on line "New Form 1295 Certificate of Interested Parties Electronic Filing Application" Site at: https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm)

If any Vendors have questions as to TEC Form 1295 visit the County Purchasing Web site left column tab "[Vendor – TEC Form 1295](#)" for more information. TEC Web site links can be found at this location including Question / Answers and Video instructions. tab Link: <https://www.cameroncounty.us/vendors-tec-form-1295/>

PROPOSER SHALL SUBMIT RFP ON THE FORM PROVIDED, SIGN THE VENDOR AFFIDAVIT, AND RETURN ENTIRE RFP PACKET. In the event of inclement weather and County Offices are officially closed on a Proposal deadline day, RFP's will be received

unit 2:00 p.m. of the next business day. Proposals will be opened at the Cameron County Courthouse, 1100 East Monroe Street, Brownsville, Texas in the Purchasing Department – Basement Floor – Room # B17 (as per Purchasing Dept. time clock.)

RFP's SUBMITTED AFTER THE SUBMISSION DEADLINE SHALL BE RETURNED UNOPENED AND WILL BE CONSIDERED VOID AND UNACCEPTABLE.

PRESENTATIONS SEQUENCE TO EVALUATION COMMITTEE. Presentations to Evaluation Committee will be sequenced (in order) as determined by the utilization of RANDOM.ORG. Process will be conducted in the Purchasing Dept. with Auditor's designee present.

SUCCESSFUL PROPOSERS WILL BE NOTIFIED BY MAIL. All responding vendors will receive written notification regarding outcome of award.

PROPOSERS MAY ATTEND PUBLICLY HELD COMM COURT MEETING FOR AWARD OF THIS SOLICITATION. All responding proposers are welcome to attend the publicly held Commissioners Court meeting relative to the outcome / award of this solicitation. Court Meeting agenda date and times may be obtained at the following web site:

<https://www.cameroncountytexas.gov/commissioners-court-agendas/>

OPEN RECORDS ACCESS TO ALL INFORMATION SUBMITTED. All information included will be open to the public, other proposers, media as per the Open Records Act and not be confidential in nature. If you deem any information as confidential, it should not be made part of your RFP package.

PLEASE NOTE CAREFULLY

THIS IS THE ONLY APPROVED INSTRUCTION FOR USE ON SUBMITTING YOUR RESPONSE. ITEMS BELOW APPLY TO AND BECOME A PART OF TERMS AND CONDITIONS OF RFP. ANY EXCEPTIONS THERETO MUST BE IN WRITING.

1. **ORIGINAL (marked "ORIGINAL") AND ONE (1) COPY (marked "COPY") sets and an electronic COPY in a USB "Flash drive" (PDF format file only) MUST BE SUBMITTED.** Each RFP shall be placed in a separate envelope completely and properly identified with the name and number of the bid. Proposals must be in the Purchasing Department BEFORE the hour and date specified.
2. Proposals MUST give full firm name and address of the proposer. **Failure to manually sign RFP will disqualify it.** Person signing RFP should show TITLE or AUTHORITY TO BIND THE FIRM IN A CONTRACT.
3. Proposals CANNOT be altered or amended after deadline time. Any alterations made before deadline time must be initiated by Proposer or his authorized agent. No RFP can be withdrawn after opening time without approval by the Commissioners Court based on a written acceptable reason.
4. Written and verbal inquiries pertaining to bids must give RFP Number and Company.
5. NO changes or cancellations permitted without written approval of Purchasing Agent. The County reserves the right to accept or reject all or any part of any RFP and waive minor technicalities.
6. This is a RFP inquiry only and implies no obligation on the part of Cameron County.
7. Partial RFP's will not be accepted unless awarded by complete RFP.
8. It is expected that the Proposer will meet all state and federal safety standards and laws in effect on the date of the RFP, for the item(s) being specified, and the particular use for which they are meant.
9. It is the responsibility of the Proposer to ask any and all questions the Proposer feels to be pertinent to the proposal. Cameron County shall not be required to attempt to anticipate such questions for proposers. Cameron County will endeavor or respond promptly to all questions asked.
10. If PROPOSER takes exception to specifications or reference data, he will be required to provide details etc. as specified.
11. A proposal may not be withdrawn or canceled by the proposer without the written acknowledgment of the County for a period of sixty (60) days following the date designated for the receipt of proposal, and proposer so agrees upon submittal of the proposal.
12. If a Bid Bond is required in this Proposal it must be included in Proposers Sealed RFP package.
13. The County reserves the right to accept or reject all or any part of any RFP, waive minor technicalities. The County of Cameron reserves the right to award by item category or by total RFP. Prices should be itemized. County also reserves the right to award either with or without trade-in, if applicable. Cameron County reserves the right to award if only one (1) RFP was received. Cameron County retains the option to re-solicit at any time if in its best interest and is not automatically bound to renewal or re-solicitation. The County reserves the right to hold all RFPs for 60 days from the due date of receipt without actions. The County reserves the right to add additional County Departments (at a later time during this RFP award) as the need arises. The County also reserves the right to consider utilizing CO-OP Interlocal Agreements / pricing if determined to be more advantageous to the County.

14. All property of Cameron County must remain (at all times) within the United States – without exception – unless prior Agenda approval has been given by Commissioners Court.
15. The County is exempt from State Sales Tax and Federal Excise Tax. DO NOT INCLUDE TAX IN RFP. Cameron County claims exemption from all sales and/or use taxes under Texas Tax Code §151.309, as amended. Texas Limited Sales Tax Exemption Certificates will be furnished upon written request to the Cameron County Purchasing Agent.
16. Proposals are scheduled to be opened and publicly acknowledged at the Cameron County Commissioners Courtroom, on the scheduled date and time specified on cover sheet of this RFP package. Proposers, their representatives and interested persons may be present. The proposals shall be opened and acknowledged only so as to avoid disclosure of the contents to competing proposers and shall remain confidential during negotiations. However, all proposals shall be opened for public review after the concession lease agreement is approved, except for trade secrets and confidential information contained in the proposal and identified by proposers as such.
17. No oral statement of any person shall modify or otherwise change, or affect the terms, conditions or specifications stated in the resulting concession agreement. All change orders to this RFP will be made in writing by the Cameron County Purchasing Department. Award of proposal does not constitute a concession agreement. A binding concession agreement will be negotiated by the Cameron County Property Manager and approved by the Commissioners Court after the proposal has been awarded.
18. No public official shall have interest in this RFP except in accordance with Vernon's Texas Codes Annotated, Local Government Code Title 5. Subtitle C, Chapter §171.
19. The proposer shall not offer or accept gifts or anything of value nor enter into any business arrangement with any employee, official or agent of Cameron County.
20. All proposals meeting the intent of this RFP will be considered for a possible negotiation.
21. Any interpretations, corrections or changes to this RFP will be made by addenda. Sole issuing authority of addenda shall be vested in Cameron County Purchasing Department. Addenda will be mailed to all who are known to have received a copy of this RFP. Proposers shall acknowledge receipt of all addenda in writing.
22. Proposals must comply with all federal and state laws, County policy and local regulations.
23. Cameron County may request a presentation and additional information to determine proposer's ability to sufficiently meet these minimum responsible standards listed above.
24. Cameron County requests proposer to supply, with this RFP, a list of at least three (3) references. Include full name and title, address, telephone number, fax number and name(s) of contact person.
25. Successful proposer shall defend, indemnify and save harmless Cameron County and all its officers, agents and employees from all suits, actions, or other claims of any person, persons, or property on account of negligent act or fault of the successful offeror, or of any agent, employee, subcontractor or supplier in the execution of or performance under any contract which may result from proposal award. Successful proposer shall pay any judgment including costs, which may be obtained against Cameron County developing out of such injury or damages.
26. Any notice provided by this proposal or required by Law to be given to the successful proposer by Cameron County shall be conclusively deemed to have been given and received on the next day after such written notice has been deposited in the mail in Brownsville, Texas by Registered or Certified mail with sufficient postage affixed thereto, addressed to the successful proposer at the address so provided; this shall not prevent the giving of actual notice in any other manner.
27. It is the responsibility of the bidder or proposer to ask any and all questions the bidder or proposer feels to be pertinent to the bid or proposal. Cameron County shall not be required to attempt to anticipate such questions for bidders or proposers. Cameron County will endeavor to respond promptly to all questions asked.
28. AWARD OF CONTRACT - Award(s), if made, will be made to the responsive and responsible Offeror(s) whose proposal is most advantageous to Cameron County, taking into consideration price and the other factors set forth in the Request for Proposals "R.F.P.". Contract will be negotiated with the offeror whose proposal is determined to be most advantageous to County. The County reserves the right and option to reject any and all proposals and to waive any formality in proposals received, to accept or reject any or all of the items in the proposal, and award the contract in whole or in part, if it is deemed in the best interest of the County. Proposals should be submitted initially on the most favorable terms, from both price and technical standpoints. The County further reserves the right to award without discussion after proposals are received to request written "BEST AND FINAL OFFERS" from respondents judged to be responsive to the minimum technical requirements.

PURCHASE ORDER AND DELIVERY: The successful PROPOSER shall not deliver products or provide services without a contract approved by the Cameron County Commissioners Court and a Cameron County Purchase Order signed by an authorized agent of the Cameron County Purchasing Department.

This shall be understood to include bringing merchandise to the appropriate room or place designated by the using department. Every tender or delivery of goods must fully comply with all provisions of these requirements and the specifications including time, delivery and quality. Nonconformance shall constitute a breach which must be rectified prior to expiration of the time for performance. Failure to rectify within the performance period will be considered cause to reject future deliveries and cancellation of the contract by Cameron County without prejudice to other remedies provided by law. **Where delivery times are critical, Cameron County reserves the right to award accordingly.**

NO PLACEMENT OF DEFECTIVE TENDER: Every tender or delivery of goods must fully comply with all provisions of this contract as to time of delivery, quality and the like. If a tender is made which does not fully conform, this shall constitute a breach and Seller shall not have the right to substitute a conforming tender provided, where the time for performance has not yet expired, the Seller may seasonably notify Buyer of their intention to cure and may then make a conforming tender within the contract time but not afterward.

PLACE OF DELIVERY: The place of delivery shall be that set forth on the purchase order. Any change thereto shall be affected by modification as provided for in clause 20, "Modifications", hereof. The terms of this agreement are "no arrival, no sale".

DELIVERY TERMS AND TRANSPORTATION CHARGES: RFP must show number of days required to place material in receiving agency's designated location under normal conditions. Failure to state delivery time obligates Proposer to complete delivery in 24 hours. A five-day difference in delivery promise may break a tie. Unrealistically short or long delivery promises may cause RFP to be disregarded. Consistent failure to meet delivery promises without valid reason may cause removal from Proposer list.

An accurate delivery date must be quoted on the "RFP Form". When there are various items, a delivery date must be included with each item quoted. Freight and shipping charges to Cameron County must be included in the RFP price. Final location will be supplied to the vendor on award of RFP, F.O.B. destination. Delivery locations will be: Various County Building locations. Delivery days after receipt of order (ARO). Specify all (various) dates by categories or item if different.

If delay is foreseen, contractor shall give written notice to Director of Purchasing. The County has the right to extend delivery date if reasons appear valid. Contractor must keep County advised at all times of status of order. Default in promised delivery (without accepted reasons) or failure to meet specifications, authorized the County to purchase supplies elsewhere and charge full increase in cost and handling to defaulting contractor.

Delivery shall be made during normal working hours only, 8:00 a.m. to 5:00 p.m. unless otherwise noted in RFP.

VARIATION IN QUANTITY: The County assumes no liability for commodities produced, processed or shipped in excess of the amount specified herein.

SELLER TO PACKAGE GOODS: Seller will package goods in accordance with good commercial practice. Each shipping container shall be clearly and permanently packed as follows: (a) Seller's name and address; (b) Consignee's name, address and purchase order or purchase release number and the supply agreement number if applicable; (c) Container number and total number of containers, e.g. box 1 of 4 boxes; and (d) the number of the container bearing the packing slip. Seller shall bear cost of packaging unless otherwise provided. Goods shall be suitably packed to secure lowest transportation costs and to conform with requirements of common carriers and any applicable specifications. Buyer's count or weight shall be final and conclusive on shipments not accompanied by packing lists.

SHIPMENT UNDER RESERVATION PROHIBITED: Seller is not authorized to ship the goods under reservation, and no tender of a bill of lading will operate as a tender of goods.

TITLE AND RISK OF LOSS: The title and risk of loss of the goods shall not pass to Buyer until Buyer actually receives and takes possession of the goods at the point or points of delivery.

INSPECTION: Upon receiving item(s), they will be inspected for compliance with the RFP Specifications. If the item(s) do not pass inspection, the vendor will be required to pick up the rejected item(s) at the delivery point, provide the necessary replacement, and return the item(s) to the original point of delivery.

All items proposed shall be new, in first class condition, including containers suitable for shipment and storage (Cameron County prefers recycled packaging whenever possible), unless otherwise indicated in RFP. Verbal agreements to the contrary will not be recognized. All materials and services shall be subject to Purchaser's approval. Unsatisfactory material will be returned at Seller's expense. Cameron County reserves the right to inspect any item(s) or service location for compliance with specifications and requirements and needs of the using department. If an offeror cannot furnish a sample of a RFP item, where applicable, for review, or fails to satisfactorily show an ability to perform, the County can reject the RFP as inadequate.

TESTING: Cameron County reserves the right to test equipment, supplies, material and goods Proposed for quality, compliance with specifications and ability to meet the needs of the user. Demonstration units must be available for review. Should the goods or services fail to meet requirements and/or be unavailable for evaluation, the RFP is subject to rejection. **County user Dept.(s) reserves the right to make the final determination as to equivalents.**

SPECIAL TOOLS AND TEST EQUIPMENT: If the price stated on the face hereof includes the cost of any special tooling or special test equipment fabricated or required by Seller for the purpose of filling this order, such special tooling equipment and any process sheets related thereto shall become the property of the Buyer and to the extent feasible shall be identified by the Seller as such.

INVOICES AND PAYMENTS: (a) Vendor shall submit separate invoices, in duplicate, on each purchase order after each delivery. Invoices shall indicate the purchase order number, shall be itemized and transportation charges, if any, shall be listed separately. A copy of the bill of lading and the freight weigh bill when applicable, should be attached to the invoice. Mail to: Cameron County, ATTN: Auditor's Office, 1100 East Monroe St., Brownsville, Texas 78520. Payment shall not be due until the above instruments are submitted after delivery. Vendors must keep the Auditor advised of any changes in your remittance addresses. (b) County's only obligation to pay Vendor is to pay from funds budgeted and available for the purpose of the purchase. Lack of funds shall render this contract null and void to the extent funds are not available and any delivered but unpaid for goods will be returned to Vendor by the County. (c) Do not include Federal Excise, State or City Sales Tax. County shall furnish tax exemption certificate if required.

Any invoice, which cannot be verified by the contract price and/or is otherwise incorrect, will be returned to the Vendor for correction. Under term contracts, when multiple deliveries and/or services are required, the Vendor may invoice following each delivery and the County will pay on invoice. Contracts providing for a monthly charge will be billed and paid on a monthly basis only. Prior to any and all payments made for good and/or services provided under this contract, the Vendor should provide his Taxpayer Identification Number or social security number as applicable. This information must be on file with the Cameron County Auditor's office. Failure to provide this information may result in a delay in payment and/or back-up withholding as required by the Internal Revenue Services.

Vendor shall submit two (2) copies of an itemized invoice showing RFP number and purchase order number to:

**CAMERON COUNTY AUDITOR
ACCOUNTS PAYABLE
1100 EAST MONROE ST.,
BROWNSVILLE, TEXAS 78520**

Please note that any payment due under this RFP award will be applied towards any debt, including but not limited to delinquent taxes that is owed to Cameron County.

PAYMENT DISCOUNT: Indicate the payment discount (s) available depending on the when invoices are paid. For example, 1/30 means a 1% discount if paid within 30 days, 2/15 means a 2% discount if paid within 15 days, etc. Payment in full will be made within thirty (30) days of delivery, inspection, and receipt of invoice.

All costs quotations must include all the various features needed to satisfy the requirements. Note: No amounts will be paid for the items in this RFP in excess of the amounts quoted.

Criminal Background Checks are Mandatory:

Checks are mandatory for all personnel performing work on Cameron County sites. Contractors, consultants, and subcontractors are required to take all reasonable steps to assure that their employees do not represent a threat to the County or Facilities. Failure to comply with this requirement may result in immediate termination of any award or contract. The selected contractor shall provide a complete list of names (including supervisors) that may be working on campus. The contractor(s) shall remove from the Cameron County work place any of its employees who are found to be unacceptable by Cameron County. Such requests shall not be unreasonable, are the sole decision of Cameron County, and are not subject to negotiation. Contractor shall provide proper identification for all contractor employees. While on Cameron County premises, all contractor employees must wear attire that identifies them as contractor's employee with identification visible from both the front and the back. Vehicles shall be clearly identified as company vehicles and be maintained in a neat clean and sanitary condition. At least one person in each vehicle, preferably the driver, must be able to speak, read and write. It shall be the contractor's responsibility to see that employees render quiet and courteous service.

Trade Secrets, Confidential Information and the Texas Public Information Act.

If you consider any portion of your Bid/Proposal/Qualification Statement to be privileged or **confidential** by statute or judicial decision, including trade secrets and commercial or financial information, clearly identify those portions.

Bid/Proposal/Qualification Statement will be opened in a manner that avoids disclosure of the contents to competing offers and to keep the proposals secret during negotiations. All proposals are open for public inspection after the contract is awarded, but trade secrets and confidential information in the proposals are not open for inspection.

Cameron County will honor your negotiations of the trade secrets and confidential information and decline to release such information initially, but please note that the final determination of whether a particular portion of your proposal is in fact a trade secret or commercial or financial information that may be withheld from public inspection will be made by the Texas Attorney General or a court of competent jurisdiction. In the event a public information request is received for a portion of your proposal that you have marked as being confidential information, you will be notified of such request, and you will be required to justify your legal position in writing to the Texas Attorney General pursuant to Section §552.305 of the Government Code. In the event that it is determined by opinion or order of the Texas Attorney General or a court of competent jurisdiction that the information is in fact not privileged and confidential under Section §552.110 of the Government Code and Section §252.049 of the Local Government code, then such information will be made available to the requested.

Bid/Proposal/Qualification Statement are to be signed by an officer of the company authorized to bind the submitter to its provisions. Bid/Proposal/Qualification Statement are to contain a statement indicating the period during which the proposal will remain valid. A period of not less than ninety (90) days required. The Bid/Proposal/Qualification Statement submitted by the bidders/proposer/responders shall become an integral part of the contract between the County and the bidder/proposer/responder and the representations, covenants, and conditions therein contained shall be binding upon the person, firm or corporation executing the same.

THE RESPONDER(S) IS/ARE RESPONSIBLE FOR READING AND UNDERSTANDING ALL DOCUMENTS, FORMS, SPECIFICATIONS, AND INSTRUCTIONS WITHIN THIS ENTIRE DOCUMENT. Follow all Bid/Proposal/Qualification Statement package instructions; **you are responsible for obtaining any information needed in order to respond to this solicitation.** Further, the RESPONDER is responsible for providing any and all relevant information necessary to submit a response. Failure to do so will be at the Respondent's risk and may result in rejection of the response as non-conforming.

General Requirements apply to all advertised solicitations; however, these may be superseded, whole or in part, by OTHER DATA CONTAINED HEREIN. Be sure your RFP package is complete.

**CAMERON COUNTY
REQUEST FOR PROPOSAL (RFP)**

RFP # 250502

ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

INSTRUCTIONS

PART I – GENERAL REQUIREMENTS

- 1.0 By order of the Commissioners' Court of Cameron County, Texas, sealed proposals will be received for:

ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

**SEE (DIVISION 1 – GENERAL REQUIREMENTS) WHICH FURTHER DESCRIBES THE
SCOPE OF WORK/SERVICES AS SPECIFIED ON TECHNICAL SPECIFICATIONS AND
CONSTRUCTION DRAWINGS AND SPECIFICATIONS
PROVIDED BY ENGINEERING FIRM,
EXHIBITS A & B.**

It is the responsibility of the responder to provide utility improvements (Water & Wastewater (Sanitary Sewer), Electrical) which best complies with the specifications listed in RFP package.

It is the Responder's responsibility to provide a Payment and Performance Bond, and proof of insurance. Responder's shall fill out the form which follows, which details basic equipment and construction and installation requirements. Failure to fill out the form, leaving items blank, or referencing other manufacturer documents instead of filling out the form, will be considered non-responsive and could disqualify proposal.

- 2.0 INCURRED EXPENSES: There is expressed or implied obligation for Cameron County to reimburse for any expense incurred in preparing proposals in response to this request, and Cameron County will not reimburse anyone for these expenses. Cameron County will consider all RFP's from all responsible proposers.
- 3.0 CASHIER'S CHECK AND FORFEITURE: Each RFP shall be accompanied by a Cashier's Check, Certified Check, or acceptable Proposer's Bond payable to Cameron County, in the amount of not less than 5% of the largest possible total for the proposal submitted, must accompany each proposal. Proposal guarantee bond as a guarantee that if the Proposer receives an award, the Proposer will enter into a contract for services and submit proof of any required insurance. Checks of unsuccessful Proposers will be returned. If the successful Proposer fails to satisfy all pre-work requirements or commence work after award, that Proposer shall forfeit this security deposit. Cameron County shall retain it as liquidated damages.
- 4.0 GENERAL CONDITIONS: Proposers shall thoroughly examine the specific requirements, schedules, instructions and all other contract documents. RFP must set forth accurate and complete information as required by this RFP (including attachments). No plea of ignorance by the Proposer of conditions that exist or that may hereafter exist as a result of failure or omission on the part of the Proposer to make the necessary examinations and investigations, or failure to fulfill in every detail the requirements of the contract documents, will be accepted as a basis for varying the requirements of Cameron County.
- 5.0. SITE INSPECTION: Before submitting a Proposal, Proposers are encouraged to visit the site and make all investigations and examinations necessary to ascertain site and/or local physical conditions and requirements affecting the full performance of the utility improvements Agreement and to verify any representations made by Cameron County, Texas, upon which the Proposer will rely. If the Proposer receives an award because of its RFP submission, failure to have made such investigations and

examinations will in no way relieve the Proposer from its obligations to comply in every detail with all provisions and requirements of the utility improvements Agreement, nor will a plea of ignorance of such conditions and requirements be accepted as a basis for any claim by the Proposer for additional compensation or relief. Failure to do so will not relieve the successful Proposer from performing the contract in accordance with all terms and conditions as set forth.

Each Proposer attests, by signing this RFP that he/she has acquainted themselves with the job site and fully understands there will be no recourse for negligence or oversight for not doing so.

6.0 **ASSIGNMENT:** The awarded Proposer shall not assign, transfer, convey, sublet, or otherwise dispose of any award or of any of its rights, title, or interests therein, without the prior written consent of the County Commissioners Court.

7.0 **CONTRACT PERIOD:** .

Contact Danny Villarreal, Cameron County Construction Manager at: phone (956) 454-1378 for questions and to make arrangement to inspect site at Cameron County

8.0 **RFP PRICE PROPOSAL:**

PROPOSER hereby certifies that this RFP is made without prior understanding, agreement or connection with any corporation, firm or person submitting a RFP for the same materials, supplies, services or equipment and is in all respects fair and without collusion or fraud. Further, the PROPOSER hereby agrees to abide by all terms and conditions of this RFP and certifies that the person executing the RFP form is authorized to sign this RFP for the PROPOSER.

9.0 **PRE-AWARD SURVEY:** After RFP opening and prior to award, County reserves the right to make a pre-award survey of proposer's facilities and its operation to be used in the services and performance of this UTILITY IMPROVEMENTS work. Proposer agrees to allow all reasonable requests for inspection of such facilities or operations with two (2) working days advance notice. Failure to allow an inspection is cause for rejection of a RFP as non-responsive. County reserves the right to reject equipment as unacceptable for utility improvement performance as a result of the pre-award survey.

10.0 **MINIMUM REQUIREMENTS FOR RESPONSIBLE PROPOSAL:**

A proposer must affirmatively demonstrate proposer's responsibility. At a minimum, a prospective proposal must contain in the order presented here an outlined response to the following criteria:

11.0 **RFP EVALUATION AND AWARD:**

EVALUATION AND SELECTION CRITERIA

WEIGHTED QUANTITATIVE SCORING:

Each Vendor will be assigned a score of 0 - 4 by each evaluator for each criteria

4 = Very good / Exceeds expectations

3 = Above expectations

2 = Meets expectations

1 = Does not meet expectations

0 = non-responsive

Evaluators score by category will be multiplied by the assigned weight for each criteria by vendor then totaled. Scoring for price will be a ratio and based on a pro rata factor of the best price submitted.

Once RFPs are reviewed and scored, a short list will be compiled. Interviews may be conducted with Proposers determined by total score rankings. Additional information may be required at that time. Negotiations will begin with the Proposer selected for the project. Commissioners Court will make the final selection and possible approval of the contract.

An Evaluation Committee will review each proposal. Committee will be comprised of, but not limited to, County Staff. Proposer may be requested to appear before the Committee to answer questions or give additional information regarding the project or for a formal presentation.

Proposals will be evaluated as to the proposal, which offers the best overall project and is deemed to be the most advantageous and yield the greatest benefit to the County. Some specific elements the Committee will be evaluating are as follows:

(1) Firms Experience, Reputation and References (20 points)

In addition to Attachment A (Vendor References). Please provide a list of projects your company has constructed which are of similar Size, Construction Type and Complexity to this project. Please list in chronological sequence beginning with most recent. For those projects constructed within the **last 5 years** and which meet the criteria, please denote the following information: Previous Project Owner's; Name, address, Contact name, telephone number, email address, year Project was completed (Owner reserves the right to call all owners listed to solicit references) Committee will assess points based on but not limited to: job performance, quality of work, meeting timelines, efforts towards overcoming delays, professionalism, project closeouts, bill payment history, change order pricing, and job safety. Committee will also assess points based on Owner's assessment of past experience with Proposer/Contractor.

(2) Financials and Background (15 points)

Please provide the following documents dated within the last 18 months.

- 1- current financial statement
2. Provide a bank letter of reference with regards to the company's financial strength.
3. letter of Bonding Capacity from a treasury listed provider.

(3) Experience and Reputation of the Proposed Project Staff (15 points)

Provide completed resume(s) of the key supervisory personnel to be assigned to this project. Resumes must include references with names and telephone numbers for Owner verification. Please note Owner will reserve the right to call listed references. Key personnel should have demonstrated ample experience on projects of similar size, construction type, and complexity. Points are to be assigned on the merits of the proposed personnel, no substitutions will be allowed without Owner consent if awarded contract.

Please identify the following:

1. Project Manager
2. Onsite Project Superintendent

(4) Cost Considerations (40 points)

The lowest monetary offer to the base bid will receive the maximum points. In case of ranking points tie the lowest monetary base bid submitted will be considered the highest-ranking Offeror.

(5) Responsiveness to RFP (5 points)

Provide all attachments required, and additional information for ranking criteria as required in a clear and easily reviewed manner for full points.

(6) Proposed Subcontractor Team (5 points)

Provide **Attachment "L"** within 24 hours of Proposal Submission Deadline. Points are to be assigned on the merits of the proposed subcontractors, no substitutions will be allowed without Owner consent if awarded contract.

TOTAL 100 points

At the discretion of the Committee, some or all proposals may be ranked in order of meeting the overall requirements of the highest and best use of concession project. The County reserves the right to negotiate with any, one, or all the ranked proposers. The Evaluation Committee will make a recommendation for award by the Cameron County Commissioners' Court.

12.0 REJECTION OF RFP:

County expressly reserves the right to:

- 1) waive any defect, irregularity or informality in any proposal;
- 2) reject or cancel any RFP or parts of any proposal;
- 3) accept proposals from one or more proposers; or
- 4) procure the services in whole or in part by other means.

SAMPLE EVALUATION SHEET
RFP# 250502
ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

PROPOSER'S BUSINESS NAME: _____

DATE EVALUATED: _____

EVALUATOR'S SIGNATURE: _____

EVALUATOR PRINT NAME: _____

RFQ REVIEW:

Each Vendor will be assigned a score of 1- 4 by each evaluator for each criteria

4 = Very good / Exceeds expectations

3 = Above expectations

2 = Meets expectations

1 = Does not meet expectations

0 = non-responsive - Utilization of 0 by evaluator requires Evaluation Committee's full consensus.

The Request for qualifications will be evaluated using
Quantitative Scoring per the following categories:

	<u>Evaluator's Score:</u>	<u>Score if revised</u>	<u>Weighted Weight</u>
A. 20 – Firm's Experience, Reputation, References	_____	X	20 =
B. 15 – Financials & Background	_____	X	15 =
C. 15 – Experience and Reputation of Proposed Project Staff	_____	X	15 =
D. 40 – Cost Consideration	_____	X	40 =
E. 5 - Responsiveness of Proposal	_____	X	5 =
F. 5 – Proposed Subcontractor Team	_____	X	5 =
		TOTAL	_____

The County shall receive, publicly open, and read aloud the names of the offerors and any monetary proposals made by the offerors. Not later than the 45th day after the date on which the proposals are opened, an evaluation committee shall evaluate and rank each proposal submitted in relation to the published selection criteria.

The County will then proceed to select the offeror that submits the proposal that offers the best value for the County based on the selection criteria in the request for proposal and the weighted value for those criteria in the request for proposal and its ranking evaluation. In determining the best value for the County, the County is not restricted to considering price alone but may consider any other factor stated in the selection criteria.

The County shall first attempt to negotiate a contract with the selected offeror. The County and its architect or engineer may discuss with the selected offeror options for a scope or time modification and any price change associated with the modification.

If the County is unable to negotiate a satisfactory contract with the selected offeror, the County shall, formally and in writing, end negotiations with that offeror and proceed to the next offeror in the order of the selection ranking until a contract is reached or all proposals are rejected.

- 13) **Contractor General Conditions:** To furnish all labor, materials and equipment necessary to provide the General Conditions at a cost not to exceed the amounts listed below. Note any exceptions which you take with the itemized list on Attachment .
- 14) **Contractor Fees:** To complete, or cause to be completed, all work for the projects for the percentage fees listed on the RFP Form, Attachment ""'. The General Contracting Fee shall include small tools and consumables, non-payroll insurances, indirect job overhead, warranty, and corporate overhead including but not limited to: (i) Salaries and other compensation of the Contractor's personnel stationed at the Contractor's principal office or offices other than the Project Site office; (ii) Expenses of the Contractor's principal office and offices other than the Project Site office; (iii) Performance bonuses, similar plans paid to employees of Contractor, whether or not such employee worked on the Project; and (iv) Data Processing, Project Accounting and Project Scheduling expenses from the Contractor's principal office or offices other than the Project Site office.
- 15) **Cost of the Work:** Includes, but is not necessarily limited to, all direct job costs, taxes, final clean and permits.
- 16) **Other:** All additions or reductions to the Scope of Work, that changes the GMP, will be performed for the proposed Contractor Fee. Contractor will itemize the cost impact on any proposed changes in General Conditions. Additions will be considered only in the event of an impact on the project's critical path to completion as supported by Contractor's schedule, or Owner-requested additional General Conditions. Weather delays will not be cause for extended General Conditions.
- 17) **Construction Services:**
- Prepare and maintain detailed schedule of construction (to be updated weekly).
 - Closely supervise all work, ensuring adherence to specifications, quality standards, schedule and costs.
 - Conduct weekly job-site meetings, create agendas, take minutes, highlight problems or required decisions, and administer corrections as specified by the project team.
 - Manage all related reports, permits and inspections.
 - Coordinate with CAMERON COUNTY's subcontractors and vendors (if any).
 - Provide detailed pricing as may be requested for changes to the Scope of Work. The Contractor should promote competitive pricing of changes.
 - Manage all aspects of approved changes to the Scope of Work.
 - As directed by CAMERON COUNTY, Contractor shall coordinate receipt of and become responsible for proper storage and handling of materials furnished by Client.
 - In conjunction with the Project Engineer and County Construction Manager, create a comprehensive punch list and cause the resolution of each deficiency within thirty (30) days after Substantial Completion.
 - Provide all documentation of guarantees, warranties and operating manuals to Client
 - Note all field changes on plans for inclusion in as-builts documents. As-builts to be provided on both hard copy and electronic format.

PART II - REQUIRED DOCUMENTATION

RFP # 250502

Please note this Section may not address all documentation required by the RFP. The Proposer is cautioned to read the entire RFP to determine all requirements. CAMERON COUNTY RESERVES THE RIGHT TO REJECT ANY RFP WHICH DOES NOT CONTAIN ALL INFORMATION REQUIRED BY THIS RFP.

Proposals shall include all of the information solicited in this RFP, and any additional data that the Proposer deems pertinent to the understanding and evaluation of the Proposal. The Proposer should not withhold any information from the written response in anticipation of presenting the information orally or in a demonstration, since oral presentations or demonstrations may not be solicited.

Submittal of a RFP shall constitute the Proposer's agreement and intent to follow and adhere to all statements, offerings and monetary incentives contained within this Proposal.

In conjunction with other material and information requested in the RFP, all Proposers responding to this solicitation shall provide one (1) original (marked "Original") and one (1) copy (marked "Copy") and all attachments of the following in 8 ½ " by 11" format, clearly legible, tabbed and in a binder. In addition, an electronic copy of the original and complete submittal (RFP) shall be also provided in a "Flash Drive – USB" along with the original and copy. **To achieve a uniform review process and to obtain a maximum degree of comparability, Cameron County requires that RFP information be submitted in the following order:**

Table of Contents

List title of each tabbed section and title of any additional information included in this Proposal.

Tab 1 - Transmittal Cover

(Format and Content: Please included in your RFP's / RFQ's as part of your cover).

Executive Summary (2 pages max.)

Submit a signed letter (Executive Summary) briefly addressing the services to be provided by Proposer.

Introduction (2 pages max.)

Proposals must include confirm that the firm will comply with all of the provisions in this RFP. If exceptions will be taken it should be so noted. Proposals must be signed by a company officer empowered to bind the company. A proposer's failure to include these items in their proposals may cause their proposal to be determined to be non-responsive and the proposal may be rejected. Include the following: *Firms Name, Address, Phone #, Contact Name, Phone #, Email address.*

Understanding of the Project (1 pages max.)

Proposers must provide a comprehensive narrative statement that illustrates their understanding of the project as proposed and detail schedule (timeline).

Methodology Used for the Project (1 page max.)

Proposers must provide a comprehensive narrative statement that sets out the methodology they intend to employ and that illustrates how their methodology will serve to accomplish the work and meet project schedule.

Management Plan for the Project (1 page max.)

Proposers must provide a comprehensive narrative statement that sets out the management plan they intend to follow and illustrates how their plan will serve to accomplish the work and meet project schedule.

Provide list specific to the personnel assigned to accomplish the work called for in this RFP; illustrate the lines of authority; designate the individual responsible and accountable for the completion of the proposed project.

Provide a narrative description of the organization of the project team.

Provide a personnel roster that identifies each person who will actually work on the contract and provide the following information about each person listed and Title;

RFP MAG Guarantee per Proposal (1 page max.)

Proposer's MAG Guarantee associated with this offer.

Tab 2 - Proposed General Contractor Information

- a. Name of owner/operator
- b. Address of GE owner/operator
- c. Telephone & Fax number
- d. Identification by name and address of principal financial investors/supporters committed to the project, specifying estimated proportionate levels of involvement for each in the total project.
- e. Include the name and telephone numbers of the designated individual(s), who will answer technical and contractual questions with respect to the proposal.

Tab 3 - Authorization to Do Business in Texas and Management / Organization

Evidence of authorization and if incorporated: certificate of good standing issued by the Secretary of State of Texas indicating Proposer is authorized to conduct business within the State of Texas.

If Business is an individual: proof of registration with Cameron County doing business under assumed name (d/b/a).

Tab 4 - RFP Bond

Each RFP shall be accompanied by a Cashier's Check made payable to Cameron County in the amount of **five (5) percent (%) of the total cost proposal** as a guarantee that if the Proposer receives an award, the Proposer will enter into a contract for services and submit proof of any required insurance. Checks of unsuccessful proposers will be returned. If the successful Proposer fails to satisfy all pre-work requirements or commence work after award, that Proposer shall forfeit this security deposit. Cameron County shall retain it as liquidated damages.

Tab 5 – Price Proposal

Proposer shall provide a detailed breakdown of the total project cost. (Must use the attached “Price Proposal Sheet”

Tab 6 - Security (Performance Bond)

The selected Proposer, within 30 days of the time of the execution of the Construction Agreement, shall furnish the County with a valid security (performance) deposit for the amounts detailed in Construction Agreement.

Tab 7 - Time Frame

Describe the time frame for proposed Utility Improvements for Isla Blanca Park located in Cameron County. Project commencement date (number of months after contract is approved by the Cameron County Commissioners Court.)
Project completion date.

Tab 8 – Changes / Deviations

Requested changes to Construction Agreement

List any requested changes to the draft construction Agreement. Each requested change shall reference the lease article and page number. All terms and conditions in the Draft Construction Agreement are final unless any requested changes are approved and agreed upon. The County has the right to negotiate the terms and conditions with the selected Proposer.

Deviations to terms, conditions and specifications

Any deviations from the terms, conditions and technical specifications and/or schematic drawings listed herein must be clearly indicated; otherwise, it will be considered that the RFP offered is in strict compliance with these specifications and the successful Proposer will be held responsible.

Tab 9 - References - Mandatory

Complete & include **Attachment A** three (3) references page. References to include (3) three business/Commercial references and one (1) creditor or bank.

Tab 10 - All other information required by this RFP

(Please note if applicable: All design documents must be reviewed and approved by Cameron County prior to any construction. It is the responsibility of the selected Proposer to obtain and comply with all permits, licenses and authorizations as may be applicable from all governing agencies having jurisdiction over the construction site/building).

Proposer must submit the following documents after contract award:

Insurance documentation within ten (10) days from execution of the contract.

Payment and Performance Bonds.

Permits.

All other information required in this RFP

Deviations

All Proposals must clearly and with specific detail, note all deviations to the exact requirements imposed upon the Proposer by the specifications. Such deviations must be stated upon the RFP Form; otherwise Cameron County will consider the subject Proposals as being made in strict compliance with said specifications to Proposers, the Proposer being held therefore accountable and responsible. Proposers are hereby advised that Cameron County will only consider Proposals that meet the exact requirements imposed by the specifications; except, however, said Proposals may not be subject to such rejection where, at the sole discretion of Cameron County, the stated deviation is considered to be equal or better than the imposed requirement and where said deviation does not destroy the competitive character of the RFP process by affecting the amount of the RFP such that an advantage or benefit is gained to the detriment of the other Proposers.

Records & Right to Audit

The Proposer shall maintain such financial records and other records as may be prescribed by the County or by applicable federal and state laws, rules, and regulations. The Proposer shall retain these records for a period of three (3) years after final payment, or until they are audited by the County, whichever event occurs first. These records shall be made available during the term of the Construction Agreement and the subsequent three-year period for examination, transcription, and audit by the County, its designees, or other authorized entities.

Modifications Due to Public Welfare or Change in Law

The County shall have the power to make changes in the Concession Agreement as the result of changes in law and/or Ordinances of Cameron County to impose new rules and regulations on the Proposer under the Concession Agreement relative to the scope and methods of providing services as shall from time-to-time be necessary and desirable for the public welfare. The County shall give the Proposer notice of any proposed change and an opportunity to be heard concerning those matters. The scope and method of providing services as referenced herein shall also be liberally construed to include, but is not limited to, the manner, procedures, operations and obligations, financial or otherwise, of the Proposer. In the event any future change in Federal, State or County law or the Ordinances of Cameron County materially alters the obligations of the Proposer, or the benefits to the County, then the Concession Agreement shall be amended consistent therewith. Should these amendments materially alter the obligations of the Proposer, then the Proposer or the County shall be entitled to an adjustment in the rates and charges established under the Concession Agreement. Nothing contained in the Concession Agreement shall require any party to perform any act or function contrary to law. The County and Proposer agree to enter into good faith negotiations regarding modifications to the lease which may be required in order to implement changes in the interest of the public welfare or due to change in law. When such modifications are made to the Concession Agreement, the County and the Proposer shall negotiate in good faith, a reasonable and appropriate adjustment for

any changes in services or other obligations required of the Proposer directly and demonstrably due to any modification in the lease under this clause.

Right to Require Performance

- a. The failure of the County at any time to require performance by the Proposer of any provision hereof shall in no way affect the right of the County thereafter to enforce same. Nor shall waiver by the County of any breach of any provision hereof be taken or held to be a waiver of any succeeding breach of such provision or as a waiver of any provision itself.
- a. In the event of failure of the Proposer to deliver services in accordance with the lease terms and conditions, the County, after due written notice, may procure the services from other sources and hold the Proposer responsible for any resulting additional purchase and administrative costs. This remedy shall be in addition to any other remedies that the County may have.

NON-PERFORMANCE

- a. Time is of the essence in this contract and failure to deliver the services specified shall be considered a default.
- b. In case of default, the County may procure the services from other sources and hold the Proposer responsible for all costs occasioned there by and may immediately cancel the contract.

SPECIAL PROVISIONS

- a. PUBLIC ENTITY CRIMES - Any person submitting a RFP or RFP in response to this invitation certifies that they are aware of, and in compliance with, all requirements under Section 287.133, Texas Statutes, on Public Entity Crimes. Prior to RFP award, the recommended Proposer may be required to submit a sworn statement attesting to compliance with said statute.
- b. PERMITS AND LICENSES - The Proposer agrees to secure all necessary licenses and permits prior to award and agrees to comply with all Federal and State laws, and

Minor Irregularities

The County reserves the right to waive minor irregularities in RFP's, providing such action is in the best interest of the County. Minor irregularities are defined as those that have no adverse effect on the County's best interests and will not affect the outcome of the selection process by giving the Proposer an advantage or benefit not enjoyed by other Proposers.

Governing Laws

Except to the extent Federal law is applicable, the laws and regulations of the State of Texas, and the County of Cameron, Texas, shall govern the interpretation, effect, and validity of any contract(s) resulting from this RFP. Venue of any court action shall be in Cameron County. In the event that a suit is brought for the enforcement of any term of the contract, or any right arising there from, the parties expressly waive their respective rights to have such action tried by jury trial and hereby consent to the use of non-jury trial for the adjudication of such suit.

INSURANCE AND LIABILITY

During the period of this Contract, contractor shall maintain at his expense, insurance with limits not less than those prescribed below. With respect to required insurance, Contractor shall:

- a. Name County as additional insured, as its interests may appear,
- b. Provide County a waiver of subrogation,
- c. Provide County with a thirty (30) calendar days advance written notice of cancellation or material change to said insurance,
- d. Provide the County Purchasing Agent at the address shown on Page 1 of this contract, a Certificate of Insurance evidencing required coverage within ten (10) calendar days after receipt of Notice of Award. Also, please assure your certificate contains the contract number as indicated on the Contract Award form when issued by Cameron County. All insurance policies shall be issued by insurers licensed to do business in the State of Texas and any insuring company is required to have a minimum rating of B, Class VIII in the "Best Key Rating Guide" published by A.M. Best & Company, Inc.,
- e. Loss Deductible Clause: The County shall be exempt from, and in no way liable for, any sums of money, which may represent a deductible in any insurance policy. The payment of such deductible shall be the sole responsibility of the Proposer and/or subcontractor providing such insurance, and
- f. Submit an original certificate of insurance reflecting coverage as follows:

Automobile Liability:

Bodily Injury (Each person)	\$250,000.00
Bodily Injury (Each accident)	\$500,000.00
Property Damage	\$500,000.00

General Liability (Including Contractual Liability):

Bodily Injury (Per occurrence)	\$5,000,000.00
Bodily injury Aggregate	\$10,000,000.00
Property Damage (Per occurrence)	\$5,000,000.00
Property Damage Aggregate	\$10,000,000.00
Fire Damage	\$5,000,000.00
Medical Expense (Anyone (1) person)	\$5,000,000.00

Excess Liability:

Umbrella Form Not Required

Worker's Compensation: Statutory

g. INDEMNITY

The Proposer covenants and agrees that it will indemnify and hold harmless the COUNTY and all of the County's officers, agents, and employees from any claim, loss, damage, cost, charge, attorney's fees and costs, or any other expense arising out of any act, action, neglect, or omission by Proposer during the performance of the contract, whether direct or indirect, and whether to any person or property to which the COUNTY or said parties may be subject, except that neither the Proposer nor any of its subcontractors, or assignees, will be liable under this section for damages arising out of injury or damage to persons or property directly caused or resulting from the sole negligence of the COUNTY or any of its officers, agents, or employees.

h. PROTECTION OF PERSONS AND PROPERTY

- 1) The Proposer will take all reasonable precautions for, and will be responsible for initiating, maintaining and supervising all programs relating to the safety of all persons and property affected by, or involved in, the performance of his operations under this contract.
- 2) The Proposer will take all reasonable precautions to prevent damage, injury or loss to: (a) all persons who may be affected by the performance of his operations, including employees; (b) all materials and

equipment; and (c) all property at or surrounding the work site. In an emergency affecting the safety of persons or property, the Proposer will act, with reasonable care and discretion, to prevent any threatened damage, injury or loss.

- i. Companies issuing the insurance policy, or policies, shall have no recourse against the County for payment of premiums or assessments for any deductibles which all are the sole
- j. PROPOSERS may, at the COUNTY'S request, be required to provide proof that their firm meets the preceding insurance requirements, by submission of Certificates of Insurance Coverage(s), prior to award of the Contract.



**ADDENDUM
ACKNOWLEDGEMENT FORM**

ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

Title of Project

RFP # 250502

Receipt of the following Addendum is acknowledged:

Failure to acknowledge an addendum may result in a Respondent being deemed non-responsive.

Addendum no. _____ Date: _____

Addendum no. _____ Date: _____

Addendum no. _____ Date: _____

Addendum no. _____ Date: _____

Addendum no. _____ Date: _____

Addendum no. _____ Date: _____

Signature: _____ Date: _____

Title _____

Name of Firm

THIS FORM MUST BE RETURNED WITH YOUR RFP



**CAMERON COUNTY
PROVIDER QUALIFICATIONS**

Please complete all fields below. If not applicable, please mark with N/A

Firm Name:

Legal Name (if different):

Years in Business:

Number of years providing similar service:

Contact Person:

Mailing Address:

Phone Number: _____

Email of Contact Person:

Number of Full Time Employees:

Name and Experience of Proposed Point of Contact for this Proposal:

(Maximum 10 pages)

THIS FORM MUST BE RETURNED WITH YOUR RFP

HISTORICALLY UNDERUTILIZED BUSINESS (HUB) DECLARATION

The primary objective of the Cameron County HUB Program is to ensure Historically Underutilized Businesses receive a fair and equal opportunity for participation in the County's procurement process. This fact holds true for Services (Professional & Non-Professional), Commodities, and Construction contracts and any subcontracts thereto. The program strongly encourages Prime Contractors to provide subcontracting opportunities to Certified Hub Contractors/Vendors. Our goal for HUB contractor/vendor participation, as well as HUB subcontractor participation is 30%. To be considered as a "Certified HUB Contractor/Vendor" the contractor/vendor must have been certified by, and hold a current and valid certification with any of the three agencies listed below.

Have you been Certified as a HUB or an MBE/WBE source?: ☐ Yes ☐ No

If yes, by whom?: ☐ Texas Building & Procurement Commission ☐ Other _____

Indicate Certification No(s): _____ or Are Certificate(s) Attached?: ☐ Yes ☐ No

LIST OF CERTIFIED HUB SUBCONTRACTORS

(Attach additional pages if necessary)

What percentage of the Bid, RFP, or RFQ is to be subcontracted with Certified HUB sources?: _____ %
(List HUB Subcontractor information below).

HUB Subcontractor Name: _____ HUB Status: _____
 Certifying Agency (Check all applicable): ☐ Texas Building & Procurement Commission ☐ Other
 Address: _____ City: _____ State: _____ Zip: _____
 Contact Person: _____ Title: _____ Phone No.: () _____
 Subcontract Amount: \$ _____ Description of Work to be Performed: _____

HUB Subcontractor Name: _____ HUB Status: _____
 Certifying Agency (Check all applicable): ☐ Texas Building & Procurement Commission ☐ Other
 Address: _____ City: _____ State: _____ Zip: _____
 Contact Person: _____ Title: _____ Phone No.: () _____
 Subcontract Amount: \$ _____ Description of Work to be Performed: _____

HUB Subcontractor Name: _____ HUB Status: _____
 Certifying Agency (Check all applicable): ☐ Texas Building & Procurement Commission ☐ Other
 Address: _____ City: _____ State: _____ Zip: _____
 Contact Person: _____ Title: _____ Phone No.: () _____
 Subcontract Amount: \$ _____ Description of Work to be Performed: _____

THIS FORM MUST BE RETURNED WITH YOUR RFP

RFP Title _____ Proposer's Name _____ Date: _____

REFERENCES

Please list (3) three references - (1) should be a concessionaire customer who can verify the quality of service your company provides. The County prefers customers of similar size and scope of work to this RFP.

REFERENCE ONE

Government/Company Name: _____

Address: _____

Contact Person and Title: _____

Phone: _____ e-mail address: _____

Contract Period: _____ Scope of Work _____

REFERENCE TWO

Government/Company Name: _____

Address: _____

Contact Person and Title: _____

Phone: _____ e-mail address: _____

Contract Period: _____ Scope of Work _____

REFERENCE THREE

Government/Company Name: _____

Address: _____

Contact Person and Title: _____

Phone: _____ e-mail address: _____

Contract Period: _____ Scope of Work _____

THIS FORM MUST BE RETURNED WITH YOUR RFP.

BANK OR CREDITOR REFERENCES

REFERENCE

Government/Company Name: _____

Address: _____

Contact Person and Title: _____

Phone: _____ e-mail address: _____

Contract Period: _____ Scope of Work _____

THIS FORM MUST BE RETURNED WITH YOUR RFP

STATE OF TEXAS
COUNTY OF CAMERON

AFFIDAVIT

The undersigned certifies that the RFP prices contained in this RFP have been carefully checked and are submitted as correct and final and if RFP is accepted (within 60 days), agrees to furnish any and/or all items upon which prices are offered, at the price(s) and upon the conditions contained in the Specifications.

BEFORE ME, the undersigned authority, A Notary Public in and for the State of _____, on this day personally appeared _____ who, after having first been duly sworn, upon oath did depose and say;

That the foregoing RFP submitted by _____ hereinafter called "Proposer" is the duly authorized agent of said company and that the person signing said RFP has been duly authorized to execute the same. Proposer affirms that they are duly authorized to execute this contract, that this company, corporation, firm, partnership or individual has not prepared this RFP in collusion with any other Proposer. The Proposer is not a member of any trust, pool, or combination to control the price of products or services RFP on, or to influence any person to RFP or not to RFP thereon. I further affirm that the Proposer has not given, offered to give, nor intends to give, at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discounts, trip, favor, or service to a public servant in connection with the submitted RFP. The contents of this RFP as to prices, terms or conditions of said RFP have not been communicated by the undersigned nor by any employee or agent to any other person engaged in this type of business prior to the official opening of this RFP.

Name and Address of Proposer:

Telephone number _____ Fax number _____

Signature

Name: _____ Title: _____

SWORN TO AND SUBSCRIBE BEFORE ME THIS _____ day of _____ 20_____.

Notary Public in and for County _____ State _____

THIS FORM MUST BE RETURNED WITH YOUR RFP

RESIDENCE CERTIFICATION

Pursuant to Texas Government Code §2252.001 *et seq.*, as amended, Cameron County requests Residence Certification. §2252.001 *et seq.* of the Government Code provides some restrictions on the awarding of governmental contracts; pertinent provisions of §2252.001 are stated below:

“Nonresident Proposer” refers to a person who is not a resident.

“Resident Proposer” refers to a person whose principal place of business is in this State, including a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

☐ I certify that _____ is a Resident
(Company Name)

Proposer of Texas as defined in Government Code §2252.001.

☐ I certify that _____ is a Nonresident
(Company Name)

Proposer as defined in Government Code §2252.001 and our principal place of business is

(City and State)

Print Name: _____ Signature: _____

THIS FORM MUST BE RETURNED WITH YOUR RFP

STATEMENT OF NON-COLLUSION

CAMERON COUNTY EXPRESSLY REQUESTS THAT PROPOSERS NOT DISCUSS THIS ENGAGEMENT OR THIS PROPOSER'S PLANS, EXPERIENCE OR CREDENTIALS WITH OTHER PROPOSER'S OR ANY MEMBER OF COMMISSIONERS' COURT, ANY COUNTY OFFICIAL, OR ANY EVALUATION COMMITTEE MEMBER APPOINTED BY COMMISSIONERS COURT. EXCLUDED ARE PRE-RFP OR PRE-RFP CONFERENCES, EVALUATION COMMITTEE SCHEDULED PROPOSER PRESENTATIONS OR PROPOSER INTERVIEWS, OR EVALUATION COMMITTEE SCHEDULED EQUIPMENT OR SERVICES DEMONSTRATIONS. YOU MAY CONTACT THE PURCHASING AGENT / PURCHASING DEPARTMENT AT ANY TIME.

FROM RFP OPENING DATE THROUGH COMMISSIONERS COURT MEETING FOR SELECTION, VENDORS WILL NOT APPROACH THE COUNTY JUDGE OR COMMISSIONERS TO DISCUSS MATTERS PERTAINING TO THIS BID.

01. Has any individual with the firm submitting this RFP response made any contact with any member of Commissioners Court, any County Official, or an Evaluation Committee member concerning this Proposal, other than questions to the Purchasing Agent?

02. Has any individual with the firm submitting this RFP response made any contact with any other proposer concerning this RFP?

Signature of person doing business with the governmental entity

Date

THIS FORM MUST BE RETURNED WITH YOUR RFP

ORDER NO. 2007O2005

THE STATE OF TEXAS §
COUNTY OF CAMERON §

**ORDER ADOPTING CONTRACTING RULES
FOR PERSONS INDEBTED TO COUNTY**

WHEREAS, pursuant to V.T.C.A., Local Government Code, Section 262.0276, a commissioner's court is authorized to adopt rules permitting a county to refuse to enter into a contract or other transaction with a person indebted to the county;

WHEREAS, the Commissioners Court of Cameron County finds it is in the best interest of Cameron County to adopt such rules;

NOW THEREFORE, BE IT ORDERED by the Commissioners Court of Cameron County, that the following rules be adopted regarding Cameron County and persons interested in doing business with Cameron County:

1. Cameron County may refuse to enter into a contract or other transaction with a person with a past due debt to Cameron County, including delinquent ad valorem taxes, even if the person is the lowest or successful Proposer; and
2. For purposes of this Order, a debt is past due if it is not received in the County Treasurer's Office by the due date in a written agreement or notice, and ad valorem taxes are past due if not received in the County Tax Assessor/Collector's Office by February 1st following the January 1st on which the ad valorem taxes are due.
3. For purposes of this Order, a person includes an individual, sole proprietorship, corporation, nonprofit corporation, partnership, joint venture, limited liability Company, and any other entity that proposes or otherwise seeks to enter into a contract or other transaction with Cameron County requiring approval by the Commissioners Court.

ADOPTED this 13 day of March, 2007.

Taxpayer Identification Number (T.I.N.): _____

Cameron County Acct #'s: Real Estate _____ Personal Property _____

01. Is the person or the firm submitting this RFP current with all local and State taxes?

Yes ____ No ____

Signature of person submitting this Bid

Date

THIS FORM MUST BE RETURNED WITH YOUR RFP

Certification Regarding Debarment & Suspension Ineligibility

As is required by the Federal Regulations Implementing Executive Order 12549, Debarment and Suspension, 45 CFR Part 76, Government-wide Debarment and Suspension, in the applicant certifies, to the best of his or her knowledge and belief, that both it and its principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or agency;
- b. Have not within a three-year period preceding this bid and/or application 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, theory, 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 with commission of any of the offenses enumerated herein; and
- d. Have not within a three-year period preceding this bid had one or more public transactions terminated for cause or because of default.

Company Name: _____

Signature: _____

Print Name: _____

Title: _____

Telephone Number: _____

Date: _____

If the Bidder is unable to certify to all of the statements in this Certification, such Bidder should attach an explanation to this Bid.

THIS FORM MUST BE RETURNED WITH YOUR RFP

SWORN STATEMENT ON DEBARMENT

This SWORN statement is submitted with project number _____

By: _____
(PRINT INDIVIDUALS NAME AND TITLE)For: _____
(PRINT NAME OF ENTITY SUBMITTING SWORN STATEMENT)whose business address is:

CITY

STATE

ZIP

VOICE PHONE

and if applicable its Federal Employee Identification Number (FEIN) is:

(INDICATE WHICH STATEMENTS APPLY)

_____ Neither the entity submitting this SWORN statement, nor any of its officers, directors, executives, partners, shareholders, employees, members or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime.

_____ The entity submitting this SWORN statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity **HAS BEEN CHARGED WITH AND CONVICTED OF A PUBLIC ENTITY CRIME.**

_____ The entity submitting this SWORN statement is not present on any Federal list of debarred contractors, nor been debarred from any other type of contracting.

AUTHORIZED SIGNATURE_____
(Printed Name) (Title)

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

Personally known _____ OR Produced identification _____

SHOW TYPE OF IDENTIFICATION

Notary Public State of _____, County of _____ My commission expires _____

(PRINTED/TYPED/ OR STAMPED COMMISSIONED NAME OF NOTARY PUBLIC)***THIS FORM MUST BE RETURNED WITH YOUR RFP***

Company Name: _____

Please answer each individual question. If it does not pertain to your company, please write "N/A" and sign at the bottom of page.

CONFLICT OF INTEREST QUESTIONNAIRE For vendor doing business with local governmental entity		FORM CIQ
This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session. This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a). By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code. A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.	OFFICE USE ONLY 	
1 Name of vendor who has a business relationship with local governmental entity. 		
2 ☐ Check this box if you are filing an update to a previously filed questionnaire. (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)		
3 Name of local government officer about whom the information is being disclosed. Name of Officer		
4 Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary. A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor? ☐ Yes ☐ No B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity? ☐ Yes ☐ No		
5 Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more. 		
6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1). 		
7 Signature of vendor doing business with the governmental entity Date		

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at [http://www.statutes.legis.state.tx.us/ Docs/LG/htm/LG.176.htm](http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm). For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

- (a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

- (2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

- (a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

- (1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);
- (2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or
- (3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

- (1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

- (2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

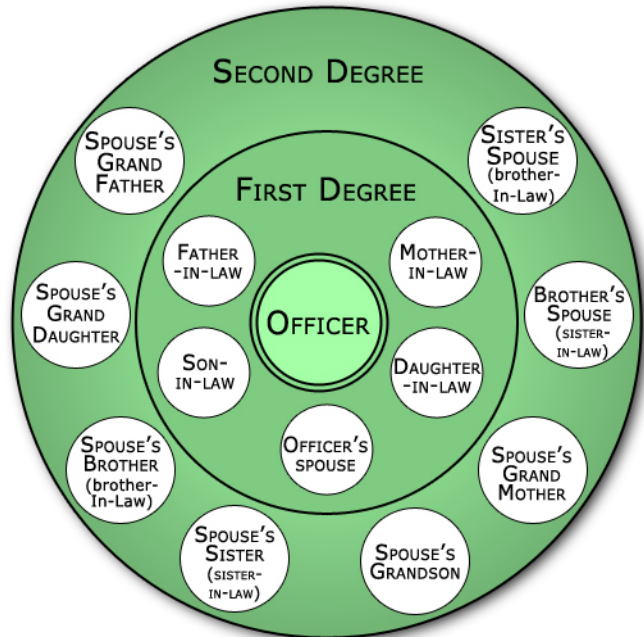
NEPOTISM CHART

The chart below shows

- **Affinity Kinship** (relationship by marriage)
- **Consanguinity Kinship** (relationship by blood)
for purposes of interpreting nepotism as defined in VTCA Government Code, Chapter 573, §§573.021 - .025

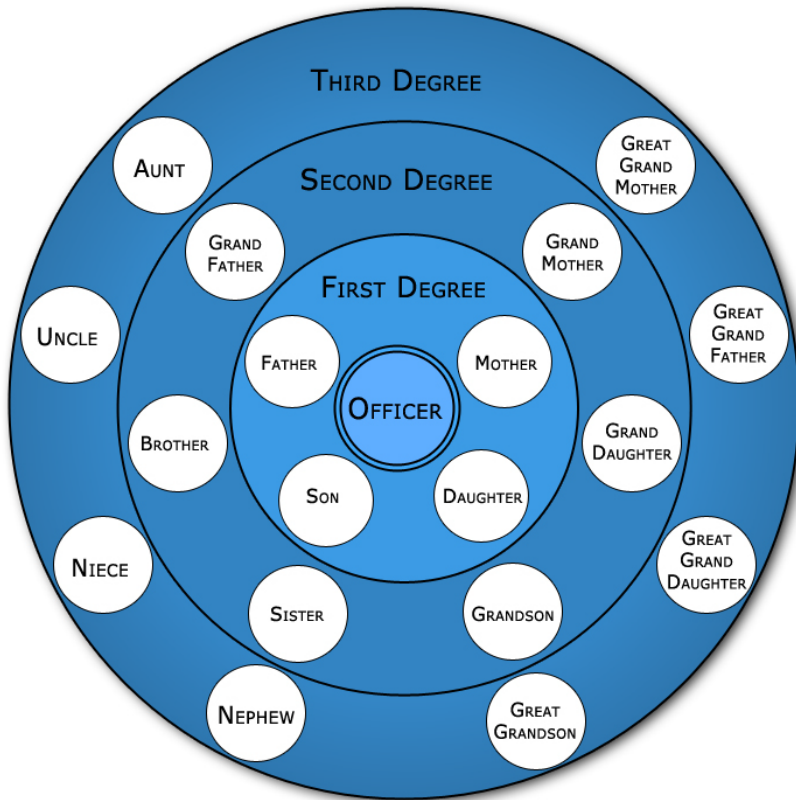
AFFINITY KINSHIP

Relationship by Marriage



CONSANGUINITY KINSHIP

Relationship by Blood



DISCLOSURE OF INTERESTS

MUST BE FILLED OUT AND SUBMITTED WITH THE BID/RFP/RFO
IF DISCLOSING: BIDDER / PROPOSER MUST ALSO FILE WITH THE COUNTY CLERK'S OFFICE
THE PURCHASING DEPT. WILL NOT BE FILING ON THE BIDDER'S BEHALF

Cameron County, Texas requires all persons or firms seeking to do business with the County to provide the following information. Every question must be answered. If the question is not applicable, answer with "N/A." By law this questionnaire must be filed with the records administrator (County Clerk's Office) of the local government.

Date _____

FIRM NAME: _____

ADDRESS: _____

FIRM is: 1. Corporation () 2. Partnership () 3. Sole Owner ()
 4. Association () 5. Other () _____

DISCLOSURE QUESTIONS

If additional space is necessary, please use the reverse side of this page or attach separate sheet.

1. State the names of each "employee, elected official, or member of Commissioners Court" of Cameron County having Substantial Interest in Business Entity Local Govt. Code §171.002 (use box below)
 - a) For purpose of this chapter, a person has a substantial interest in a business entity if :
 - (1) the person owns 10 percent or more of the voting stock or shares of the business entity or owns either 10 percent or more or \$15,000 or more of the fair market value of the business entity; or
 - (2) funds received by the person from the business entity exceeds 10 percent of the person's gross income for the previous year.
 - b) A person has a substantial interest in real property if the interest is an equitable or legal ownership with a fair market value of \$2,500 or more.
 - c) A local public official is considered to have a substantial interest under this section if a person related to the official in the first degree by consanguinity or affinity, as determined under Chapter 573, Government Code, has a substantial interest under this section.

Please write "N/A" in the boxes if non-applicable

Name	Title	Department

CERTIFICATE

I certify that all information provided is true and correct as of the date of this statement, that I have not knowingly withheld disclosure of any information requested; and that supplemental statements will be promptly submitted to the Cameron County as changes occur.

Certifying Person: _____ Title: _____ (Type or Print)

Signature of Certifying Person: _____ Date: _____

THIS FORM MUST BE RETURNED WITH YOUR RFP



HOUSE BILL 89 VERIFICATION (REVISED)

I, _____,
[Person Name]

the undersigned representative of _____
[Company or Business Name]

(hereafter referred to as Company) being an adult over the age of eighteen (18) years of age, does hereby depose and verify that the Company named above, under the provisions of Subtitle F, Title 10, Texas Government Code Chapter 2270:

1. Does not currently boycott the country of Israel; and
2. Will not boycott the country of Israel during the term of the contract with Cameron County, Texas.

Signature: _____

Date: _____

Pursuant to Section 2270.001, Texas Government Code:

1. *“Boycott Israel” means refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, but does not include an action made for ordinary business purposes; and*
2. *“Company” means a for-profit sole proprietorship, organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, or any limited liability company, including a wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of those entities or business associations that exist to make a profit.*

THIS FORM MUST BE RETURNED WITH YOUR RFP

Please attach the 1295 Form

**See link below to login to
Texas Ethics Commission website**

1295 Filing Info

THIS FORM MUST BE RETURNED WITH YOUR RFP

LIST OF GENERAL CONDITIONS

Field and home staff administration and supervision based on the Project Schedule:

	Raw Costs	Burden	% of Time	No of Weeks	
Project Manager	\$ /wk x	% x	x	Wks	
Project Engineer	\$ /wk x	% x	x	Wks	
Superintendent	\$ /wk x	% x	x	Wks	
	\$ /wk x	%x	x	Wks	
	\$ /wk x	%x	x	Wks	
	\$ /wk x	%x	x	Wks	
	\$ /wk x	%x	x	Wks	
				Total	

Indicate the percentage of time your personnel will be dedicated solely to this project:

Project Manager	Superintendent	%	Project Engineer	%
2) Field Engineering Labor with burden				
3) Field Engineering Equipment and Supplies				
4) Field Project Office				
5) Safety Supervisor Inspections				
6) Temporary Fire Extinguishers and Safety Equipment /Labor				
7) Office Furniture				
8) Office Supplies				
9) Postage				
10) Federal Express/Courier Services				
11) Miscellaneous Printing				
12) Copy Machine and Paper				
13) Office Equipment				
14) Telephone and Fax Service				
15) Personal Computers On Site				
16) Janitorial Services				
17) Vehicle Rental				
18) Vehicle Fuel, Maintenance, Insurance, and Repair				
19) All Risk Builder's Risk Insurance				
20) Liability Insurance(Prorata Share)				
21) Project Scheduling Services				
22) Project Accounting Services				
23) Construction Clean-Up with burden				
24) Final Clean-Up			=	C.O.W.
25) Dumpster Fees			=	C.O.W
26) Building Permit			=	\$
27) Other				
28) Other				
29) Other				
30) Other				

Subtotal: (Items 2-30)

Maximum General Conditions (Items 1-31)

Note: Please indicate with a N/A the items above that, in your opinion, do not apply to this project. Please indicate with a "0" (zero) the items above that are included in your fee.

Estimate the following items which will be reimbursed as Cost of the Work:

Contractor's P & P Bond Cost
Building Permit Fees

\$ C.O.W

DETAILED INFORMATION**Part "B" submission:****(1) Organizational Experience and References:**

- (a) Name of firm
- (b) Address of Principal Office
- (c) Phone Number
- (d) Fax Number
- (e) Email Address and/or Web Address
- (f) Form of Business Organization (Corporation, Partnership, Individual, Joint Venture, other?)
- (g) Year Founded
- (h) Primary individual to contact
- (i) List the major projects constructed by your firm within the last five (5) years in similar scope and size to the project herein. For each project provide the name, nature of the project and function of the building, size (square feet), locations, cost, completion date, Owner and Architect, and the manner in which your organization was selected (Bid, RFP, CM, or other method).

(2) Organizational Chart and Resumes of the Project Team :

- (a) Given the scope and schedule of the project, identify the specific Project Manager, Estimator, and Superintendent who would work on the project. Provide a resume and references for each individual

(3) Definition of Cost of the Work**(4) Comments, Clarifications and Exclusions****(5) Certificates of Insurance (sample)****(6) Safety Program and Record**

- (a) State your organizations safety plan and accident rate.
- (b) List your organizations Workers Compensation Experience Multiplication Rate/EMR for the last five (5) years as obtained from your insurance agent

(7) Financials and Background

- (a) Attach a financial statement, certified by a public accountant and audited, including your organization's latest balance sheet and income statement showing the following items:
 - (i) Current assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory, and prepaid expenses)
 - (ii) Noncurrent assets (e.g., net fixed assets, other assets).
 - (iii) Current liabilities (e.g., accounts payable, notes payable (current), accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes).
 - (iv) Noncurrent liabilities (e.g., notes payable).
 - (v) Capital accounts and retained earnings (e.g., capital, capital stock, authorized and outstanding shares par value, earned surplus and retained earnings).
- (b) Name and address of firm preparing attached financial statement and date thereof.
- (c) Is the attached financial statement for the identical organization named under item (a) above? If not explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent and subsidiary).
- (d) Provide name, address, and phone for bank reference
- (e) Surety: name of bonding company, name and address of agent. Proof of ability to bond will be required prior to selection.
- (f) Include a commitment letter from the subcontractor's, supplier's, and vendor's bonding agency for all proposed contracts over \$50,000.
- (g) Documentation that no single client of all proposed vendors, subcontractors, contractors, and suppliers represents more than 20% of gross revenues for these companies.

(8) Claims and Suites:

- (a) List all lawsuits or requested arbitration with regard to construction contracts over the past five (5) years.
- (b) List all judgments, claims, arbitration proceedings, or suites pending against your organization.
- (c) State whether your organization has ever failed to complete any work.

SUBCONTRACTOR LIST – THIS COMPLETED LIST MUST BE SUBMITTED WITH PROPOSAL OR EMAILED
NOT LATER THAN 24 HOURS AFTER PROPOSAL OPENING –
Email to purchasing@co.cameron.tx.us and to Danny.cillarreal@co.cameron.tx.us

RFP # 250502 ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

TRADE: MECHANICAL ~~N/A~~

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: ELECTRICAL

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: FIRE ALARM ~~N/A~~

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: PLUMBING

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: SITEWORK

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: POLISHED CONCRETE FINISHING

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: STRUCTURAL CONCRETE

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: MASONARY

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: STRUCTURAL STEEL ~~N/A~~

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: LANDSCAPING

COMPANY NAME: _____

CONTACT PERSON: _____

~~TRADE: SHEET METAL N/A~~

~~COMPANY NAME: _____~~

~~CONTACT PERSON: _____~~

TRADE: PAINTING

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: WOOD FRAMING

COMPANY NAME: _____

CONTACT PERSON: _____

TRADE: DOORS AND HARDWARE

COMPANY NAME: _____

CONTACT PERSON: _____

~~TRADE: HVAC N/A~~

~~COMPANY NAME: _____~~

~~CONTACT PERSON: _____~~

THIS FORM MUST BE RETURNED WITH YOUR PROPOSAL

TEXAS OPEN RECORDS ACT AND CONFIDENTIALITY

All materials submitted to Cameron County, Purchasing Department pursuant to this Invitation for Bid/Request for Proposals/Statement of Qualifications become subject to the mandates of the Texas Open Records Act, Government Code, Chapter 552, Subchapter A, §§552.009; Subchapter D, §§552.205; and Subchapter F, §§552.261 through 552.274. The purpose of this Act is to ensure and facilitate the public's right of access to and review of government records so they may efficiently and intelligently exercise their inherent political power. Almost all "records," as that term is defined in the Act, may be disclosed to the public upon request. Except where specific state or federal statutes create a confidential privilege, persons who submit information to public bodies have no right to keep this information from public access or reasonable expectation that this information will be kept from public access.

If you believe that any of the information you have submitted to the County pursuant to this Request for Proposals is **confidential** under a specific state or federal statute and therefore not subject to the public access, *you must comply with the following:*

- A. Place said documents/records in a separate envelope marked **"Confidential"** **DO NOT** label your entire response to the Bid/Request for Proposals/Statement of Qualifications as "Confidential" – label only those portions of the response that you feel are made confidential by state or federal law as "Confidential." If only a portion of a document is confidential, please identify specifically the portions of the document you are claiming are confidential. Under the State of Texas Open Records Act, the County is obligated to produce documents for public inspection even if the documents contain a portion which is confidential but can redact the confidential parts.
- B. For each such document for which you are claiming a confidential privilege, identify the federal and/or state law that creates said privilege, e.g., for trade secrets.

Should an Open Records request be presented to the County requesting information you have identified as "Confidential," you will be responsible for defending your position in the Court where the proceeding is filed, if needed.

If you fail to identify any records submitted as part of your Bid/Request for Proposals/Statement of Qualifications as "Confidential" by placing them in the "Confidential" envelope AND you fail to identify the specific state or federal law creating said privilege, you are irrefutably agreeing that said records are not confidential and are subject to public access.

GENERAL TERMS & CONDITIONS (Requests for proposals (RFP))

RFP # 250502

ADDENDA: If RFP specifications, terms or conditions are revised, the Cameron County Purchasing Department will issue an addendum addressing the nature of the changes and notify interested potential Proposers. Proposers must acknowledge receipt and consideration of any such changes by signing the addendum and including it in the RFP package containing the Proposer's submittal.

ADVERTISING: Unless otherwise required by law, Proposers to County RFPs shall not publish and shall keep confidential their intentions and actions respecting any response to the RFP.

AWARD: Cameron County may hold RFP responses for a period of sixty (60) days. Cameron County reserves the right to reject any or all responses to RFPs. Cameron County reserves the right to award a contract, if any, based on the Proposer's response when compared to the EVALUATION CRITERIA (AS STATED IN THE RFP) and, in accordance with the laws of the State of Texas, reserves the right to waive any formality or irregularity, to make awards to more than one proposer. Commissioners Court reserves the right to determine the method and procedures for the final award of all RFPs at any time they may choose, regardless of the Point System used by the Evaluation Committee.

BONDS: If the contract that may be entered into with the County will likely require a performance guarantee or bond, the Purchasing Department will attach a separate page to the RFP explaining those requirements.

CANCELLATION AND TERMINATION: In any contract resulting from the RFP, the County shall have the right to cancel all or any part of the undelivered portion of the contract if (1) Proposer breaches any of the terms hereof, including, but not limited to, applicable warranties, and/or (2) Proposer becomes insolvent or files for bankruptcy. Such right of cancellation is in addition to, and not in lieu of, any other remedies which the County may have in law or equity. Cancellation of work hereunder shall be affected by the delivery to the Proposer of a "Notice of Cancellation of Undelivered Work" specifying the extent to which performance of work, including all goods and services, under the contract is cancelled and the date upon which such cancellation becomes effective.

The performance of work under any resulting contract may be terminated in whole, or in part, by the County in accordance with this provision. The County shall have the right to terminate all or any part of the contract if (1) the Proposer breaches any of the terms hereof, including, but not limited to, applicable warranties, and/or (2) Proposer becomes insolvent or files for bankruptcy. Such right of termination is in addition to, and not in lieu of, any other remedies which the County may have in law or equity. Termination of work hereunder shall be affected by the delivery to the Proposer of a "Notice of Termination" specifying the extent to which performance of work, including all goods and services, under the contract is terminated and the date upon which such termination becomes effective.

CHANGE ORDERS: No oral statement of any person shall modify or otherwise change, or affect the terms, conditions or specifications stated in the resulting contract. All change orders to the contract will be made in writing by mutual consent of the Proposer and the County.

CONTRACT RENEWALS: Contract Renewals must receive Commissioners Court approval. For contract renewal status and information, please contact Elisa Cisneros at 956-982-5405 e-mail: Elisa.Cisneros2@co.cameron.tx.us Cameron County Purchasing Dept. or Dylbia Jeffries 956-550-1340 djefferies@co.cameron.tx.us at the Cameron County Civil Legal Division. Any price escalations are limited to those stated by the original contract terms. All contracts with a one (1) year renewal option require that the Proposer must notify Cameron County of any anticipated price increases in writing at least three months (90 calendar days) prior to the annual renewal award date unless otherwise specified within the specific provisions of the contract up for renewal. This allows the County sufficient time to find an alternative vendor if possible. If Proposer fails to notify the County within time noted it shall be assumed that there will be no price increase for the following year's award period if renewed. This procedure does not apply to any contract which allows for Open Market Price increases or Cost allowance increases.

DISCRIMINATION: In order to encourage fair employment practices, the Proposer agrees as follows: 1.) Proposer will not discriminate against any employee or applicant for employment because of race, sex, color, age, religion, handicap, or national origin; 2) in all solicitations or advertisements for employees, the Proposer will state that all qualified applicants will receive consideration without regard to race, color, sex, age, religion, handicap or national origin; 3) the Proposer will furnish such

relevant information and reports as requested by the County for the purpose of determining compliance with these regulations; and 4) failure of the Proposer to comply with these laws will be deemed a breach of contract and it may be cancelled, terminated or suspended in whole or in part as a result thereof.

DISQUALIFICATION OF PROPOSER: Upon submitting a response to this RFP, Proposer certifies that the Proposer has not violated the antitrust laws of this state codified in Texas Business and Commerce Code 15.01, *et seq.*, as amended, or the federal antitrust laws, and has not communicated directly or indirectly its RFP considerations, plan or response to any competitor or any other person engaged in such line of business. Any and all responses may be rejected if the County believes that collusion exists among the Proposers. If multiples are submitted by a Proposer and after all responses to the RFPs are opened one or more of the responses are withdrawn, the result will be that all of the responses submitted by that Proposer will be withdrawn; however, nothing herein prohibits a Proposer from submitting multiples for different products or services.

EVALUATION: All responses will be evaluated in accordance with law and reviewed to assure they are in the best interest of Cameron County. Evaluations shall be based on criteria bearing on price and performance of the items or services in the user environment. Any specific criteria section or sections identified elsewhere in this RFP may be evaluated by one or more evaluators once the basis and details of this process have been approved by the Purchasing Officer and acknowledged by the Evaluation Committee. Detailed information pertaining to this selective evaluation process is available to Proposers and the Commissioners Court upon request. Evaluation sheets and any summary of all responses are subject to review by the Cameron County Purchasing Department and Evaluation Committee's recommendation to Cameron County Commissioners Court. Compliance with all RFP requirements, delivery terms and needs of the using department are considerations in evaluating responses. Pricing is NOT the only criterion for making a recommendation (see criteria and relative importance of price and other evaluation factors, if any, specified elsewhere in this RFP). The Cameron County Purchasing Department reserves the right to contact any Proposer, at any time, to clarify, verify or request information with regard to that Proposer's response. The Cameron County Purchasing Department further reserves the right to hold negotiation discussions with any responsible Proposer determined to be reasonably susceptible of being selected for award in accordance with law.

PROTEST PROCEDURES: Procedure - This protest procedure is available to Proposers responding to this RFP and requesting a debriefing conference.

Debriefing Conference – A debriefing conference must be requested in writing to the Purchasing Department within five (5) business days from the date of the RFP award by the Cameron County Commissioners' Court. Debriefing questions must be submitted in writing to the Purchasing Department no later than two (2) business days before the scheduled date for the Debriefing Conference. These questions will be answered at the debriefing conference. Follow-up questions must be submitted (in writing) no later than one (1) business day after the date of the Debriefing Conference and answered no later than two (2) business days after the date of the Debriefing Conference. Follow-up answers will be sent via e-mail or fax (if e-mail not available). For RFPs, Proposers are given the opportunity to ask questions of the Evaluation Committee relative to their responses and the Committee's scores.

Protests are made: 1. To the Purchasing Department after the debriefing conference. Proposer protests shall be received, in writing, by the Purchasing Department within five (5) business days after the debriefing conference. 2. To the Protest Committee, only after the protest to the Purchasing Department was not satisfactorily resolved. Protests to the Protest Committee shall be made within five (5) business days after the Proposer has received notification from the County Purchasing Department of its decision.

Grounds for protest

1. Errors were made in computing the score.
2. The County failed to follow procedures established in the RFP, the Purchasing policy on acquisitions or applicable state or federal laws or regulations.
3. Bias, discrimination or conflict of interest on the part of an evaluator. Protests not based on these criteria shall not be considered.

Format and Content - Protesting Proposers shall include, in their written protest to the Cameron County Purchasing Department, all facts and arguments upon which they rely. Proposers shall, at a minimum, provide:

1. Information about the protesting Proposer; name of firm, mailing address, phone number and name of individual responsible for submission of the protest.
2. Information about the acquisition and the acquisition method.
3. Specific and complete statement of the County's action(s) being protested. 4. Specific reference to the grounds for the protest.
5. Description of the relief or corrective action requested.
6. For protests to the Protest Committee, a copy of the Purchasing Department's written decision on the protest.

Review Process:

1. Upon receipt of a Proposer's protest, the Purchasing Department shall postpone further steps in the acquisition process until the Proposer protest has been resolved.
2. The Department's internal protest review procedures consist of the following:
 - a) The Purchasing Department shall perform an objective review of the protest by individuals not involved in the acquisition protested. The review shall be based on the written protest material submitted by the Proposer.
 - b) A written decision will be delivered to the Proposer within five business days after receipt of the protest, unless more time is needed. The protesting Proposer shall be notified if additional time is necessary.

Final Determination:

The final determination shall:

1. Find the protest lacking in merit and uphold the agency's action; or
2. Find only technical or harmless errors in the agency's acquisition process, determine the agency to be in substantial compliance, and reject the protest; or 3. Find merit in the protest and provide the agency options which may include recommendations to a) correct its errors and reevaluate all proposals, and/or b) reissue the Proposer solicitation document; or c) make other findings and determine other courses of action as appropriate.

Protest Committee Review Process:

Protests to the Protest Committee may be made only for Protest Committee approved acquisitions, and only after review by County Purchasing Department. Protests of the decisions of County Purchasing Department shall be made by letter to the Protest Committee, who may establish procedures to resolve the protest. Protests shall be received by the Protest Committee within five business days after the decision of Purchasing Department in order to be considered. The Committee's decision is final, with no further administrative appeal available.

FISCAL FUNDING: A multi-year lease or lease/purchase arrangement (if requested by the Special Requirements/Instructions), or any contract continuing as a result of an extension option, must include "fiscal funding out" clause. If, for any reason, funds are not appropriated to continue the lease or contract, said lease or contract shall become null and void on the last day of the current appropriation of funds. After expiration of the lease, leased equipment shall be removed by the Proposer from the using department without penalty of any kind or form to Cameron County. All charges and physical activity related to delivery, installation, removal and redelivery shall be the responsibility of the Proposer.

GRATUITIES AND PROHIBITION AGAINST PERSONAL INTEREST IN CONTRACTS: Any elected or appointed official who has any substantial interest, either direct or indirect, in any business entity seeking to contract with the County, shall, before any vote or decision on any matter involving the business entity, file an affidavit stating the nature and extent of interest and shall abstain from any participation in the matter. This is not required if the vote or decision will not have any special effect on the entity other than its effect on the public. However, if a majority of the governing body is also required to file, and do file similar affidavits, then the member is not required to abstain from further participation. Attached and included in this RFP is a disclosure of all of this Company's business or pecuniary financial relationships with officers or employees of Cameron County or County entities (if any such relationships exist) which must be filled out, attached and included with the RFP response. The County may, by written notice to the Proposer, cancel this contract without liability to Proposer if it is determined by County

that gratuities, in the form of entertainment, gifts, or otherwise, were offered or given by the Proposer, or any agent, or representative of the Proposer, to any officer or employee of Cameron County with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending or the making or any determinations with respect to the performance of such a contract. In the event this contract is cancelled by County pursuant to this provision, County shall be entitled, in addition to any other rights and remedies, to recover or withhold the amount of the costs incurred by Proposer in providing such gratuities. Proposer guarantees that he has not retained a person to solicit or secure any contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except for retention of bona fide employees or bona fide established commercial selling agencies maintained by the Proposer for the purpose of securing business.

HISTORICALLY UNDERUTILIZED BUSINESS (HUB) CERTIFICATION: If Proposer is a Certified Historically Underutilized Business (HUB), please include a copy of your HUB Certificate with your response. This information will assist Cameron County in the percentage tracking of HUB utilization.

INSURANCE: The Proposer shall secure and maintain, throughout the duration of the Contract, insurance of such types and in such amounts as may be necessary to protect the Proposer and the interests of the County against all hazards or risks of loss as hereinafter specified. The form and limits of such insurance, together with the insurer, shall be acceptable to the County. It shall be the responsibility of the Proposer to maintain adequate insurance coverage at all times. Failure of the Proposer to maintain adequate coverage shall not relieve the Proposer of any contractual responsibility or obligation.

MAINTENANCE: Maintenance required for equipment requested in RFPs should be available in Cameron County by a manufacturer authorized maintenance facility. Costs for this service shall be shown on the Pricing/Delivery Information form. If Cameron County opts to include maintenance, it shall be so stated in the purchase order and said cost will be included. Service will commence only upon expiration of applicable warranties and should be priced accordingly.

MATERIAL SAFETY DATA SHEETS: Under the "Hazardous Communication Act", commonly known as the "Texas Right To Know Act", a Proposer must provide to the County with each delivery, material safety data sheets which are applicable to hazardous substances defined in the Act. Failure of the Proposer to furnish this documentation will be cause to reject any RFP applying thereto.

NAME BRANDS: Specifications may reference name brands and model numbers. It is not the intent of Cameron County to restrict responses to RFPs in such cases, but to establish a desired quality level of merchandise or to meet a pre-established standard common to similar existing items. Proposers may offer items of equal stature and standard, but the burden of proof of such stature and standard rests with Proposers. Cameron County shall act as sole judge in determining equality and acceptability of products offered.

PRICING: Prices for all goods and/or services shall be firm for the duration of the contract and shall be stated on the Pricing/Delivery Information form. Prices shall be all inclusive: No price changes, additions, or subsequent qualifications will be honored during the term of the contract. All prices must be written in ink or typewritten. Pricing on all transportation, freight, drayage and other charges are to be prepaid by the Proposer and included in the price. If there are any additional charges of any kind, other than those mentioned above, specified or unspecified, Proposer MUST indicate the items required and attendant costs or forfeit the right to payment for such items. Where unit pricing and extended pricing differ, unit pricing prevails.

RECYCLED MATERIALS: Cameron County encourages the use of products made of recycled materials and shall give preference in purchasing to products made of recycled materials if the products meet applicable specifications as to quantity and quality. County will be the sole judge in determining product preference application.

SCANNED RE-TYPED RESPONSE: If in its RFP response, Proposer either electronically scans, re-types, or in some way reproduces the County's published RFP package, then in event of any conflict between the terms and provisions of the County's published RFP specifications, or any portion thereof, and the terms and provisions of the RFP response made by Proposer, the County's RFP specifications as published shall control. Furthermore, if an alteration of any kind to the County's published RFP specifications is only discovered after the contract is executed and is or is not being performed, the contract is subject to immediate cancellation.

SILENCE OF SPECIFICATIONS: The apparent silence of specifications as to any detail, or the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practices are to prevail and that only material and workmanship of the finest quality are to be used. All interpretations of specifications shall be made

on the basis of this statement. The items furnished under this contract shall be new, unused of the latest product in production to commercial trade and shall be of the highest quality as to materials used and workmanship. The manufacturer furnishing these items shall be experienced in design and construction of such items and shall be an established supplier of the item needed in the RFP. Substitute items will not be accepted unless approved (in advance).

SUPPLEMENTAL MATERIALS: Proposers are responsible for including all pertinent product data in the returned RFP package. Literature, brochures, data sheets, specification information, completed forms requested as part of the RFP package and any other facts which may affect the evaluation and subsequent contract award should be included. Materials such as legal documents and contractual agreements, which the Proposer wishes to include as a condition of the RFP response must also be in the returned RFP response package. Failure to include all necessary and proper supplemental materials may be cause to reject the Proposer's entire RFP.

TITLE TRANSFER: Title and Risk of Loss of goods shall not pass to Cameron County until Cameron County actually receives and takes possession of the goods at the point or points of delivery. Receiving times may vary with the using department. Generally, deliveries may be made between 8:30 a.m. and 4:00 p.m., Monday through Friday. Proposers are advised to consult the using department for instructions. The place of delivery shall be shown under the "Special Requirements/Instructions" section of this RFP package and/or on the Purchase Order as a "Deliver To:" with the address.

USAGE REPORTS: Cameron County reserves the right to request, and receive at no additional cost up to two (2) times during the contract period, a usage report detailing the products and/or services furnished to date under a contract resulting from this RFP. The reports must be furnished no later than five (5) working days after written request and itemize all purchases to date by

Cameron County department with a description, of each item purchased, including the manufacturer, quantity of each item purchased, the per unit and extended price of each item purchased, and the total amount and price of all items purchased.

WARRANTY PRICE: (a) The price to be paid by the County shall be that contained in Proposer's response to the RFP which Proposer warrants to be no higher than Proposer's current prices on orders by others for products of the kind and specification covered by this agreement for similar quantities under similar or like conditions and methods of purchase. In the event Proposer breaches this warranty, the prices of the items shall be reduced to the Proposer's current prices on orders by others, or in the alternative, County may cancel this contract without liability to Proposer for breach or Proposer's actual expense.

(b) The Proposer warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for commission, percentage, brokerage, or contingent fee excepting bona fide employees of bona fide established commercial or selling agencies maintained by the Proposer for the purpose of securing business. For breach or violation of this warranty, the County shall have the right in addition to any other right or rights to cancel this contract without liability and to deduct from the contract price, or otherwise recover the full amount of such commission, percentage, brokerage or contingent fee.

Proposers shall furnish all data pertinent to warranties or guarantees which may apply to items in the RFP.

Proposers may not limit or exclude any implied warranties.

Proposer warrants that products sold and services provided to the County shall conform to the highest commercial and/or professional standards in the industry and laws established by the U.S. Department of Labor, U.S. Department of Homeland Security, Occupational Safety and Health Administration and O.S.H.A. Act of 1970. In the event any product does not conform to OSHA Standards, where applicable, Cameron County may return the product for correction or replacement at the Proposer's expense. If Proposer fails to make the appropriate correction within a reasonable time, Cameron County may correct at the Proposer's expense.

-WARRANTY ITEMS/PRODUCTS: Proposer warrants that products sold and services provided to the County shall conform to the highest commercial and/or professional standards in the industry and laws established by the U.S. Department of Labor, U.S. Department of Homeland Security, Occupational Safety and Health Administration and O.S.H.A. Act of 1970. In the event product does not conform to OSHA Standards, where applicable, Cameron County may return the product for correction or replacement at the Proposer's expense. If Proposer fails to make the appropriate correction within a reasonable time, Cameron County may correct at the Proposer's expense.

Proposer shall not limit or exclude any implied warranties and any attempt to do so shall render this contract voidable at the option of the County.

Proposer warrants that the goods furnished will conform to the specifications, drawings and descriptions listed in the RFP invitation and to the sample(s) furnished by Proposer, if any. In the event of a conflict between the specifications, drawings and descriptions, the specifications shall govern. All items must be new, in first class condition, unless otherwise specified. The design, strength, and quality of materials must conform to the highest standards of manufacturing practice.

Items supplied under this contract shall be subject to the County's approval. Successful Proposer shall warrant that all items/services shall conform to the proposed specifications and/or all warranties as stated in the Uniform Commercial Code and be free from all defects in material, workmanship and title. Any items found defective or not meeting specifications shall be picked up and promptly replaced by the successful Proposer at no expense to the County.

SAFETY WARRANTY: As noted above, Proposer warrants that the products sold to County shall conform to the standards promulgated by the U.S. Department of Labor under the Occupational Safety and Health Act of 1970. In the event the product does not conform to OSHA standards, County may return the product for correction or replacement at the Proposer's expense. In the event Proposer fails to make the appropriate correction within a reasonable time, correction made by County will be at Proposer's expense. Have you attached the required warranty information to the RFP (if applicable)? "Yes" or "No"

APPLICABLE LAW

To the extent it is applicable, this agreement shall be governed by the Uniform Commercial Code. Wherever the term "Uniform Commercial Code" is used, it shall be construed as meaning "the Uniform Commercial Code" as adopted in the State of Texas as effective and in force on the date of this agreement. Otherwise, Texas state and federal law shall apply.

ASSIGNMENT DELEGATION: No right, obligation or interest in this contract shall be assigned or delegated to another by Proposer without the written permission of the County. Any attempted assignment or delegation by Proposer shall be wholly void and totally ineffective for all purposes unless made in conformity with this paragraph.

CONTRACT OBLIGATION: Cameron County Commissioners Court must award any resulting contract and the County Judge or other person authorized by the Cameron County Commissioners Court must sign the contract before it becomes binding on Cameron County or the Proposer. Department Heads are NOT authorized to sign agreements for Cameron County. Binding agreements shall remain in effect until all products and/or services covered by this RFP - have been delivered and accepted and all contract requirements have been satisfied.

ERRORS AND OMISSIONS: Errors and Omissions in the RFP or any provision herein described will not be construed as to relieve the Proposer of any responsibility or obligation requisite to the complete and satisfactory implementation, operation, and support of all obligations under any resulting contract.

FORCE MAJEURE: If, by reason of Force Majeure, either party hereto shall be rendered unable wholly, or in part, to carry out its obligations under this RFP and any resulting contract, then such party shall give notice and full particulars of Force Majeure in writing to the other party within a reasonable time after occurrence of the event or cause relied upon, and the obligation of the party giving such notice, so far as it is affected by such Force Majeure, shall be suspended during the continuance of the inability then claimed, except as hereinafter provided, but for no longer period, and such party shall endeavor to remove or overcome such inability with all reasonable dispatch. The term "Force Majeure" as employed herein, shall mean acts of God, strikes, lockouts, or other industrial disturbances, act of public enemy, orders of any kind of government of the United States or the State of Texas or any civil or military authority, insurrections, riots, epidemics, landslides, lightening, earthquakes, fires, hurricanes, storms, floods, washouts, droughts, arrests, restraint of government and people, civil disturbances, explosions, breakage or accidents to machinery, pipelines or canals, or other causes not reasonably within the control of the party claiming such inability. It is understood and agreed that the settlement of strikes and lockouts shall be entirely with the discretion of the party having the difficulty, and that the above requirement that any Force Majeure shall be remedied with all reasonable dispatch shall not require the settlement of strikes and lockouts by acceding to the demands of the opposing party or parties when such settlement is unfavorable in the judgment of the party having the difficulty.

HOLD HARMLESS AGREEMENT: The successful Proposer shall indemnify and hold Cameron County harmless from all claims for personal injury, death and/or property damage resulting directly or indirectly from Proposer's performance. Proposer shall procure and maintain, with respect to the subject matter of this RFP, appropriate insurance coverage including, as a minimum, public liability and property damage with adequate limits to cover Proposer's liability as may arise directly or indirectly from work performed and goods or services sold under the terms of this RFP. Certification of such coverage must be provided to the County upon request.

INFRINGEMENTS: There will be no warranty by County against infringements. As part of this contract for sales, Proposer agrees to ascertain whether goods manufactured in accordance with the specifications attached to this agreement will give rise to the rightful claim of any third person by way of infringement or the like. County makes no warranty that the production of goods according to the specification will not give rise to such a claim, and in no event shall County be liable to Proposer for indemnification in the event that Proposer gets sued on the grounds of infringement or the like. If Proposer is of the opinion that an infringement or the like will result, Proposer shall notify County to that effect in writing within two (2) weeks after the signing of this agreement. If County does not receive notice and is subsequently held liable for the infringement or the like, Proposer will hold County harmless. If Proposer in good faith ascertains that production of the goods in accordance with the specifications will result in infringement or the like, this contract shall be null and void, except that County will pay Proposer the reasonable cost of Proposer's search as to infringement. The Proposer agrees to protect the County from claims involving infringement of patents or copyrights.

INTERPRETATION PAROLE EVIDENCE: Unless a separate contract or addendum hereof is prepared and entered into following the award of this RFP to a successful Proposer, this writing is intended by the parties as a final expression of the terms of this RFP and the general terms of any resulting contract. No course of prior dealings between the parties and no usage of the trade shall be relevant to supplement or explain any term. Acceptance or acquiescence in a course of performance rendered under this RFP and any resulting contract shall not be relevant to determine meaning even though the accepting or acquiescing party has knowledge of the performance and opportunity for objection. Whenever a term defined by the Uniform Commercial Code is used in this agreement, the definition contained in the Code is to Control, if applicable.

LATE RESPONSES: RFP responses must be received by the County before the hour and date specified. Responses received after the time and date specified will be disqualified and may be returned to sender. The County is not responsible for lateness or non-delivery of mail, delivered to wrong office, carrier, etc.

MODIFICATIONS: This contract can be modified or rescinded only by a writing signed by both of the parties or their duly authorized agents.

O.S.H.A: Proposer must meet all Federal and State OSHA requirements.

REMEDIES: The successful Proposer and County agree that both parties have all rights, duties, defenses and remedies available under law.

RIGHT TO ASSURANCE: During the RFP process and any resulting contract, whenever a Proposer or County in good faith has reason to question the other's intent to perform, demand may be made that the other party give written assurance of intent. In the event that a demand is made, and no assurance is given within five (5) days, such failure may be treated as an anticipatory repudiation of the RFP and any resulting contract.

SEVERABILITY: If any section, subsection, paragraph, sentence, clause, phrase or word of these requirements or the specifications shall be held invalid, such holding shall not affect the remaining portions of these requirements and the specifications and it is hereby declared that such remaining portions would have been included in these requirements and the specifications as though the invalid portion had been omitted.

VENUE: Both parties agree that venue for any litigation arising from this contract shall lie in Cameron County, Texas.

PROPOSER SHALL CONFIRM ACCEPTANCE OF RFB TERMS: The Proposer shall specifically state acceptance of these terms and conditions as a basis for providing the County with a response to this RFP.

THESE TERMS INCORPORATED: These General Terms and Conditions shall be incorporated in the response to the RFP and any resulting contract to this RFP. The Proposer shall specifically state acceptance of these terms and conditions as a basis for providing the County with a response to this RFP.

OTHER TERMS: The Proposer shall state any exceptions desired to these terms and conditions and may suggest alternate wording that addresses the intent of the term or condition. The County may accept or reject any suggestions in accordance with law.



CAMERON COUNTY

INVITATION

Cameron County is requesting bids/proposals/qualifications for the following, which should BE REFERENCED ON ENVELOPE, "ATTN: COMMISSIONERS COURT - SEALED BID/PROPOSAL:
DEADLINE – **3:00 P.M.**

07/23/25 RFQ #250502 ISLA BLANCA PARK UTILITY IMPROVEMENTS

A = Annual Q = Quarterly B = Bid RFP = Proposal RFQ = Qualifications

Detailed specifications are available from Dalia Loera at 956/544-0871 of the County Purchasing Department or website – Bids & Specs. Tab <https://www.cameroncountytexas.gov/purchasing-bids-rfpq-addms-tabs/>

Your sealed submittals should contain the REFERENCE “ATTN: COMMISSIONERS COURT – SEALED BID/PROPOSAL/REQUEST FOR QUALIFICATIONS ON THE OUTSIDE OF YOUR RETURN ENVELOPE and addressed and sent to the County Purchasing Department - **Cameron County Courthouse, (Dancy Building) 1100 E. Monroe St., Basement Floor, Room # B17, Brownsville, TX. 78520.** Properly referenced and returned Bids/ RFP’s / RFQ’s will be opened at the Cameron County Courthouse, 1100 East Monroe Street, Brownsville, Texas in the Purchasing Department – Basement Floor – Room #B17 at 3:00 p.m. (as per Purchasing Dept. time clock) on deadline date. Bidders are invited to attend. Cameron County is an Equal Employment Opportunity Employer and expressly reserves the right to accept or reject any and all submittals and may waive formalities.

TO APPEAR: June 21, 2025 & June 28, 2025

RFP # 250502 ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

PRICE PROPOSAL FORM (GENERAL CONTRACT)

Project: **ISLA BLANCA UTILITY IMPROVEMENTS PROJECT**
RFP #: 250502

Place: Cameron County Purchasing Department, 1100 E. Monroe Street, Basement Floor, Room B17, **Attention: Mr. Roberto C. Luna, Jr., Purchasing Agent**

Due Date: JULY 23RD, 2025

Time: Before 3:00 p.m.

1. Pursuant to and in compliance with the Request for Proposals and the proposed Contract Documents, prepared by GDJ Engineering relating to the above referenced project, the undersigned, having become thoroughly familiar with the terms and conditions of the proposed Contract Documents and with local conditions affecting the performance and costs of the work at the place where the work is to be completed, and having fully inspected the site in all particulars, hereby proposes and agrees to fully perform the work within the time stated and in strict accordance with the proposed Contract Documents, and addenda, thereto, including furnishing of any and all labor and materials for all roofing, for the following sum of money:

A: Cost Proposal:

All labor, materials, services and equipment, necessary for completion of the work shown on the drawings and described in the specifications.

_____ DOLLARS (\$)).

Same price in words: _____

Responder must submit attached "Price Proposal Sheets" for itemized price break down for components (by unit price) and should have total proposal cost to match the above cost proposal.

B. ALTERNATES: N/A

C. UNIT PRICES:

The Undersigned acknowledge by initials _____ that the Unit Prices listed below are included in the Base Proposal amount.

The Undersigned further agrees that in case of authorized variations of quantities from those shown or specified, the following Unit Prices will be used in adjusting the Contract Sum.

Add or Subtract

N/A

2. If awarded this Contract the undersigned will execute a satisfactory Construction Contract, Performance Bond, Labor and Material Payment Bond and proof of insurance coverage, with the Owner for the entire work as per the Contract Documents within 5 days after notice of award. It is agreed that this proposal is subjected to the Owner's acceptance for a period of Thirty (30) days from the above date.

RFP # 250502 ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

3. **Contract time will be _____ days from issuance of Notice to Proceed.** Time extension will be reviewed on a monthly basis.

4. Enclosed is a Certified Check or Bidders Bond in the amount of \$ _____ compliance with the specification requirements. (5% of the highest amount bid).

The above check or Bidders Bond is to become the property of the Owner in the event the Construction Contract (when offered by the Owner) and the bonds and proof of insurance coverage are not executed within the time set forth above.

5. The undersigned agrees to the following:

- A. To furnish all materials as shown and specified in the plans and specifications.
- B. To start work 5 days after notice of award of contract.
- C. To work _____ working days per week.

6. The full amount of all allowances as specified in the General Requirements, Division 1, of the specifications, in the Base Proposal price shown.

7. Receipt is acknowledged of the following addenda:

No.	Dated	No.	Dated
No.	Dated	No.	Dated

8. Bidder agrees that the Owner has the right to accept or reject any or all bids and to waive all informalities.

Respectfully submitted,

By:

Signature

Title

Business Address

(Seal - if Proposer is a corporation)

CAMERON COUNTY ISLA BLANCA RV AND UTILITY IMPROVEMENTS PROJECT							
Item	Code	ALT	UNIT BID PRICE ONLY, WRITTEN IN WORDS	Unit	Approx. Quantities	UNIT BID PRICE ONLY, WRITTEN IN FIGURES	ITEM COST WRITTEN IN FIGURES
100	7001		PREPARING ROW DOLLARS and CENTS	AC	51.00		
104	7023		REMOV CONC (FOUNDATIONS) DOLLARS and CENTS	SY	2,303.00		
132	7006		EMBANKMENT (FNL)(DC)(TY C) DOLLARS and CENTS	CY	2,362.50		
192	7901		LOOSE AGGR GRND COVER DOLLARS and CENTS	CY	1,012.50		
247	7176	1	FL BS (CMP IN PLC)(TY A GR 1-2)(FNL POS) DOLLARS and CENTS	CY	2,362.50		
250	7002		GEOGRID BASE REINFORCEMENT (TYPE 2) DOLLARS and CENTS	SY	6,300.00		
500	7001		MOBILIZATION DOLLARS and CENTS	LS	1.00		
502	7001		BARRICADES, SIGNS AND TRAFFIC HANDLING DOLLARS and CENTS	MO	12.00		
503	7002		PORTABLE CHANGEABLE MESSAGE SIGN DOLLARS and CENTS	EA	2.00		
506	7021		CONSTRUCTION EXITS (INSTALL)(TY 2) DOLLARS and CENTS	SY	312.00		
506	7024		CONSTRUCTION EXITS (REMOVE) DOLLARS and CENTS	SY	312.00		
506	7039		TEMP SEDMT CONT FENCE (INSTALL) DOLLARS and CENTS	LF	5,127.00		
506	7041		TEMP SEDMT CONT FENCE (REMOVE) DOLLARS and CENTS	LF	5,127.00		
530	7901		DRIVEWAYS (CONC RIBBONS) DOLLARS and CENTS	SY	2,708.00		
530	7902		DRIVEWAYS (CONC PATIO) DOLLARS and CENTS	SY	1,200.00		
CC001			SANITARY SEWER LINE TESTING DOLLARS and CENTS	LF	17,000.00		
CC002			WATERLINE TESTING DOLLARS and CENTS	LF	3,269.00		

CAMERON COUNTY ISLA BLANCA RV AND UTILITY IMPROVEMENTS PROJECT							
Item	Code	ALT	UNIT BID PRICE ONLY, WRITTEN IN WORDS	Unit	Approx. Quantities	UNIT BID PRICE ONLY, WRITTEN IN FIGURES	ITEM COST WRITTEN IN FIGURES
CC003			GROUNDWATER DEWATERING INCLUDING WELLPOINTING _____ DOLLARS and _____ CENTS	LF	20,350.00		
CC004			SURGE, CAP, AND ABANDON EXISTING SANITARY SEWER PIPE _____ DOLLARS and _____ CENTS	LS	1.00		
CC005			FILL, SEAL, AND ABANDON EXISTING BRICK MANHOLES _____ DOLLARS and _____ CENTS	EA	65.00		
CC006			TIE INTO EXISTING MANHOLE _____ DOLLARS and _____ CENTS	EA	3.00		
CC007			8" PVC SANITARY SEWER LINE (SDR-26) ALL DEPTHS _____ DOLLARS and _____ CENTS	LF	13,935.00		
CC008			12" PVC SANITARY SEWER LINE (SDR-26) ALL DEPTHS _____ DOLLARS and _____ CENTS	LF	2,658.00		
CC009			15" PVC SANITARY SEWER LINE (SDR-26) ALL DEPTHS _____ DOLLARS and _____ CENTS	LF	488.00		
CC010			CEMENT STABILIZED ENCASEMENT (AS SHOWN ON PLANS) _____ DOLLARS and _____ CENTS	LF	517.00		
CC011			SANITARY SEWER MANHOLE (ALL DEPTH - 48"DIA) _____ DOLLARS and _____ CENTS	EA	82.00		
CC012			SANITARY SEWER CLEANOUT _____ DOLLARS and _____ CENTS	EA	9.00		
CC013			4" SERVICE RECONNECTIONS ALL LENGTHS SHORT/LONG _____ DOLLARS and _____ CENTS	EA	667.00		
CC014			TRENCH SAFETY _____ DOLLARS and _____ CENTS	LF	17,000.00		
CC015			REMOVE AND REPLACE FLEXIBLE PAVEMENT _____ DOLLARS and _____ CENTS	SY	1,250.00		
CC016			FURNISH AND INSTALL 4" DIAM. C900 DR18 PVC WATERLINE _____ DOLLARS and _____ CENTS	LF	114.00		
CC017			FURNISH AND INSTALL 8" DIAM. C900 DR18 PVC WATERLINE _____ DOLLARS and _____ CENTS	LF	3,155.00		
CC018			FURNISH AND INSTALL 8" 11.25 DEG. BEND (MJ WITH MEGA LUG JOINT RESTRAINT FITTING) _____ DOLLARS and _____ CENTS	EA	3.00		
CC019			FURNISH AND INSTALL 8" 45 DEG. BEND (MJ WITH MEGA LUG JOINT RESTRAINT FITTING) _____ DOLLARS and _____ CENTS	EA	8.00		

CAMERON COUNTY ISLA BLANCA RV AND UTILITY IMPROVEMENTS PROJECT							
Item	Code	ALT	UNIT BID PRICE ONLY, WRITTEN IN WORDS	Unit	Approx. Quantities	UNIT BID PRICE ONLY, WRITTEN IN FIGURES	ITEM COST WRITTEN IN FIGURES
CC020			FURNISH AND INSTALL 10" X 8" TEES (MJ WITH MEGA LUG JOINT RESTRAINT FITTING) _____ DOLLARS and _____ CENTS	EA	4.00		
CC021			FURNISH AND INSTALL 8" SLEEVES _____ DOLLARS and _____ CENTS	EA	2.00		
CC022			FURNISH AND INSTALL 10" SLEEVES _____ DOLLARS and _____ CENTS	EA	2.00		
CC023			INSTALL 8" DUCTILE IRON END PLUG WITH THRUST RESTRAINT _____ DOLLARS and _____ CENTS	EA	2.00		
CC024			8" GATE VALVE W VALVE BOX _____ DOLLARS and _____ CENTS	EA	10.00		
CC025			SINGLE WATER SERVICE: FURNISH AND INSTALL 3/4" COPPER OR HDPE SERVICE TO ALL RV SITES _____ DOLLARS and _____ CENTS	EA	75.00		
CC026			PROVIDE 4" WATER SERVICE CONNECTION INCLUDING TAP INTO NEW 8" MAIN _____ DOLLARS and _____ CENTS	EA	1.00		
CC027			CONNECT NEW 8" WATERLINE TO EXISTING 8" WATERLINE _____ DOLLARS and _____ CENTS	EA	2.00		
CC028			CONNECT NEW 8" WATERLINE TO EXISTING 10" WATERLINE _____ DOLLARS and _____ CENTS	EA	4.00		
CC0029			FURNISH AND INSTALL FIRE HYDRANT ASSEMBLY _____ DOLLARS and _____ CENTS	EA	7.00		
CC030			FURNISH AND INSTALL 8" DIA. COUPLING ADAPTER _____ DOLLARS and _____ CENTS	EA	4.00		
CC031			TRENCH SAFETY _____ DOLLARS and _____ CENTS	LF	4,149.00		
CC032			REMOVE AND REPLACE FLEXIBLE PAVEMENT _____ DOLLARS and _____ CENTS	SY	575.00		
CC033			ELECTRICAL IMPROVEMENTS _____ DOLLARS and _____ CENTS	LS	1.00		
TOTAL COST PROPOSAL						\$	

(Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will prevail.)
The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc.,
to cover the finished work of the several kinds called for.
Bidder understands that the Owner reserves the right to reject any or all bids to waive any minor informalities in the bidding.

TOTAL COST PROPOSAL IN WORDS

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned, as PRINCIPAL, AND _____, as SURETY are held and firmly bound unto _____ hereinafter called the OWNER Dollars, (\$_____) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that Whereas the Principal has submitted the Accompanying Bid, dated_____, 202__, for_____.

NOW, THEREFORE, if the Principal shall not withdraw said Bid within the period specified therein after the opening of the same, or if no period be specified, within thirty (30) days after the said opening, and shall within the period specified therefore, or if no period be specified, within then (10) days after the prescribed forms are presented to him for signature, enter into a written Contract with the Local Public Agency in accordance with the Bid as accepted, and give bond with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such contract; or in the event of the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give such bond within the time specified, if the Principal shall pay the Owner the difference between the amount specified in said Bid and the amount for which the Owner may procure the required work of supplies or both, if the latter be in excess of the former, then the above obligation shall be void and of no effect, otherwise, to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounded parties have executed this instrument under their several seals this___day of_____ 202__, the name and corporate seal of each corporate party being here to affixed and these present signed by its undersigned representative, pursuant to authority of its governing body.

_____ (SEAL)

_____ (SEAL)

_____ (SEAL)

ATTEST:

BY: _____

BY: _____

Affix Corporate Seal

ATTEST:

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

BY: _____

BY: _____

Affix Corporate Seal

Countersigned

BY: _____

Attorney-in-Fact, State of

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the
, Secretary of the Corporation named as Principal in the within bond; that
, who signed the said bond on behalf of the Principal was then
of said corporation; that I know his signature, and his signature there to is genuine; and that said
bond was duly signed, and attested to for and in behalf of said corporation by authority of this
governing body.

Title (Corporate Seal)

Power-of-Attorney for person signing for surety company must be attached to bond.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENT: that
(Name of Contractor or Company)

(Address)

a _____ hereinafter called Principal, and

(Corporation/Partnership)

(Name of Surety Company)

(Address)

hereinafter called Surety, are held and firmly bound unto

(Name of Recipient)

hereinafter called OWNER, in the penal sum of \$ _____ dollars and cents in lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, successors, and assigns, jointly and severally, firmly in these presents.

THE CONDITION OF THE OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER dated the _____ day of _____, 202__, a copy of which is hereto attached and made a part hereof for the construction of:

(Name of Recipient)

(Recipient's Address)

hereinafter called OWNER, in the penal sum of \$ _____ dollars and _____ cents in lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, successors, and assigns, jointly and severally, firmly in these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER dated the _____ day of _____, 20__, a copy of which is hereto attached and made a part hereof for the construction of:

ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

NOW THEREFORE , if the Principal shall promptly make payment to all persons, firms, SUB-CONTRACTORS, and corporation furnishing materials or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUB-CONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

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

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

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

one of which shall be deemed an original, this the _____ day of _____, 202____.

ATTEST:

(Principal)

(Principal Secretary) BY _____ (s)

(SEAL)

(Witness as to Principal)

(Address)

(Surety)

ATTEST:

(Witness as to Surety) BY _____
(Attorney in Fact)

(Address)

(Address)

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

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

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

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENT: that

(Name of Contractor or Company)

(Address)

a _____ hereinafter called Principal, and
(Corporation/Partnership)

(Name of Surety Company)

(Address)

hereinafter called Surety, are held and firmly bound unto

(Name of Recipient)

hereinafter called OWNER, in the penal sum of \$ _____ dollars \$ _____ cents
in lawful money of the United States, for the payment of which sum well and truly to be made
we bind ourselves, successors, and assigns, jointly and severally, firmly in these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a
certain contract with the OWNER dated the _____ day of _____, 202__, a copy of
which is hereto attached and made a part hereof for the construction of:

ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

NOW THEREFORE, the condition of this obligation is such that, if Contractor shall promptly
and faithfully perform said Contract, then this obligation shall be null and void; otherwise, it
shall remain in full force and effect.

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

IN WITNESS WHEREOF, this instrument is executed in _____ parts,
(Number)
one of which shall be deemed an original, this the _____ day of _____, 202__.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

ATTEST:

BY: _____
(Principal)

(Principal Secretary)

(Witness as to Principal)

(Address)

ATTEST:

(Surety)

(Witness as to Surety)

BY: _____
(Attorney in Fact)

(Address)

(Address)

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

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

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

STATEMENT OF RESPONDERS QUALIFICATIONS

All questions must be answered, and the data given must be clear and comprehensive. The statement must be notarized. If necessary, may be answered on separate attached sheets. Responder may submit any additional information they desire.

Name of Bidder: _____ Date Organized: _____

Address: _____ Date Incorporated: _____

Number of years in contracting business under present name _____

Contracts on Hand:

Contract	Amount \$	Completion Date

Type of work performed by your company: _____

Have you ever failed to complete any work awarded to you? _____

Have you ever defaulted on a contract? _____

List the projects most recently completed by your firm (include projects of similar importance):

Project	Amount \$	Mo./Yr. Completed

Major equipment available for this contract:

Attach resume(s) for the principal member(s) of your organization, including the officers as well as the proposed superintendent for the project.

Credit available: \$ _____ Bank Reference: _____

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

The undersigned hereby authorizes and requests any person, firm or corporation to furnish any and all information requested by the _____ for verification of the recitals comprising this Statement of Qualifications response.

Executed this _____ day of _____, 202 ____.

By: (signature) _____ Title: _____

(print name) _____

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

LIST OF SUBCONTRACTORS

To be submitted in a separate envelope with the Proposal

Owner's Project: **ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT**

To: Cameron County

The undersigned submit the following names of subcontractors to be used in performing the Contract. Each subcontractor is required to submit a standard AIA Qualification Statement clearly indicating prior historical restoration project experience and references.

SUBCONTRACTORS

1.	Site Work and Paving	_____
2.	Landscape / Irrigation	_____
3.	Decomposed Granite Trail	___ N/A _____
4.	Concrete	_____
5.	Masonry	_____
6.	Finish Carpentry	___ N/A _____
7.	Metal Roofing	___ N/A _____
8.	Painting	_____
9.	HVAC	___ N/A _____
10.	Plumbing	_____
11.	Electrical	_____
12.	Environmental	_____

All Qualification Statements will be reviewed by the Engineer, who will make appropriate recommendations to the Owner.

SPECIAL INSURANCE CONDITIONS OF THE AGREEMENT

The following minimum limits of insurance coverage will be required:

CONTRACTOR shall maintain, at his sole cost, at all times while performing work hereunder, the insurance coverage set forth below with companies satisfactory to the Company with full policy limits applying but not less than as stated. A Certificate evidencing the required insurance and specifically quitting the indemnification provision set forth in this agreement shall be delivered to the Company prior to commencement of the work and shall provide that any change restricting or reducing coverage or the cancellation of any policies under which certificates are issued shall not be valid as respects the Company's interest therein until the Company has received 30 days notice in writing of such change or cancellation.

- (1) **Workman's Compensation Insurance** as required by laws and regulations applicable to and covering employees of **CONTRACTOR** engaged in the performance of the work under this agreement.
- (2) **Employer's Liability Insurance** protecting **CONTRACTOR** against common law liability, in the absence of statutory liability, for employee bodily injury arising out of the master/servant relationship with a limit of not less than \$100,000.
- (3) **Comprehensive General Liability Insurance** including products/completed operation with limits of liability of not less than: Bodily Injury \$500,000. each Person, \$500,000. each occurrence/aggregate; Property Damage \$500,000. each occurrence/aggregate. OR Combined Coverage limit \$5,000,000.
- (4) **Automobile Liability Insurance** including non-owned and hired vehicle coverage with limits of liability of not less than: Bodily Injury \$250,000. each Person, \$500,000. each occurrence; Property Damage \$250,000. each occurrence.
- (5) **Excess Liability Insurance** Comprehensive General Liability, Comprehensive Automobile Liability and coverage afforded by the policies described above, with minimum limits of \$500,000. excess of the specified limits.
- (6) **Builder's "All-Risk Insurance"** protecting the respective interest of Company and **CONTRACTOR** and its "Field Sub-contractors" covering loss or damage during the course of construction of the project described in this agreement and all property at the job site or in transit thereof which shall become a part of such project. Such insurance shall be maintained until such project is completed and accepted. This insurance shall be terminated with respect to portions of such project when such portions are completed and accepted.

**INSTRUCTIONS TO PROPOSERS
(Special Provisions)**

1. **It shall be the Proposer's responsibility to ensure delivery of his proposal to the proper place and at the proper time.**
2. **Proposals shall be addressed as follows:**
SEALED PROPOSAL FOR: Isla Blanca Park Utility Improvements Project
RFP#250502

Attn: Roberto C. Luna, CPM, CTCD, CTCM
Purchasing Agent
Cameron County Courthouse, Purchasing Dept,
Basement Floor, Room B17
964 E. Harrison, Brownsville, TX

Proposal Date: **July 23rd, 2025**
Time: 3:00 P.M.

3. **Use of Separate Proposal Forms:**

These Contract Documents include a complete set of Proposal and Contract forms which are for the convenience of Proposers and are not to be detached from the Contract Document, filled out, or executed. Separate copies of Proposal Forms are furnished for that purpose.

4. **Interpretations of Addenda:**

No oral interpretation will be made to any Proposer as to the meaning of the Contract Documents or any part thereof. Every request for such an interpretation shall be made in writing to the Purchasing Agent. Any inquiry received seven or more days prior to the date fixed for opening of Proposals will be given consideration. Every interpretation made to a Proposer will be in the form of an Addendum to the Contract Documents, and when issued, will be on file in the office of the Purchasing Agent at least three days before Proposals are opened. In addition, all Addenda will be mailed or telecopied to each person holding contract Documents, but it shall be the Proposer's responsibility to inquire as to the Addenda issued. All such Addenda shall become part of the Contract and all Proposers shall be bound by such Addenda, whether or not received by the Proposers.

5. **Inspection of Site:**

Each Proposer should visit the site of the proposed work and fully acquaint himself with the existing conditions there, relating to construction and labor, and should fully inform himself as to the facilities involved, the difficulties and restrictions attending the performance of the Contract. The Proposer should thoroughly examine and familiarize

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

himself with the Drawings, Technical Specifications, and all other Contract documents. The Contractor by the execution of the Contract shall in no way be relieved of any obligation under it, due to his failure to receive or examine any form or legal instrument or to visit the site and acquaint himself with the conditions there existing, and the Owner will be justified in rejecting any claim based on facts regarding which the Contractor should have been on notice as a result thereof.

6. **Alternative Proposals:**

No alternative Proposals will be considered unless alternative Proposals are specifically requested by the technical specifications or Proposal package. Base Proposals must be provided for each **item**, even though an alternative Proposal item is also specified.

7. **Proposals:**

- A. All Proposals must be submitted on forms supplied by the Owner and shall be subject to all requirements of the Contract Documents including the Drawings, and these INSTRUCTIONS TO PROPOSERS. All Proposals must be regular in every respect and no interlineation, excisions or special conditions shall be made or included in the Proposal Form by the Proposer.
- B. Proposal Documents including the Proposal, the Proposal Guaranty, the Non-Collusion Affidavit and the Statement of Proposer's Qualifications (If required) shall be enclosed in an envelope, which shall be sealed and clearly labeled with the words "Proposal Documents", name of Proposer, date and time of the Proposal opening in order to guard against premature opening of the Proposal.
- C. The Owner may consider as irregular any Proposal on which there is an alteration to or departure from the Proposal Form hereto attached and at its option may reject the same.
- D. If the contract is awarded, it will be awarded by the Owner to a responsible Proposer on the basis of the lowest Proposal and the selected Alternative Proposal items, if any. The Contract will require the completion of the work according to the Contract Documents.
- E. Each Proposer shall include in his Proposal the following information:

Principals

Names

Social Security Number

Home Addresses, including City, State & Zip Code

Firm

Name

Treasury Number

Address

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

City, State & Zip Code

8. Proposal Guaranty:

- A. The Proposal must be accompanied by a Proposal Guaranty which shall not be less than 5 percent (5%) of the amount of the Proposal. At the option of the Proposer, the guaranty may be a certified check, bank draft, negotiable U.S. Government Bonds (at par value), or a Proposal bond in the form attached. The Proposal bond shall be secured by a guaranty, or a surety company Licensed to do business in the State of Texas. The amount of such Proposal bond shall be within the maximum amount specified for such Company. No Proposal will be considered unless it is accompanied by the required guaranty. Certified check or bank draft must be made payable to the order of County of Cameron. Cash deposits will not be accepted. The Proposal guaranty shall insure the execution of the Agreement and the furnishing of the surety bond or bonds by the successful Proposer, all as required by the Contract documents.
- B. Revised Proposals submitted before the opening of Proposals, whether forwarded by mail or telegram, if representing an increase in excess of ten percent (10%) of the original Proposal, the Proposal will not be considered.
- C. Certified checks or bank drafts, or the amount thereof, Proposal Bonds and negotiable U.S. Government bonds of unsuccessful Proposers will be returned as soon as practical after the opening of the Proposals.

9. Collusive Agreement:

- A. Each Proposer submitting a Proposal to the Owner for any portion of the work contemplated by the documents on which Proposal is based shall execute and attach thereto, an affidavit substantially in the form herein provided, to the effect that he has not entered into a collusive agreement with any other person, firm, or corporation in regard to any Proposal submitted.
- B. Before executing any subcontract the successful Proposer shall submit the name of any proposed subcontractor for prior approval and an affidavit substantially in the form to be provided by the Owner. Copies are available upon request.

10. Statement of Proposer's Qualifications:

Each Proposer shall submit on the form furnished for that purpose a statement of the Proposer's qualifications, his experience record in organization and equipment available in the contract, his organization and equipment available for the work contemplated and, when specifically requested by the Owner, a detailed financial statement. The Owner shall have the right to take such steps as it deems necessary to determine the ability of the Proposer to perform his obligations under the Contract and the Proposer shall furnish the owner all such information and data for this purpose as it may request.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

The right is reserved to reject any Proposal where an investigation of the available evidence or information does not satisfy the Owner that the Proposer is qualified to carry out properly the terms of the contract.

11. Sub-Contractors:

All Sub-Contractors must be approved by the Owner. A list of all proposed Sub-Contractors must be furnished to the Owner, prior to the start of construction.

12. Interpretation of Quoted Prices:

In case of difference in written words and figures in a Proposal, the amount stated in written words shall govern.

13. Unit Prices:

The unit price for each of the several items in the proposal of each Proposer shall include its pro rata share of overhead for both labor and materials so that the sum of the products obtained by multiplying the quantity shown for each item by the unit price Proposal represents the total Proposal. Any Proposal not conforming to this requirement may be rejected as informal. The special attention of all Proposers is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed, provided the net monetary value of all such additive and subtractive changes in quantities of such items of work (i.e., difference in cost shall not increase or decrease the original contract award price by more than twenty-five percent (25%), except for work not covered in the Drawings and Technical Specifications.

14. Rejection of Proposals:

Proposals may be rejected if they show any alteration of works or figures, additions not called for, conditional or uncalled for alternate Proposals, incomplete Proposals, any alteration or words or figures, or erasures not initialed by the person or persons signing the proposal, or irregularities of any kind.

15. Time for Receiving Proposals:

Proposals received prior to the advertised hour of opening shall be kept securely sealed. The officer appointed to open the Proposals shall decide when the specified time has arrived and no Proposal received thereafter will be considered; except that when a Proposal arrives by mail after the time fixed for opening, but before the reading of all other Proposals is completed, and it is shown to the satisfaction of the County that the late arrival of the Proposal was solely due to delay in the mails for which the Proposer was not responsible, such Proposal will be received and considered.

16. Opening of Proposals:

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

The County shall, at the time and place fixed for the opening of Proposals, cause each Proposal to be publicly opened and read aloud, irrespective of any irregularities therein. Proposers and other interested individuals may be present.

17. Withdrawal of Proposals:

Proposals may be withdrawn on written or telegraphic request dispatched by the Proposer in time for delivery in the normal course of business to the time fixed for opening; provided, that written confirmation of any telegraphic withdrawal over the signature of the Proposer is placed in the mail and postmarked prior to the time set for Proposal opening. The Proposal guaranty of any Proposer withdrawing his Proposal in accordance with the foregoing conditions will be returned promptly.

18. Award of Contract: Rejection of Proposals

- A. The Contract will be awarded to the responsible Proposer submitting the lowest responsive Proposal complying with the conditions of the Invitation for Proposals. The Proposer to whom the award is made will be notified at the earliest possible date. The Owner, however, reserves the right to reject any and all Proposals and to waive any informality in Proposals received whenever such rejection or waiver is in its interest.
- B. The Owner reserves the right to consider as unqualified to do work of general construction any Proposer who does not habitually perform with his own forces the major portions of the work involved in construction of the improvements embraced in this Contract.
- C. Time is of the essence in this Contract and the Owner may weigh the calendar days or working days Proposal in award of the Contract. The calendar days or working days will be valued equal to the liquidated damages charged per day of delay.

19. Execution of Agreement: Performance and Payment Bond

- A. Subsequent to the award and within ten (10) days after the prescribed forms are presented for signature, the successful Proposer shall execute and deliver the Owner an Agreement in the form included in the Contract Documents in such number of copies as the Owner may require (not to exceed six (6) copies).
- B. Having satisfied all conditions of award as set forth elsewhere in these documents, the successful Proposer shall, within the period specified in paragraph "a" above, furnish a surety bond in a penal sum not less than the amount of the Contract as awarded, as security for the faithful performance of the Contract, and for the payment of all persons, firms or corporations to whom the Contractor may become legally indebted for labor, materials, tools, equipment, or services of any nature including utility and transportation services, employed or used by him, in performing the work. Such bond shall be in the same form as that included in the

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

Contract Documents and shall bear the same date as, or a date sub-sequent to that of the Agreement. The current **Power of Attorney** for the person who signs for any surety company and issued be attached to such bond. This bond shall be signed by a guaranty or surety company authorized to do business in the State of Texas.

- C. The failure of the successful Proposer to execute such Agreement and to supply the required bond or bonds within ten (10) days after the prescribed forms are presented for signature, or within such extended period as the Owner may grant, based upon reasons determined sufficient by the Owner, shall constitute a default, and the Owner may either award the Contract to the next lowest responsible Proposer or readvertise for Proposals, and may charge against the Proposer the difference between the amount of the Proposal and the amount of which a Contract for the work is subsequently executed, irrespective of whether the amount thus due exceeds the amount of the Proposal Bond. If a more favorable Proposal is received by readvertising, the defaulting Proposer shall have no claim against the Local Public Agency for a refund.
- D. Full (100%) performance and payment bonds are required on all contracts in excess of \$25,000.00. The only exception is that if the contract is less than \$50,000.00, the entity may hold all payment, with no interim payments made, until final completion and presentation of lien releases from all subcontractors and suppliers, in lieu of the performance bond. Such bonds must be issued by a corporate surety authorized to do business in the State of Texas.
20. **This project will be awarded for construction in accordance with these specifications and upon approval by the Owner.**
21. **Insurance:**
- See Special Conditions of the Agreement.
22. **Certificate of Insurance:**
- The successful Proposer will furnish a completed Certificate of Insurance with the executed contract. This Certificate of Insurance shall include all applicable policies and their numbers. These policies will cover all sub-contractors and the sub-contractors' Certificate of Insurance will also be submitted covering the same amount stated above for the Contractor.
23. **In case of discrepancies or conflicts between the specifications, Proposal documents or contract documents, the following order of priority shall govern:**
1. Proposal Documents
 2. Instructions to Proposers
 3. Special Instructions to Proposers
 4. Supplemental General Conditions

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

5. Technical Specifications
6. Standard Form of Agreement
7. General Conditions of the Agreement
8. Special Conditions of the Agreement
9. Other Contract Documents

24. The award of the low Proposal does not constitute award of a contract. A contract will be binding on both parties when executed by both parties and a purchase order is issued.

GENERAL CONDITIONS OF THE AGREEMENT

Contract and Contract Documents

The project to be constructed subject to all applicable Federal and State laws and regulations.

The Plans, Specifications, Supplemental Conditions (or Special Conditions), and Addenda shall form part of this contract, and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth:

DEFINITIONS

Whenever used in any of the contract Documents, the following meanings shall be given to the terms here in defined:

- A. The term "Contract" means the Contract executed between the County of Cameron, hereinafter called the **"County"** and, ***** hereinafter called **"Contractor"**, of which these GENERAL CONDITIONS form a part.
- B. The term "Project Area" means the area within which is the specified Contract limits of the Improvements contemplated to be constructed in whole or in part under this contract.
- C. The term "Engineer" means the Cameron County Engineer, Engineer in charge, serving the **County** with architectural or engineering services, his successor, or any other person or persons employed by the **County** for the purpose of directing or having in charge the work embraced in this Contract.
- D. The term **"Architect"** means the architect contracted for the project by **Cameron County**.
- E. The term "Contract Documents" means and shall include the following: Executed Contract, Addenda (if any), Request for Proposals, Instructions to Responders, Signed Copy of Proposal, General Conditions, Special Conditions, Technical Specifications, and Drawings (as listed in the Schedule of Drawings).

ADMINISTRATION OF THE CONTRACT BY ARCHITECT AND ENGINEER

The Engineer and/or Architect will provide administration of the Contract and will be the Owner's representatives (1) during construction and (2) until final payment is due. The Architect/Engineer will advise and consult with the Owner, Engineer and Construction Manager.

The Architect/Engineer may appoint an employee or other person to assist him during the construction. These representatives will be instructed to assist the **Contractor** in interpreting the Contract Documents; however, such assistance shall not relieve the Contractor from any responsibility as set forth by the Contract Documents. The fact that the Architect's representative may have allowed work not in accordance with the Contract Documents shall not prevent the Architect from insisting that the faulty work be

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

corrected with the Contract Documents and the Contractor shall correct same.

SUPERVISION BY CONTRACTOR

- A. Except where the **Contractor** is an individual and gives his personal supervision to the work, the **Contractor** shall provide a competent superintendent, satisfactory to the **County** and the **Project Engineer**, on the work at all times during working hours with full authority to act for him. The **Contractor** shall also provide an adequate staff for the proper coordination and expediting of his work.
- B. The **Contractor** shall lay out his own work and he shall be responsible for all work executed by him under the Contract. He shall verify all figures and elevations before proceeding with the work and will be held responsible for any error resulting from his failure to do so.
- C. The **Contractor** expressly recognizes that the **Architect/Engineer** does not owe him any duty to supervise or direct his work so as to protect the **Contractor** from the consequences of his own acts or omissions.

SUBCONTRACTS

- A. The **Contractor** shall not execute an agreement with any subcontractor or permit any subcontractor to perform any work included in this contract until he has verified the subcontractor as eligible to participate in federally funded contracts.
- B. No proposed subcontractor shall be disapproved by the **County** except for cause.
- C. The **Contractor** shall be fully responsible to the **County** for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them.
- D. The **Contractor** shall cause appropriate provisions to be inserted in all subcontracts relative to the work that require compliance by each subcontractor with the applicable provisions of this Contract.
- E. Nothing contained in the Contract shall create any contractual relation between any subcontractor and the **County**.

FITTING AND COORDINATION OF WORK

The **Contractor** shall be responsible for the proper fitting of all work and for the coordination of the operations of all trades, subcontractors, or material suppliers engaged upon this Contract.

PAYMENTS TO CONTRACTOR

- A. Partial Payments
 - 1. The **Contractor** shall prepare his requisition for partial payment as of the last day of the month and submit it, with the required number of copies, to the Architect

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

and/or Engineer for their approval, on a notarized AIA G702 Application and Certificate for Payment form, and continuation sheet. In any contract where the total contract price at time of execution of the contract is \$400,000.00 or more and the contract provides for retainage of five percent (5%) of periodic contract payments, the Owner shall deposit the retainage in an interest-bearing account, and interest earned on such retainage funds shall be paid to the General Contractor upon completion of the contract. If the total contract price is less than \$400,000.00, then the retainage amount will be 10%. The amount of the payment due the Contractor shall be determined by adding to the total value of work completed to date, the value of materials properly stored on the site and deducting (1) five percent (5%) or ten percent (10%) of the total amount, to be retained until final payment and (2) the amount of all previous payments. The total value of work completed to date shall be based on the estimated quantities of work completed and on the unit prices contained in the agreement. The value of materials properly stored on the site or bonded warehouse shall be based upon the estimated quantities of such materials and the invoice prices. Copies of all invoices shall be available for inspection of the Architect and Engineer.

2. Monthly or partial payments made by the **county** to the **Contractor** are monies advanced for the purpose of assisting the contractor to expedite the work of construction. The **Contractor** shall be responsible for the care and protection of all materials and work upon which payments have been made until final acceptance of such work and materials by the **County**. Such payments shall not constitute a waiver of the right of the **County** to require the fulfillment of all terms of the Contract and the delivery of all improvements embraced in this Contract complete and satisfactory to the **County** in all details. Such payments will be made by the County within thirty days of receipt of the invoice by the County Auditor's Office.

B. Final Payment

1. After final inspection and acceptance by the **County** and Architect of all work under the Contract, the **Contractor** shall prepare his requisition for final payment which shall be based upon the careful inspection of each item of work at the applicable unit prices stipulated in the Agreement. The total amount of the final payment due the **Contractor** under this contract shall be the amount computed as described above less all previous payments.
2. The **County** before paying the final estimate shall require the **Contractor** to furnish releases (AIA G706A Contractor's Affidavit of Release of Liens form) or receipts from all subcontractors having performed any work and all persons having supplied materials, equipment (installed on the Project) and services to the **Contractor**, if the **County** deems it necessary in order to protect its interest. The **County** may, if it deems such action advisable, make payment in part or in full to the **Contractor** without requiring the furnishing of such releases or receipts and any payments made shall in no way impair the obligations of any surety or sureties furnished under this Contract. Other close out documents shall include AIA G706 Contractor's Affidavit of Payment of Debts and Claims, AIA G707

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

Consent of Surety Company to Final Payment.

3. Any amount due the **County** under Liquidated Damages shall be deducted from the final payment due the contractor.

C. Payments Subject to Submission of Certificates

Each payment to the **Contractor** by the **County** shall be made subject to submission by the **Contractor** of all written certifications required of him and his subcontractors.

D. Withholding Payments

The **County** may withhold from any payment due the **Contractor** whatever is deemed necessary to protect the **County**, and if so elects, may also withhold any amounts due from the **Contractor** to any subcontractors or material dealers, for work performed or material furnished by them. The foregoing provisions shall be construed solely for the benefit of the **County** and will not require the **County** to determine or adjust any claims or disputes between the **Contractor** and his subcontractors or material dealers, or to withhold any moneys for their protection unless the **County** elects to do so. The failure or refusal of the County to withhold any moneys from the **Contractor** shall in no way impair the obligations of any surety or sureties under any bond or bonds furnished under this Contract.

CHANGES IN THE WORK

- A. The **County** may make changes in the scope of work required to be performed by the **Contractor** under the Contract without relieving or releasing the **Contractor** from any of his obligations under the Contract or any guarantee given by him pursuant to the Contract provisions, and without affecting the validity of the guaranty bonds, and without relieving or releasing the surety or sureties of said bonds. All such work shall be executed under the terms of the original Contract unless it is expressly provided otherwise.

B. Except for the purpose of affording protection against any emergency endangering health, life, limb or property, the Contractor shall make no change in the materials used or in the specified manner of constructing and/or installing the improvements or supply additional labor, services or materials beyond that actually required for the execution of the Contract, unless in pursuance of a written order from the **County** authorizing the **Contractor** to proceed with the change. No claim for an adjustment of the Contract Price will be valid unless so ordered.

- C. If applicable unit prices are contained in the Agreement, the **County** may order the **Contractor** to proceed with desired unit prices specified in the Contract; provided that in case of a unit price contract the net value of all changes does not increase the original total amount of the agreement by more than twenty-five percent (25%) or decrease the original the total amount by twenty-five percent (25%).

- D. Each change order shall include in its final form:

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

1. A detailed description of the change in the work.
2. The Contractor's proposal (if any) or a confirmed copy thereof.
3. A definite statement as to the resulting change in the contract price and/or time.
4. The statement that all work involved in the change shall be performed in Accordance with contract requirements except as modified by the change order.
5. The procedures as outlined in this Section for a unit price contract also apply in any lump sum contract.
6. The signatures of authorized representatives of Contractor and County.

CLAIMS FOR EXTRA COST

- A. If the **Contractor** claims that any instructions by Drawings or otherwise involve extra cost or extension of time, he shall, within ten days after the receipt of such instructions, and in any event before proceeding to execute the work, submit his protest thereto in writing to the **County**, stating clearly and in detail the basis of his objections. No such claim will be considered unless so made.
- B. Claims for additional compensation for extra work, due to alleged errors in ground elevations, contour lines, or benchmarks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material, or performing more work, than would be reasonably estimated from the Drawings and maps issued.
- C. Any discrepancies, which may be discovered between actual conditions and those represented by the Drawings and maps, shall be reported at once to the Architect and/or the Engineer and work shall not proceed except at the Contractors risk, until written instructions have been received by him from the Engineer.
- D. If, on the basis of the available evidence, the **County** determines that an adjustment of the Contract Price and/or time is justifiable, a change order shall be executed.

EXTRA WORK

The term "EXTRA WORK" as used in the agreement shall be understood to mean and include all work that may be required by the Engineer or **County** to be done by the **Contractor** to accomplish any change, alteration or addition to the work shown upon the plans, or reasonably implied by the specifications, and not covered by the Contractor's proposal. It is agreed that the Contractor shall perform all Extra Work under the direction of the Engineer when presented with a written Work Order signed by the Engineer; Subject, however, to the right of the **Contractor** to require a written confirmation of such Extra Work Order by the **County**. It is also agreed that the compensation to be paid the **Contractor** for performing said Extra Work shall be determined by one or more of the following methods:

Method (a): By agreed unit prices.

Method (b): By agreed lump sum.

Method (c): If neither Method (a) nor Method (b) can be agreed the "actual field cost" of the work plus ten (10) percent.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

In the event said Extra Work be performed and paid for under Method (c), then the provisions of this paragraph shall apply and the “actual field cost” is hereby defined to include the cost of all workmen, such as foremen, time keepers, mechanics and laborers, and materials, supplies, trucks, rental of machinery and equipment for the time actually employed or used on such Extra Work plus actual transportation changes necessarily incurred if the kind of equipment or machinery is not already on the job, together with the power, fuel, lubricants, water and similar operating expenses, also all necessary incidental expenses incurred directly on account of such Extra Work, including Social Security, Old Age Benefits and other payroll taxes, and a ratable proportion of premiums on Construction and Maintenance Bonds, Public Liability and Property Damage and Workmen’s Compensation, and all other insurance as may be required by any law or ordinance, or directed by the Project Engineer and **County**, or by them agreed. The Project Engineer may direct the form in which accounts of the “actual field cost” shall be kept and may also specify in writing, before the work commences, the method of doing the work and the type and kind of machinery and equipment to be used, otherwise these matters shall be determined by the **Contractor**. Where practicable the terms and prices for the use of machinery and equipment shall be incorporated in the Written Extra Work Order.

The ten (10) percent of the “actual field cost” to be paid the **Contractor** shall cover and compensate him for his profit, overhead, general superintendence and field office expense, and all other elements of cost and expense not embraced within the “actual field cost” as above defined, save that where the Contractor’s Camp or Field Office must be maintained primarily on account of such Extra Work, then the cost to maintain and operate same, excluding staff, shall be included in the “actual field cost”.

No claim for extra work of any kind will be allowed unless ordered in writing by the Engineer. In case any orders or instructions, either oral or written, appear to the Contractor to involve extra work for which he should receive compensation, he shall make written request to the Engineer for written order authorizing Extra Work. Should a difference of opinion arise as to what does or does not constitute extra work, or as to the payment therefore, and the Engineer insists upon its performance, the **Contractor** shall proceed with the work after making written order and shall keep an accurate account of the “actual field cost” thereof, as provided under Method (c). The **Contractor** will thereby preserve the right to submit the matter for payment, as herein above described. Change orders shall be executed on form similar to AIA G701 Change Order document.

TERMINATION, DELAYS, AND LIQUIDATED DAMAGES

A. Right of the County to Terminate Contract.

In the event that any of the provisions of this contract are violated by the **Contractor**, or by any of his subcontractors, the **County** may serve written notice upon the **Contractor** and the Surety of its intention to terminate the contract. The notices shall contain the reasons for such intention to terminate the contract, and unless such violation or delay shall cease and satisfactory arrangement of correction be made within ten days, the contract shall, upon the expiration of said ten (10) days, cease and terminate. In the event of any such termination, the **County** shall immediately serve notice thereof upon the Surety and the **Contractor**. Surety shall have the right to take over and perform the

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

contract. Provided, however, that if the Surety does not commence performance thereof within ten (10) days from the date of the mailing to such Surety of notice of termination, the **County** may take over the work and complete the project by bid/contract or by force account at the expense of the **Contractor** and his Surety shall be liable to the **County** for any excess cost incurred. In such event the **County** may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefore.

B. Liquidated Damages for Delays.

If the work is not complete within the time stipulated in the applicable bid for Lump Sum or Unit Price Contract provided, the **Contractor** shall pay to the **County** as fixed, agreed, and liquidated damages (it being possible to determine the actual damage occasioned by the delay) the amount of Five Hundred Dollars (\$500.00) for each calendar day of delay, until the work is completed. The **Contractor** and his sureties shall be liable to the **County** for the amount thereof.

C. Hindrance and Delays.

No damages for delays shall be paid to the **Contractor** by the **County**, except for any unreasonable delays caused by the **County**.

D. Excusable Delays.

The right of the **Contractor** to proceed shall not be terminated nor shall the **Contractor** be charged with liquidated damages for any delays in the completion of the work due to:

- (1) Any acts of the Government, including controls or restrictions upon or requisitioning of materials, equipment, tools, or labor by reason of war, national defense, or any other national emergency.
- (2) Any acts of the **County**.
- (3) Causes not reasonably foreseeable by the parties to this Contract at the time of the execution of the Contract which are beyond the control and without the fault or negligence of the **Contractor**, including, but not restricted to, acts of God or of the public enemy, acts of another **Contractor** in the performance of some other contract with the **County**, fires, floods, epidemics, quarantine, restrictions, strikes, freight embargoes, and weather of unusual severity such as hurricanes, tornadoes, cyclones and other extreme weather conditions.

Provided, however, that the **Contractor** promptly notifies the **County** within ten (10) days in writing of the cause of the delay. Upon receipt of such notification, the **County** shall ascertain the facts and the cause and extent of delay. If, upon the basis of the facts and the terms of this contract, the delay is properly excusable, the **County** shall extend the time for completing the work for a period of time commensurate with the period of excusable delay.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

The **Contractor** shall include a time to complete the scope of work stated in calendar days that includes anticipated number of working days that construction may be unable to take place, due to inclement weather and muddy ground. Extensions to the completion date will be granted only if, in the opinion of the Architect/Engineer, climatological conditions that impede the progress of construction significantly exceed conditions for the local area. A guide for average climatological conditions will be the "Local Climatological Data" bulletin published by the Department of Commerce.

ASSIGNMENT OR NOVATION

The **Contractor** shall not assign or transfer, whether by an assignment or novation, any of its rights, duties, benefits, obligations, liabilities, or responsibilities under this **Contract** without the written consent of the **County**; provided, however, that assignments to banks or other financial institutions may be made without the consent of the **County**. No assignment or novation of this Contract shall be valid unless the assignment or novation expressly provides that the assignment of any of the **Contractors** rights or benefits under the Contract is subject to a prior lien for labor performed, services rendered, and materials, tools, and equipment supplied for the performance of the work under this Contract in favor of all persons, firms, or corporations rendering such labor or services or supplying such materials, tools, or equipment.

DISPUTES

- A. All disputes arising under this Contract or its interpretation except those disputes covered by FEDERAL LABOR STANDARDS PROVISIONS whether involving law or fact or both, or extra work, and all claims for alleged breach of contract shall, within ten (10) days of commencement of the dispute, be presented by the **Contractor** to the Architect and/or Engineer for review and decision. Any claim not presented within the time limit specified in this paragraph shall be deemed to have been waived, except that if the claim is of a continuing character and notice of the claim is not given within ten (10) days of its commencement, the claim will be considered only for a period commencing ten (10) days prior to the receipt of the Architect and/or Engineer.
- B. The **Contractor** shall submit in detail his claim and his proof thereof.
- C. If the **Contractor** does not agree with any decision of the Architect and/or Engineer, he shall in no case allow the dispute to delay the work but shall notify the Architect and/or Engineer promptly that he is proceeding with the work under protest.

TECHNICAL SPECIFICATIONS AND DRAWINGS

Anything mentioned in the Technical Specifications and not shown on the Drawings or vice versa shall be of like effect as if shown on or mentioned in both. In case of difference between Drawings and Technical Specifications, the Technical Specifications shall govern. In case of any discrepancy in Drawings, or Technical Specifications, the matter shall be immediately submitted to the Architect and/or Engineer, without whose decision, said discrepancy shall not be adjusted by the **Contractor**, save only at his own risk and expense.

SHOP DRAWINGS

- A. All required shop drawings, machinery details, layout drawings, etc. shall be submitted to the Architect and/or the Engineer in copies for approval sufficiently in advance of requirements to afford ample time for checking, including time for correcting, resubmitting and rechecking if necessary. The **Contractor** may proceed, only at his own risk, with manufacture or installation of any equipment or work covered by said shop drawings, etc. until they are approved and no claim, by the **Contractor**, for extension of the contract time shall be granted by reason of his failure in this respect.
- B. Shop drawings and samples shall be dated and marked to show the names of the Project, Engineer, **Contractor**, Originating Subcontractor, Manufacturer or Supplier. Shop drawings shall completely identify specification section and locations at which materials or equipment is to be installed. All shop drawings are to be reviewed first by the **General Contractor** who shall affix his signature. Any drawings submitted without the Contractor's stamp of approval will not be considered and will be returned to him for proper resubmission. If any drawings show variations from the requirements of the Contract because of standard shop practice or other reason, the **Contractor** shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment of contract price and/or time, otherwise the **Contractor** will not be relieved of the responsibility for executing the work in accordance with the Contract even though the drawings have been approved.
- C. The **Contractor** shall submit and, if necessary, resubmit one (1) reproducible and four (4) copies of the shop drawings.
- D. If a shop drawing is in accordance with the contract or involves only a minor adjustment in the interest of the **County**, not involving a change in contract price or time; the Project Engineer may approve the drawing. The approval shall not relieve the **Contractor** from his responsibility for adherence to the contract or for any error in the drawing.

REQUESTS FOR SUPPLEMENTARY INFORMATION

It shall be the responsibility of the **Contractor** to make timely requests of the **County** for any additional information not already in his possession which should be furnished by the **County** under the terms of this Contract, and which he will require in the planning and execution of the work. Such requests may be submitted from time to time as the need approaches, but each shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay. Each request shall be in writing and list the various items and the latest date by which each will be required by the **Contractor**. The first list shall be submitted within two weeks after Contract award and shall be as complete as possible at that time. The **Contractor** shall, if requested, furnish promptly any assistance and information the Engineer may require in responding to these requests of the **Contractor**. The **Contractor** shall be fully responsible for any delay in his work or to others arising from his failure to comply fully with the provision of this section.

MATERIALS AND WORKMANSHIP

- A. Unless otherwise specifically provided for in the technical specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose. Where equipment, materials, articles or workmanship are referred to in the technical specifications as "equal to" any particular standard, the Engineer shall decide the question of equality.
- B. The **Contractor** shall certify in writing that no materials used in the work contain asbestos materials in them excess of amounts allowed by Local/State standards, laws, codes rules and regulations; the Federal Environmental Protection Agency (EPA) standards and/or the Federal Occupational Safety and Health Administration (OSHA) standards, whichever is most restrictive. The **Contractor** shall provide this written certification to the Engineer.
- C. The **Contractor** shall furnish to the **County** for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full information as to type, performance characteristics, and all other pertinent information as required, and shall likewise submit for approval full information concerning all other materials or articles which he proposes to incorporate.
- D. Products are generally specified by ASTM or other reference standard, and/or by manufacture's name and model number or trade name. When specified only by reference standard, the **Contractor** may select any product meeting this standard by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the **Contractor** has the option of using any product and manufacturer combination listed. When only one product manufacturer is specified, this is the basis of the Contract, without substitution or exception.
- E. Substitutions will not be considered if they are indicated or implied on shop drawing submissions without formal request, or for their implementation they require a substantial revision of the Contract Documents in order to accommodate their use.
- F. No request for the substitution of products in place of those specified shall be considered after the Contract has been executed.
- G. Not later than seven (7) days from the Contract Date, the **Contractor** shall provide a list showing the name of the manufacturers proposed to be used for each of the products identified in the General Requirements of the Specifications, and where applicable, the name of the installing subcontractor.
- H. Machinery, mechanical and other equipment, materials or articles installed or used without such prior approval shall be at the risk of subsequent rejection.
- I. Materials specified by reference to the number or symbol of a specific standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the Request for Proposals except as limited to

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

type, class or grade, or modified in the technical specifications shall have full force and effect as though printed therein.

- J. The **County** may require the **Contractor** to dismiss from the work such employee or employees as the **County** or the Project Engineer may deem incompetent, or careless, or insubordinate.

SAMPLES, CERTIFICATES AND TESTS

- A. The **Contractor** shall submit all material or equipment samples, certificates, affidavits, etc., as called for in the contract documents or required by the Project Engineer, promptly after award of the contract and acceptance of the Contractor's bond. No such material or equipment shall be manufactured or delivered to the site, except at the Contractor's own risk, until the required samples or certificates have been approved in writing by the Project Engineer. Any delay in the work caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of the contract time.
- B. Each sample submitted by the **Contractor** shall carry a label giving the name of the **Contractor**, the project for which it is intended, and the name of the producer. The accompanying certificate or letter from the **Contractor** shall state that the sample complies with contract requirements, shall give the name and brand of the product, its place of origin, the name and address of the producer and all specifications or other detailed information which will assist the Project Engineer in making a prompt decision regarding the acceptability of the sample. It shall also include the statement that all materials or equipment furnished for use in the project will comply with the samples and/or certified statements.
- C. Approval of any materials shall be general only and shall not constitute a waiver of the **County's** right to demand full compliance with Contract requirements. After actual deliveries, the Project Engineer will have such check tests made as he deems necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and articles have been given general approval. If materials, equipment or accessories which fail to meet check tests have been incorporated in the work, the Project Engineer will have the right to cause their removal and replacement by proper materials or to demand and secure such reparation by the **Contractor** as is equitable.
- D. Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:
1. The **Contractor** shall furnish without extra cost, including packing and delivery charges, all samples required for testing purposes, except those samples taken on the project by the Project Engineer.
 2. The **Contractor** shall assume all costs of re-testing materials, which fail to meet contract requirements.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

3. The **Contractor** shall assume all costs of testing materials offered in substitution for those found deficient.
4. The **County** will pay all other expenses.

PERMITS AND CODES

- A. The **Contractor** shall give all notices required by and comply with all applicable laws, ordinances, and codes of the Local Government. All construction work and/or utility installations shall comply with all applicable ordinances, and codes including all written waivers. Before installing any work, the **Contractor** shall examine the drawings and technical specifications for compliance with applicable ordinances and codes and shall immediately report any discrepancy to the **County**. Where the requirements of the drawings and technical specifications fail to comply with such applicable ordinances or codes, the Architect and/or Engineer will adjust the Contract by Change Order at his expense to conform to such ordinances or codes (unless waivers in writing covering the difference have been granted by the governing body or department).

Should the **Contractor** fail to observe the foregoing provisions and proceed with the construction and/or install any utility at variance with any applicable ordinance or code, including any written waivers (notwithstanding the fact that such installation is in compliance with the drawings and technical specifications), the **Contractor** shall remove such work without cost to the **County**,

- B. The **Contractor** shall at his own expense, secure and pay for all permits for street pavement, sidewalks, shed, removal of abandoned water taps, sealing of house connection drains, pavement cuts, buildings, electrical, plumbing, water, gas and sewer permits required by the local regulatory body or any of its agencies.
- C. The **Contractor** shall comply with applicable local laws and ordinances governing the disposal of surplus excavation, materials, debris and rubbish on or off the Project Area and commit no trespass on any public or private property in any operation due to or connected with the Improvements contained in this Contract.

CARE OF WORK

- A. The **Contractor** shall be responsible for all damages to person or property that occur as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance.
- B. The **Contractor** shall provide sufficient competent watchmen, both day and night, including Saturdays, Sundays, and holidays, from the time the work is commenced until final completion and acceptance.
- C. In an emergency affecting the safety of life, limb or property, including adjoining property, the **Contractor**, without special instructions or authorization from the **County** is authorized to act at his discretion to prevent such threatened loss or injury, and he shall so act. He shall likewise act if instructed to do so by the **County**.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

- D. The **Contractor** shall avoid damage as a result of his operations to existing sidewalks, streets, curbs, pavements, utilities (except those which are to be replaced or removed), adjoining property, etc., and he shall at his own expense completely repair any damage thereto caused by his operations.
- E. The **Contractor** shall shore up, brace, underpin, secure, and protect as maybe necessary, all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be in any way affected by the excavations or other operations connected with the construction of the improvements included in this Contract. The **Contractor** shall be responsible for the giving of any and all required notices to any adjoining or adjacent property owner or other party before the commencement of any work. The **Contractor** shall indemnify and save harmless the County from any damages on account of settlements or the loss of lateral support of adjoining property and from all loss or expense and all damages for which the **County** may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.

ACCIDENT PREVENTION

- A. No laborer or mechanic employed in the performance of this Contract shall be required to work in surroundings or under working conditions, which are unsanitary, hazardous, or dangerous to his health or safety as determined under construction safety and health standards promulgated by the Secretary of Labor.
- B. The **Contractor** shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work.
- C. The **Contractor** shall maintain an accurate record of all cases of death, occupational disease, or injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the Contract. The **Contractor** shall promptly furnish the **County** with reports concerning these matters
- D. The **Contractor** shall indemnify and save harmless the **County** from any claims for damages resulting from property damage, personal injury and/or death suffered or alleged to have been suffered by any person as a result of any work conducted under this contract.
- E. The **Contractor** shall provide trench protection for all trenches in excess of a depth of five (5) feet, in the manner specified in the technical specifications and drawings.

SANITARY FACILITIES

The contractor shall furnish, install and maintain ample sanitary facilities for the workmen. As the needs arise, a sufficient number of enclosed temporary toilets shall be conveniently placed as required. Drinking water shall be provided from an approved source, so piped or transported as to keep it safe and fresh and served from single service containers or satisfactory types of sanitary drinking stands or fountains. All such facilities and services shall be furnished in strict

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

accordance with existing and governing health regulations.

USE OF PREMISES

- A. The **Contractor** shall confine his equipment, storage of materials, and construction operations to the contract limits as shown on the drawings and as prescribed by ordinances or permits, or as may be desired by the **County**, and shall not unreasonably encumber the site or public rights of way with his materials and construction equipment.
- B. The Contractor shall comply with all reasonable instructions of the County and all existing state and local regulations regarding signs, advertising, traffic, fires, explosives, danger signals, and barricades
- C. **Smoking and chewing of tobacco products is prohibited in the enclosed new construction.**

REMOVAL OF DEBRIS, CLEANING, ETC.

The **Contractor** shall, periodically or as directed during the progress of the work, remove and legally dispose of all surplus excavated material and debris, and keep the Project Area and public rights of way reasonably clear. Upon completion of the work, he shall remove all temporary construction facilities, debris and unused materials provided for work, and put the whole site of the work and public rights of way in a neat and clean condition.

INSPECTION

- A. All materials and workmanship shall be subject to inspection, examination, or test by the **County**, the Architect, and/or the Engineer at any and all times during manufacture or construction and at any and all places where such manufacture or construction occurs. The **County** shall have the right to reject defective material and workmanship or require its correction. Unacceptable workmanship shall be satisfactorily corrected. Rejected material shall be promptly segregated and removed from the Project Area and replaced with material of specified quality without charge. If the **Contractor** fails to proceed at once with the correction of rejected workmanship or defective material, the **County** may by contract or otherwise have the defects remedied or rejected materials removed from the Project Area and charge the cost of the same against any Monies which may be due the **Contractor**, without prejudice to any other rights or remedies of the **County**.
- B. The **Contractor** shall furnish promptly all materials reasonably necessary for any tests which may be required. All tests by the **County** will be performed in such manner as not to delay the work unnecessarily and will be made in accordance with the provisions of the technical specifications.
- C. The **Contractor** shall notify the **County** sufficiently in advance of back filling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent of the **County**, the **Contractor** shall uncover for inspection and recover such facilities at his own expense, when so requested by the **County**.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

- D. Should it be considered necessary or advisable by the **County** at any time before final acceptance of the entire work to make an examination of work already completed by uncovering the same, the **Contractor** shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any important or essential respect, due to fault of the **Contractor** or his subcontractors, the **Contractor** shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, shall be allowed the **Contractor** and he shall, in addition, if completion of the work of the entire Contract has been delayed thereby, be granted a suitable extension of time on account of the additional work involved
- E. Inspection of materials and appurtenances to be incorporated in the improvements included in this Contract may be made at the place of production, manufacture or shipment, whenever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the technical specifications, shall be final, except as regards (1) latent defects, (2) departures from specific requirements of the Contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a whole or in part will be made at the Project Site.
- F. Neither inspection, testing, approval nor acceptance of the work in whole or in part, by the **County** or its agents shall relieve the **Contractor** or his sureties of full responsibility for materials furnished, or work performed not in strict accordance with the Contract.

REVIEW BY COUNTY

The **County** and its authorized representatives and agents shall have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this Contract, provided, however that all instructions and approval with respect to the work will be given to the **Contractor** only by the **County** through its authorized representatives or agents.

FINAL INSPECTION

When the Improvements included in this Contract are substantially completed, the Architect/Engineer shall notify the **County** in writing that the work will be ready for final inspection on a definite date, which shall be stated in the notice. The **County** will make the arrangements necessary to have final inspection commenced on the date stated in the notice, or as soon thereafter as is practicable. The AIA Certificate of Substantial Completion G704 form shall be used to determine date of substantial completion.

DEDUCTION FOR UNCORRECTED WORK

If the **County** deems it not expedient to require the **Contractor** to correct work not done in accordance with the Contract Documents, an equitable deduction from the Contract Price will be made by agreement between the **Contractor** and the **County** and subject to settlement, in case of dispute, as herein provided.

INSURANCE

The **Contractor** shall not commence work under this contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the **County**.

- A. Compensation Insurance: The **Contractor** shall procure and shall maintain during the life of this contract Workers Compensation Insurance as required by the State of Texas for all of his employees to be engaged in work at the site of the project under this contract and, in case of any such work sublet, the **Contractor** shall require the subcontractor similarly to provide Worker's Compensation Insurance for all of the employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractors Workers Compensation Insurance.
- B. Contractors Public Liability and Property Damage Insurance and Vehicle Insurance: The **Contractor** shall procure and shall maintain during the life of this contract Contractor's Public Liability Insurance, Contractor's Property Damage Insurance and Vehicle Liability Insurance in the following amounts: See Special Conditions of the Agreement.
- C. Proof of Insurance: The **Contractor** shall furnish the **County** with certificates showing the type, amount, class of operations covered, effective dates and date of expiration of policies. Such certificates shall also contain substantially the following statement: "The insurance covered by this certificate will not be canceled or materially altered, except after ten (10) days written notice has been received by the **County**."

INDEMNITY

Contractor shall indemnify, defend and hold harmless the Architect/Engineer and **Cameron County**, its officials, officers, agents, and employees, from any and all liabilities, claims, demands, actions, losses, damages and costs, including all costs of defense thereof, of any nature whatsoever, for injury to or death of persons or loss or damage to property, or for any other reason (except for those resulting from the negligence of the County's or Architects' officials, officers, agents, and employees) occurring on the premises or in any manner arising out of or connected with Contractor's contractual obligations, including any claims, liabilities and actions based upon the acts or omissions of Contractor's officers, agents and employees.

WARRANTY OF TITLE

No material, supplies, or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease-purchase or other agreement by which an interest is retained by the seller or supplier. The **Contractor** shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed by him to the **County** free from any claims, liens, or charges. Neither the Contractor -nor any person, firm, or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any law permitting such persons to look

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

to funds due the **Contractor** in the hands of the **County**. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

WARRANTY OF WORKMANSHIP AND MATERIALS

Neither the final certificate of payment nor any provision in the Contract nor partial or entire use of the improvements included in this Contract by the **County** or the public shall constitute an acceptance of work not done in accordance with the Contract or relieve the **Contractor** of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The **Contractor** shall promptly remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of twelve (12) months from the date of final acceptance of the work.

COMPLIANCE WITH AIR AND WATER ACTS

In compliance with the Clean Air Act, as amended, 41 U.S.C. Sec 7401 ET. Seq., and the regulations of the Environmental Protection Agency with respect thereto, the **Contractor** agrees that:

1. Any facility to be utilized in the performance of this contract or any subcontract shall not be a facility listed on the EPA List of Violating Facilities pursuant to 40 CFR 15.20.
2. He will comply with all requirements of Section 114 of the Clean Air Act, as amended.

EQUAL EMPLOYMENT OPPORTUNITY

- A. The **Contractor** will not discriminate against any employee or the applicant for employment because of race, color, religion, sex, or national origin.
- B. The **Contractor** will cause the foregoing provision to be inserted in all subcontracts for any work covered by this contract so that such provisions will be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.
- C. Nothing herein provided shall be construed as a limitation upon the application of other laws, which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents.

AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS

The **Contractor** will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant for employment is qualified.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

NON-SEGREGATED FACILITIES

The **Contractor** certifies that he does not and will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not and will not permit his employees any segregated facilities at any of his establishments or permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. As used in this paragraph the term "segregated facilities" means any waiting rooms, work areas, rest rooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation. And housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise.

JOB OFFICES

- A. The **Contractor** will maintain such office and storage facilities on the site as are necessary for the proper conduct of the work. Subcontractors may do the same. These shall be located so as to cause no interference to any work to be performed on the site. The **County** shall be consulted with regard to locations.
- B. Upon completion of the improvements, or as directed by the **County**, the **Contractors** shall remove all such temporary structures and facilities from the site and leave the site of the work in the condition required by the Contract.

CONTRACT DOCUMENTS AND DRAWINGS

The **Contractor** will be furnished a maximum number of TWENTY (20) free of charge, copies of Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage, and handling.

CONTRACT PERIOD

The work to be performed under this contract shall commence within the time stipulated by the **County** in the Notice to Proceed and shall be fully completed within _____ calendar days thereafter.

ABANDONMENT BY CONTRACTOR

In case the **Contractor** should abandon or fail to resume work within ten (10) days after written notification from the **County** or the Project Engineer, or the **Contractor** fails to comply with the orders of the Project Engineer when such orders are consistent with this contract or this Agreement or with the specifications hereto attached, then and in that case, the Surety on the bonds shall be notified in writing and directed to complete the work, and a copy of said notice shall be delivered to the **Contractor**.

After receiving said notice of abandonment, the **Contractor** shall not remove from the work any machinery, equipment, tools, materials or supplies then on the job, but the same, together with any materials and equipment under contract for work, may be held for use on the work by the

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

County or the Surety on the construction bond, or another **Contractor**, in completion of the work; and the **Contractor** shall not receive any rental or credit therefore (except when used in connection with extra work, where credit shall be allowed as provided for under "Extra Work"), it being understood that the use of such equipment and materials will ultimately reduce the cost to complete the work and be reflected in the final settlement.

In case the Surety should fail to commence compliance with the notice for completion herein before provided for within ten (10) days after services of such notice, then the **County** may provide for completion of the work in either of the following elective manners:

- A. The **County** may thereupon employ such force of men and use such machinery, equipment, tools, materials and supplies as said **County** may deem necessary to complete the work and charge the expense of such labor, material, machinery, equipment, tools and supplies to said **Contractor** and the expense so charged shall be deducted and paid by the **County** out of such money as may be due, or that may thereafter at any time become due to the **Contractor** under and by virtue of this Agreement. In case such expense is more than the sum which would have been payable under this contract if the same had been completed by the Contractor, then the Contractor and/or his surety shall pay the amount of such excess to the County.
- B. The **County**, under sealed bids, after five (5) days notice published one or more times in a newspaper having a general circulation in the **County** of the location of the work, may let a contract for the completion of the work under substantially the same terms and conditions which are provided in this contract. In case of any increase in cost to the **County** under the new contract as compared to what would have been the cost under this contract, such increase shall be charged to the **Contractor** and the Surety shall be and remain bound thereto. When the work shall have been substantially completed the **Contractor** and his Surety shall be notified and Certificates of Completion and Acceptance shall be issued as provided herein-above, a complete itemized statement of the contract accounts, certified to by the Engineer as being correct, shall then be prepared and delivered to the **Contractor** and his Surety, whereupon the **Contractor** and/or his Surety shall pay the balance due as reflected by said statement within twenty-one (21) days after the date of such Certificate of Completion.

In the event the statement of the account shows that the cost to complete the work is less than that which would have been the cost to the **County** had the work been completed by the **Contractor** under the terms of this contract and when the **Contractor** and/or his Surety shall pay the balance shown to be due by them to the **County**, then all machinery, equipment tools, materials or supplies left on the site of the work shall be turned over to the **Contractor** and/or his Surety. Should the cost to complete the work exceed the contract price and the **Contractor** and/or his Surety fail to pay the amount due the **County** within the time designated hereinabove, and there remains any machinery, equipment, tools, material or supplies on the site of the work, notice thereof, together with an itemized list of such equipment and materials, shall be mailed to the **Contractor** and his Surety at the respective addresses designated in this contract provided, however, that actual written notice given in any manner will satisfy this condition. After mailing or otherwise giving such notice, such property shall be held at the risk of the **Contractor** and his Surety subject only to the duty of the **County** to exercise ordinary care to protect

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

such property. After fifteen (15) days from the date of said notice the **County** may sell such machinery, equipment, tools, materials or supplies and apply the net sum derived from such sale to the credit of the **Contractor**, as the **County** may elect.

The **County** shall release any machinery, equipment, tools, materials or supplies, which remain on the work and belong to persons other than the **Contractor** or his Surety, to their proper Localities without notice to the **Contractor**.

ABANDONMENT BY THE COUNTY

In case the **County** shall fail to comply with the terms of this contract and should fail or refuse to comply with said terms within ten (15) days after written notifications by the **Contractor**, the **Contractor** may suspend or wholly abandon the work, and may remove therefrom all machinery, tools and equipment. And thereupon the Project Engineer shall make an estimate of the total earned by the **Contractor**, which estimate shall include the value of all work actually completed by said **Contractor** at the prices stated in the attached proposal, the value of all partially completed work at a fair and equitable price, and the amount of all extra work performed at the prices agreed upon, or provided for by the terms of this contract, and a reasonable sum to cover the cost of any provisions made by the **Contractor**, to carry the whole work to completion and which cannot be utilized. The Project Engineer shall then make a final statement of the balance due the **Contractor** by deducting from the above estimate all previous payments by the **County**, all other sums that may have been retained by the **County**, under the terms of this Agreement, and shall certify same to the **County** who shall pay to the **Contractor** on or before thirty (30) days after the date of the notification by the **Contractor**, the balance shown by said final statement as due the Contractor under the terms of this Agreement.

BONDS

It is further agreed by the parties of this contract that the **Contractor** shall execute a performance bond and a payment bond, each in the sum of one hundred (100%) percent, in the forms provided for this purpose, and it agreed that this contract shall not be in effect until such bonds are furnished and approved by the **County**.

RIGHTS AND REMEDIES

Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

No action or failure to act by the **County** or Architect or **Contractor** shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such act or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

STANDARD FORM OF AGREEMENT

STATE OF TEXAS §

COUNTY OF CAMERON §

THIS AGREEMENT, MADE AND ENTERED INTO THIS THE ____ DAY OF _____, 2024, A.D., by and between the County of Cameron thereunto duly authorized so to do, Party of the First Part, hereinafter called County, and, of _____, Party of the Second Part hereinafter termed Contractor.

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the Party of the First Part (County), and under the conditions expressed in the bond bearing every date herewith, the said Party of the Second Part (Contractor), hereby agrees with said Party of the First Part (County), to commence and complete the construction of certain improvements described as follows: **Isla Blanca Park Utility Improvements Project RFP No. 250502**, and any extra work in connection therewith, under the terms as stated in the General Conditions of the Agreement, Special Conditions of the Agreement, Technical Specifications and Plans and at his (or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories, with the conditions and prices stated in the Proposal attached hereto, in accordance with all General Conditions of the Agreement, Special Conditions of the Agreement, Technical Specifications and Plans and in accordance with the Plans, which include all maps, plats, blueprints and other drawings and printed or written explanatory matter thereof, and the specifications therefore, together with the Contractor's written approval, and the General Conditions of the Agreement, Special Conditions of the Agreement, Technical Specifications and Plans and the Construction Bonds hereto attached, all of which are made a part hereof and collectively evidence and constitute the entire contract.

The Contractor hereby agrees to commence work within ____ days after the date written notice to do so shall have been given to him, and to substantially complete same within _____ calendar days, after the date of the written notice to commence work.

The County agrees to pay the Contractor in current funds the sum of \$_____ (to include alternates# _____) for the performance of the Contract in accordance with the proposal submitted therefore, subject to additions and deductions as provided in the General Conditions of the Agreement, and to make payment on account thereof as provided therein.

Contractor further agrees not to do any work unless he has received a valid Purchase Order issued by Cameron County for payment of the work to be accomplished.

This instrument contains the entire agreement between the parties relating to the rights herein granted and obligations herein assumed. Any oral representations or modifications concerning this instrument shall be of no force or effect, excepting a subsequent modification in writing, signed by the party to be charged. This Agreement may be amended, provided that no amendment, modification, or alteration of the terms of this agreement shall be binding unless the same is in writing and duly executed by the parties hereto.

All notices to Cameron County shall be sent by certified or registered mail, addressed to:

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

Cameron County Judge, Cameron County Courthouse, 964 East Harrison Street, Brownsville, Texas 78520, and Cameron County Engineer, 805 W. Price Rd., Brownsville, Texas 78521, or at such other address as the COUNTY may otherwise designate. All notices to Contractor shall be sent certified or registered mail, addressed to: _____ or at such other address as said Contractor may otherwise designate in writing.

This Agreement shall be governed by the laws of the State of Texas and venue shall be in Cameron County.

IN WITNESS WHEREOF, the parties of these presents have executed this Agreement in quadruplicate in the year and day first above written.

PARTY OF THE FIRST PART
Eddie Trevino, Jr.
Cameron County Judge

PARTY OF THE SECOND PART
(Contractor)

ATTESTED BY:

Sylvia Garza Perez, County Clerk

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

NOTICE OF AWARD

TO:

PROJECT DESCRIPTION: **ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT**

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement and Invitation to Bid dated _____.

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

You are required by the Instructions to 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.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of the 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 SECURITY. The OWNER will be entitled to such other rights as may be granted by law.

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

Dated the ____ day of _____, 202__.

OWNER: CAMERON COUNTY

BY:

TITLE: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by _____, this the ____ day of _____, 202__.

BY: _____

TITLE: _____

RFP # 250502 ISLA BLANCA UTILITY IMPROVEMENTS PROJECT

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the _____, Secretary of the Corporation named as Principal in the within bond; that _____, who signed the said bond on behalf of the Principal was then _____ of said corporation; that I know his/her signature, and his/her signature thereto is genuine; and that said bond was duly signed, sealed, and attested to, for and in behalf of said corporation by authority of this governing body.

Corporate Seal

Title: _____

* Power-of-attorney for person signing for surety company must be attached to bond.

ATTORNEY'S REVIEW CERTIFICATION

I, the undersigned, Dylbia L. Jefferies Vega, the duly authorized and acting legal representative of the County of Cameron, Texas, do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and am of the opinion that each of the agreements may be duly executed by the proper parties, acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties; and that the agreements shall constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

Attorney's signature: _____ Date: _____

Print Attorney's Name: Dylbia L. Jefferies Vega



PROJECT CLOSE-OUT CHECK LIST

Project Name: ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

Project RFP #: 250502

TASK DESCRIPTION

COMPLETED DATE

A. General Requirements

1. Certificate of Substantial Completion (AIA G704)
(Executed by Architect/Engineer, Contractor and Owner) _____
2. Inspections Certifications
 - a. Certificate of Occupancy
(By Building Inspections Officials) _____
 - b. Copy of Building Official Inspection Card
(Showing required inspection approvals) _____
 - c. Regulatory Inspection Sign-Offs (as applicable)
 - (1) General Contract _____
 - (2) Plumbing Subcontract _____
 - (3) Fire Protection Contract _____
 - (4) Mechanical Contract _____
 - (5) Electrical Contract _____
 - (6) Certification Reports for All Backflow Assemblies _____
(Includes Plumbing, HVAC, Fire Protection as applicable)
 - (7) Well Water Quality Test Report (if applicable) _____
 - (8) Other Certifications as Required _____
(NCDFS, NC DOT, Land Quality, Local Government, Utilities, Health
Dept., Fireproofing Certification, Structural Steel Inspection Certification, etc.)
3. Closeout Reports & Documentation
 - a. Owner Instruction and Training with Equipment and Systems _____

(Memo/List of Attendees required for each session)
 - b. HVAC Test and Balance Report _____



PROJECT CLOSE-OUT CHECK LIST

Project Name: ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

Project RFP #: 250502

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
(Approval cover letter from Architect/Engineer required)		
c. Attic Stock Turnover (Transfer to Owner with Typed Inventory Required)	_____	_____
d. Keys & Permanent Hardware Changeover (Delivery of Final Keys and Cabinet to Owner; Memo of Hardware Changeover Date)	_____	_____
e. Insurance Coverage Change Over	_____	_____
f. Utility Account Change Over		
(1) Electric Service	_____	_____
(2) Gas Service	_____	_____
(3) Water Service	_____	_____
(4) Other Utility Service	_____	_____
 B. Record Document Requirements		
1. As-built drawings (as applicable)		
a. Site/Civil	_____	_____
b. Architectural & Structural	_____	_____
c. Plumbing	_____	_____
d. Fire Protection	_____	_____
e. Mechanical	_____	_____
f. Electrical	_____	_____
g. Security	_____	_____
h. Other (Kitchen Equipment, etc.)	_____	_____
2. Final Finish Schedule (updated with actual finishes and bound in with O+M Manual)	_____	_____



PROJECT CLOSE-OUT CHECK LIST

Project Name: ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

Project RFP #: 250502

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
3. Operation & Maintenance (O+M) Manuals (Approval cover letter from Designer required)	_____	_____
a. Product & Operations Data	_____	_____
b. Maintenance Information	_____	_____
c. Product Warranty Certificates/Maintenance Agreements	_____	_____
4. Shop Drawings – Complete Set (With Architect's Review Stamp)	_____	_____
5. Construction Site Documentation (Contractor's Job Log and Photographs)	_____	_____
C. Final Accounting Requirements – by Contractor		
1. Affidavit of Release of Liens (AIA G706A)	_____	_____
2. Affidavit of Payment of Debts and Claims (AIA G706)	_____	_____
3. Consent of Surety to Final Payment (AIA G707)	_____	_____
4. Final Request for Payment Certified by Architect/Engineer	_____	_____
D. Final Accounting Requirements – by Architect/Engineer		
1. Cover Letter of Approval of Roof Warranty	_____	_____
2. Cover Letter of Approval for O&M Manuals	_____	_____
3. Certification by Architect of Completed Final Punch List	_____	_____
4. Final Completion Certificate executed by Architect/Engineer	_____	_____
5. Final Liquidated Damages analysis by Architect/Engineer	_____	_____
6. Record Drawings (electronic CAD files +set of pdf files + 3 reproducible sets of all drawings based on Contractor As-Builts)	_____	_____
7. Certification of Project Compliance	_____	_____
8. MSDS Asbestos Free Building Letter	_____	_____



PROJECT CLOSE-OUT CHECK LIST

Project Name: ISLA BLANCA PARK UTILITY IMPROVEMENTS PROJECT

Project RFP #: 250502

<u>TASK DESCRIPTION</u>	<u>COMPLETED</u>	<u>DATE</u>
E. Warranty Period		
1. Pre-Expiration Warranty Inspection (Inspection 30 days prior to warranty expiration date)	_____	_____
F. Cameron County requirements		
1. Final Payment Requires Commission Approval.	_____	_____
2. TDLR Accessibility Compliance Letter from Registered Accessibility Specialist (RAS)	_____	_____
3. Windstorm Certification – Flood Zone Certification, if required in Zone A designated areas for new buildings and additions	_____	_____
4. Required Training documentation/logs, complete with sign in sheets on personnel present for Elevators and Boilers, TDLR certification of Inspection.	_____	_____

TECHNICAL SPECIFICATIONS

SPECIFICATIONS GENERAL NOTE: THE FOLLOWING SPECIFICATIONS LISTED IN THE "APPLICABLE TXDOT SPECIFICATIONS", "WATER AND WASTEWATER GOVERNING SPECIFICATIONS", AND "ELECTRICAL GOVERNING SPECIFICATIONS" SHALL GOVERN ALL THE MATERIALS, TESTING, AND CONSTRUCTION REQUIREMENTS AND ALL PERTINENT ITEMS LISTED UNDER THESE SPECIFICATIONS. IN THE EVENT OF CONFLICTING SPECIFICATIONS, THE MORE STRINGENT SPECIFICATION SHALL GOVERN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

Cameron County

SPECIFICATION LIST

APPLICABLE TXDOT SPECIFICATIONS (FOR RV LOT CONSTRUCTION)

Project: Isla Blanca RV and Utility Improvements Project

COUNTY OF CAMERON

GOVERNING SPECIFICATIONS AND SPECIAL PROVISIONS

STANDARD SPECIFICATIONS: ADOPTED BY THE TEXAS DEPARTMENT OF
TRANSPORTATION NOVEMBER 1, 2024.
STANDARD SPECIFICATIONS ARE INCORPORATED
INTO THE CONTRACT BY REFERENCE.

ITEMS 1 THROUGH 9 UNDER "GENERAL REQUIREMENTS AND COVENANTS" OF THE TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS ARE NOT APPLICABLE TO THIS PROJECT. THESE ITEMS SHALL BE GOVERNED BY THE COUNTY'S REQUIREMENTS AS LISTED IN OTHER AREAS OF THE BID DOCUMENT. ALL OTHER SPECIFICATIONS AND SPECIAL PROVISIONS APPLICABLE TO THIS PROJECT ARE IDENTIFIED BELOW:

STANDARD SPECIFICATIONS:

ITEM 100	PREPARING RIGHT OF WAY (103) (752)
ITEM 104	REMOVING CONCRETE
ITEM 110	EXCAVATION (132)
ITEM 132	EMBANKMENT (100) (110) (160) (204) (210) (216) (400)
ITEM 192	LANDSCAPE PLANTING (161) (166) (168) (734) (752)
ITEM 247	FLEXIBLE BASE (105) (204) (210) (216) (520)
ITEM 250	GEOGRID BASE REINFORCEMENT
ITEM 500	MOBILIZATION
ITEM 502	BARRICADES, SIGNS AND TRAFFIC HANDLING (503) (505) (510)
ITEM 503	PORTABLE CHANGEABLE MESSAGE SIGN
ITEM 506	TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS (161) (432) (556)
ITEM 530	INTERSECTIONS, DRIVEWAYS, AND TURNOUTS (247) (260) (275) (276) (292) (316) (330) (334) (360) (421) (440)

GENERAL:

THE SPECIFICATION ITEMS LISTED HERE PLUS THE SPECIFICATIONS LISTED IN OTHER AREAS OF THE BID DOCUMENT INCLUDING THE ELECTRICAL GOVERNING SPECIFICATIONS, AND WATER AND WASTEWATER GOVERNING SPECIFICATION ARE THOSE UNDER WHICH PAYMENT IS TO BE MADE UNLESS OTHERWISE STATED IN THE PLANS, GENERAL NOTES, SPECIFICATIONS, OR OTHER AREAS OF THE BID DOCUMENT. THESE, TOGETHER WITH SUCH OTHER PERTINENT ITEMS CONSTITUTE THE COMPLETE SPECIFICATIONS FOR THIS PROJECT.

WATER AND WASTEWATER GOVERNING SPECIFICATIONS

SECTION 00 01 10

TABLE OF CONTENTS

(CAMERON COUNTY)

(ISLA BLANCA RV PARK UTILITY IMPROVEMENT PROJECT)

TECHNICAL SPECIFICATIONS

SECTION 01 11 00	Summary of Work
SECTION 01 29 00	Measurement and Payment
SECTION 01 31 00	Project Management and Coordination
SECTION 01 33 00	Submittal Procedures
SECTION 01 45 00	Quality Control
SECTION 01 55 26	Traffic Control
SECTION 01 57 23	Temporary Stormwater Pollution Control
SECTION 01 60 00	Product Requirements
SECTION 01 66 00	Product Storage and Handling Requirements
SECTION 01 70 00	Execution and Closeout Requirements

DIVISION 02	EXISTING CONDITIONS
SECTION 02 41 00	Demolition, Cutting, and Patching

DIVISION 03	CONCRETE
SECTION 03 11 00	Concrete Forming
SECTION 03 15 00	Concrete Accessories
SECTION 03 20 00	Concrete Reinforcing
SECTION 03 30 00	Cast-In-Place Concrete
SECTION 03 60 00	Grouting
SECTION 03 74 00	Modification to Existing Concrete

DIVISION 05	METALS
SECTION 05 05 19	Anchor Systems
SECTION 05 50 00	Miscellaneous Metal Fabrications

DIVISION 09	FINISHES
SECTION 09 91 00	Painting and Coating
DIVISION 26	ELECTRICAL
SECTION 26 05 43	Underground System
DIVISION 31	EARTHWORK
SECTION 31 00 00	Earthwork
SECTION 31 10 00	Waste Material Disposal
SECTION 31 11 00	Clearing and Grubbing
SECTION 31 22 19	Finish Grading
SECTION 31 23 19	Dewatering and Drainage
SECTION 31 23 33	Trenching, Backfilling, Embedment and Encasement
SECTION 31 23 33.14	Trench Shielding
SECTION 31 25 00	Erosion and Sediment Controls
SECTION 31 50 00	Trench and Excavation Safety Systems
DIVISION 32	EXTERIOR IMPROVEMENTS
SECTION 32 13 13	Concrete Paving and Sidewalks
SECTION 32 92 19	Seeding and Sodding
DIVISION 33	UTILITIES
SECTION 33 01 30.16	Television Inspection of Sewer Pipelines
SECTION 33 01 30.41	Cleaning of Sewers and Manholes
SECTION 33 01 30.51	Bypass Pumping of Existing Sewer Systems
SECTION 33 04 40	Disinfection of Potable Water Facilities
SECTION 33 05 05.30	Sanitary Sewer Acceptance Testing
SECTION 33 05 31.11	Solid Wall Polyvinyl Chloride PVC Gravity Sewer Pipe
SECTION 33 05 31.11	Polyvinyl Chloride Pressure Pipe for Water for Water Transmission and Distribution
SECTION 33 05 33	High Density Polyethylene (HDPE) Pipe, Fittings, and JoiningFusion
SECTION 33 05 61	Precast Concrete Manhole
DIVISION 40	PROCESS INTERCONNECTIONS
SECTION 40 05 06	Piping Specialties
SECTION 40 05 07	Hangers and Supports for Process Piping
SECTION 40 05 19	Ductile Iron Pipe and Fittings
SECTION 40 05 31.13	Process PVC Pressure Pipe
SECTION 40 05 50	Miscellaneous Valves and Fittings
SECTION 40 23 00	Plant Piping, General
SECTION 40 80 05	Field Testing of Piping Systems

DIVISION 46	WATER AND WASTEWATER EQUIPMENT
SECTION 46 05 00	Common Work Results for Water and Wastewater Equipment

END OF SECTION

SECTION 01 11 00**SUMMARY OF WORK****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Work by Owner (All work required for the completion of this project shall be performed by the Contractor).
- B. Owner furnished products (The Contractor shall furnish and install all products and materials required to complete the work).
- C. Contractor use of site and premises.
- D. Description of project.
- E. Owner occupancy.

1.2 RELATED WORK (NOT USED)**1.3 REFERENCES (NOT USED)****1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS (NOT USED)****1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)****1.7 CONTRACTOR USE OF SITE AND PREMISES**

- A. Limit use of site and premises to allow:
 - 1. Owner continued use of adjacent buildings, surrounding area parking lots, etc., and work operations.

1.8 MATERIALS

- A. All contract construction materials for this project shall meet all AWWA and TCEQ requirements. Any material, pipe or equipment in contact with potable water shall meet all NSF 61 regulations
- B. Comply with OSHA requirements for this construction project.

1.9 DESCRIPTION OF PROJECT

A. SCOPE OF PROJECT

GENERAL SITE IMPROVEMENTS

1. Provide mobilization
2. Provide pavement repair at all road crossings.
3. All water and sewer services to RV pads shall be bored and not open cut. minimize any damage to existing streets and asphalt.

WASTEWATER COLLECTION SYSTEM IMPROVEMENTS

1. Fill, seal, and abandon existing brick manhole
2. Provide 8"–15" pvc sanitary sewer line including tie-ins to existing manholes and placing new manholes
3. Provide sanitary sewer cleanouts
4. Provide service reconnections all lengths short/long
5. Provide wellpoint groundwater dewatering
6. Provide trench safety, meeting all codes and requirements
7. Provide flexible pavement repair
8. Provide fiberglass sanitary sewer manholes (in flood area, provide water tight ring and covers)

WATER DISTRIBUTION SYSTEM IMPROVEMENTS

1. Furnish and install 4"–8" waterline complete with required fittings
2. Provide fittings including all bends and gate valves
3. Provide water service; furnish and install 5/8" to 3/4" copper or HDPE service to all RV sites
4. Connect new 8" waterline to existing 10" waterline
5. Provide existing meter and new meter box locations
6. Provide fire hydrants (field verify)
7. Provide well point groundwater dewatering
8. Provide trench safety, meeting all codes and requirements

B. GENERAL

The Project consists of:

A. General Site Improvements

This includes initial mobilization, installation of water and sewer services to RV Pads and pavement repair at utility crossings.

B. Wastewater Collection System Improvements

Work includes the abandonment of existing brick manholes, installation of new 8"–15" PVC sanitary sewer lines, construction of new manholes and cleanouts, reconnection of existing services, groundwater dewatering, trench safety, manhole rehabilitation, and installation of fiberglass manholes in flood-prone areas.

C. Water Distribution System Improvements

This section covers installation of new 4"–8" waterlines, all required fittings, gate valves, service lines to RV sites (5/8" to 3/4" copper or HDPE), connection to the existing 10" waterline, relocation or installation of meter boxes, placement of fire hydrants, trench safety, and groundwater control.

D. Stormwater Pollution Prevention Plan (SWPPP)

Environmental controls include the installation of silt fence or other best management practices (BMPs), and the construction of a designated concrete washout pit to comply with stormwater regulations.

C. ACCESSIBILITY

It is intended that work of this Project comply with State and Federal requirements providing for accessibility to persons with disabilities. Dimensions given for clearances, heights, etc., are critical and must be carefully maintained.

1.10 OWNER OCCUPANCY

- A. Cooperate with the Owner to minimize conflict, and to facilitate the Owner's operations.
- B. Schedule the Work to accommodate this requirement.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 00**MEASUREMENT AND PAYMENT****PART 1 – GENERAL****1.1 DESCRIPTION OF BASE BID ITEMS****A. Bid Item No. 1: Mobilization**

Mobilization shall be measured by lump sum. Lump sum price will be full compensation for moving equipment, personnel and supplies to and from the project site; furnishing, installing and removing temporary construction facilities; implementing security requirements unless specifically shown in other bid items; and incurring utility costs during construction. Payment for 50% of the lump sum amount shall be made for mobilization with the contractor's initial pay request. Payment for 50% of the lump sum amount shall be made for demobilization with the contractor's final pay request.

B. Bid Item No.2: Preparing Right of Way

Preparing Right of Way shall be measured by the Station (STA) and paid for at the unit price bid per STA. The unit price shall be full compensation for all labor, materials, equipment, and incidentals required to clear and prepare the designated right-of-way for construction.

C. Bid Item No. 3: Sanitary Sewer Line Testing

Sanitary Sewer Line Testing shall be measured by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation; including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

D. Bid Item No.4: Waterline Line Testing

Waterline line Testing shall be measured by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation; including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

E. Bid Item No.5: Traffic Control

Traffic Control This item shall be measured by the Month and paid for at the unit price bid per Month. The unit price shall be full compensation for furnishing, installing, maintaining, relocating, and removing all traffic control devices necessary to safely direct vehicular and pedestrian traffic through and around the project site.

F. Bid Item No.6: Groundwater Dewatering Including Well pointing

Groundwater Dewatering Including Well Pointing shall be measured by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation; including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

G. Bid Item No.7: Surge, Cap and Abandon Existing Sanitary Sewer Pipe

Surge, Cap, and Abandon Existing Sanitary Sewer Pipe shall be measured by Lump Sum and paid for at the lump sum price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

H. Bid Item No.8: Fill, Seal and Abandon Existing Brick Manholes

Fill, Seal, and Abandon Existing Brick Manholes shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

I. Bid Item No.9:Tie Into Existing Manhole

Tie into Existing Manhole shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

J. Bid Item No.10: 8" PVC Sanitary Sewer Line (SDR-26) All Depths

8" PVC Sanitary Sewer Line (SDR-26) All Depths by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation; including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

K. Bid Item No.11: 12" PVC PVC Sanitary Sewer Line (SDR-26) All Depths

12" PVC Sanitary Sewer Line (SDR-26) All Depths shall be measured by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation; including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

L. Bid Item No.12: 15" PVC PVC Sanitary Sewer Line (SDR-26) All Depths

15" PVC Sanitary Sewer Line (SDR-26) All Depths shall be measured by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation; including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

M. Bid Item No.13: Cement Stabilized Encasement

Cement Stabilized Encasement shall be measured by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation; including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

N. Bid Item No.14: Sanitary Sewer Manhole (All Depth – 48” DIA)

Sanitary Sewer Manhole (All Depth – 48” DIA) shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

O. Bid Item No.15: Sanitary Sewer Cleanout

Sanitary Sewer Cleanout shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

P. Bid Item No.16: 4” Service Reconnections All Lengths Short/Long

4” Service Reconnections All Lengths Short/Long shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

Q. Bid Item No.17: Trench Safety

Trench Safety this item shall be measured by the Linear Foot (LF) and paid for at the unit price bid per LF of trench protected. The unit price shall be full compensation for furnishing all labor, materials, equipment, and incidentals necessary to install and maintain trench safety systems

R. Bid Item No.18: Remove and Replace Flexible Pavement

Remove and Replace Flexible Pavement This item shall be measured by the Square Yard (SY) and paid for at the unit price bid per SY. The unit price shall be full compensation for all labor, materials, equipment, and incidentals necessary to remove existing pavement and replace it with new flexible pavement in accordance with the plans and specifications.

S. Bid Item No.19: Furnish and Install 4” Diam C900 DR18 PVC Waterline

Furnish and Install 4” Diam C900 DR18 PVC Waterline shall be measured by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation, including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

T. Bid Item No.20: Furnish and Install 8" Diam C900 DR18 PVC Waterline

Furnish and Install 8" Diam C900 DR18 PVC Waterline shall be measured by Linear Foot and paid for at the Linear Foot price bid. Price is the total compensation for complete installation; including all excavation, backfilling, compaction, removal of surplus earth, installing locator wire, and furnishing all materials, tools, labor and other incidentals necessary to complete this item.

U. Bid Item No.21: Furnish and Install 8" 11.25 Deg. Bend (MJ with Mega Lug Joint Restraint Fitting)

Furnish and Install 8" 11.25 Deg. Bend (MJ with Mega Lug Joint Restraint Fitting) shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

V. Bid Item No.22: Furnish and Install 8" 45 Deg. Bend (MJ with Mega Lug Joint Restraint Fitting)

Furnish and Install 8" 45 Deg. Bend (MJ with Mega Lug Joint Restraint Fitting) shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

W. Bid Item No.23: Furnish and Install 10" x 8" Tees (MJ with Mega Lug Joint Restraint Fitting)

Furnish and Install 10" x 8" Tees (MJ with Mega Lug Joint Restraint Fitting) shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

X. Bid Item No.24: Furnish and Install 8" Sleeves

Furnish and Install 8" Sleeves Waterline shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

Y. Bid Item No.25: Furnish and Install 10" Sleeves

Furnish and Install 10" Sleeves Waterline shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

Z. Bid Item No.26: 8" Gate Valve W Valve Box

8" Gate Valve W Valve Box shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

AA. Bid Item No.27: Install 8" Ductile Iron End Plug with Thrust Restraint

Install 8 Ductile Iron End Plug with Thrust Restraint shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

AB. Bid Item No.28: Single Water Service: Furnish and Install 3/4" Copper or HDPE Service to All RV Sites

Furnish And Install 3/4" Copper or HDPE Service to All RV Sites shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

AC. Bid Item No.29: Provide 4" Water Service Connection Including Tap into New 8" Main

Provide 4" Water Service Connection Including Tap Into 8" New Main shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

AD. Bid Item No.30: Connect New 8" Waterline to Existing 8" Waterline

Connect New 8" Waterline to Existing 8" Waterline Sites shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

AE. Bid Item No.31: Connect New 8" Waterline to Existing 10" Waterline

Connect New 8" Waterline to Existing 10" Waterline Sites shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

AF. Bid Item No.32: Furnish and Install Fire Hydrant Assembly

Furnish and Install Fire Hydrant Assembly shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

AG. Bid Item No.33: Furnish and Install 8" DIA Coupling Adapter

Furnish and Install 8" DIA Coupling Adapter shall be measured by Each and paid for at the Each price bid. Price is the total compensation for furnishing design, materials, tools, labor, equipment, and incidentals necessary to complete this item.

AH. Bid Item No.341: Storm Water Pollution Prevention

Storm Water Pollution Prevention shall be measured on a Lump Sum (LS) basis and paid for at the unit price bid. The lump sum price shall be full compensation for furnishing all labor, materials, equipment, and incidentals necessary to implement and maintain the Stormwater Pollution Prevention Plan (SWPPP) for the duration of the project.

SECTION 01 31 00**PROJECT MANAGEMENT AND COORDINATION****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Coordination
- B. Preconstruction conference
- C. Site mobilization conference
- D. Progress meetings
- E. Pre-installation conferences

1.2 RELATED WORK (NOT USED)**1.3 REFERENCES (NOT USED)****1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS (NOT USED)****1.6 DELIEVERY, STORAGE AND HANDLING (NOT USED)****1.7 COORDINATION**

- A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and cleanup of Work of separate Sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.8 PRE-CONSTRUCTION CONFERENCE

- A. A pre-construction conference will be held at a location designated by Owner after award of Contract and prior to the start of significant construction activities. The Owner will notify the Contractor as to the date and time of the conference one week in advance of the proposed date. Owner, Engineer, Contractor's Project Manager and Project Superintendent, and Contractor's Subcontractor Representatives shall attend.
- B. Contractor shall be prepared to discuss the following items as a minimum:
 - 1. Distribution and discussion of:
 - a. List of major subcontractors and suppliers
 - b. Projected construction schedules
 - 2. Critical work sequencing
 - 3. Liquidated Damages
 - 4. Major equipment deliveries and priorities
 - 5. Project coordination:
 - a. Designation of responsible personnel
 - 6. Procedures and processing of:
 - a. Field decisions
 - b. RFIs
 - c. Proposal requests
 - d. Submittals/Shop Drawings
 - e. Change Orders
 - f. Applications for Payment
 - 7. Adequacy of distribution of Contract Documents
 - 8. Procedures for maintaining record documents
 - 9. Use of premises:
 - a. Work and storage areas
 - b. Owner's requirements
 - 10. Construction facilities, controls, and construction aids
 - 11. Temporary utilities
 - 12. Contractor's safety plan and first-aid procedures
 - 13. Security procedures
 - 14. Housekeeping procedures
 - 15. Submittal schedule
 - 16. Quality control
 - 17. Planned outages

- 18. Laboratory testing
- 19. Factory and Field Testing
- C. The Owner will preside at the conference and the Engineer will prepare the minutes of the meeting and distribute copies of same to all participants who so request by completion of the attendance form to be circulated at the beginning of the conference.

1.9 SITE MOBILIZATION CONFERENCE

- A. Engineer may schedule a conference at the Project site prior to Contractor occupancy.
- B. Attendance Required: Owner, Engineer, and Contractor, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements.
 - 3. Construction facilities and controls.
 - 4. Temporary utilities.
 - 5. Survey and building layout.
 - 6. Security and housekeeping procedures.
 - 7. Schedules.
 - 8. Procedures for testing.
 - 9. Procedures for maintaining record documents.
 - 10. Requirements for start-up of equipment.
 - 11. Inspection and acceptance of equipment put into service during construction period.

1.10 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work as determined by the Engineer.

1.11 PREINSTALLATION CONFERENCES

- A. When required in individual specification Section, convene a pre-installation conference at work site prior to commencing work of the Section. Obtain final confirmation of Engineer for necessity of meeting.
- B. Require attendance of parties directly affecting, or affected by, work of the specific Section.
- C. Notify Engineer four days in advance of meeting date.
- D. Review conditions of installation, preparation and installation procedures, and coordination with related work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 00**SUBMITTAL PROCEDURES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding Submittal Procedures, Construction Progress Schedules, Product and Design Data, Shop Drawings, Samples, Test Reports, Certificates, Manufacturer's Instructions, Manufacturer's Field Reports, Erection Drawings, Operation And Maintenance Manuals, Other Submittals, Contractor Review, and Engineer Review as specified herein.

1.2 RELATED WORK (NOT USED)**1.3 REFERENCES (NOT USED)****1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS (NOT USED)****1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)****1.7 SUBMITTAL PROCEDURES****A. Scheduling and Handling**

1. Contractor shall identify all critical path items and schedule submittals sufficiently in advance of the need for the material or equipment to expedite Project construction. Provide submittals on the critical path (i.e. long lead) items as soon as possible to avoid impacting or delaying construction schedule. Coordinate submission of related items.
2. Develop a submittal schedule that allows sufficient time for initial review, correction, resubmission and final review of all submittals. Allow time for fabrication, purchase, testing, and delivery of material or equipment once submittal is approved.
3. 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. For each submittal for review, allow 15 calendar days excluding delivery time to and from Contractor/Engineer. This time for review shall in no way be justification for delays or additional compensation to the Contractor.
4. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
5. Submittals not requested will not be recognized nor processed.
6. Incomplete, improperly packaged, and submittals from sources other than the Contractor will not be accepted or reviewed. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

B. Transmittal Form and Numbering

1. Transmit each submittal with Transmittal Letter. Group submittals of related products in a single submission but each submittal shall only contain related types of work, material, product, or equipment. Unrelated mixed/combined submittals will not be accepted.
2. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
3. Identify: Date, Project Name and Number, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.
4. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents, except as noted by any requested variance.
5. Identify any deviations from the Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
6. Allow space on submittals for Contractor and Engineer review stamps.
7. When revised for resubmission, identify changes made since previous submission.

1.8 CONSTRUCTION PROGRESS SCHEDULES

- A. At least 3 days prior to the pre-construction conference, submit preliminary construction schedule defining planned operations for the Work.
- B. At least 3 days prior to the scheduled construction meeting, submit updated construction progress schedule.
- C. Construction Progress Schedule shall include:
 1. Overall percent complete, projected and actual
 2. Completion progress by listed activity and sub-activity, to within 5 days prior to submittal
 3. Changes in Work scope and activities modified since submittal
 4. Delays in submittals or resubmittals, deliveries, or Work
 5. Adjusted or modified sequences of Work
 6. Other identifiable changes
 7. Revised projections of progress and completion
- D. Narrative Progress Report:
 1. Submit with each monthly submission of construction progress schedule
 2. Summary of Work completed during the past period between reports
 3. Work planned during the next period
 4. Explanation of differences between summary of Work completed and Work planned in previously submitted report

5. Current and anticipated delaying factors and estimated impact on other activities and completion milestones
6. Corrective action taken or proposed

1.9 PRODUCT AND DESIGN DATA

- A. Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents. Provide product and design data such as manufacturer's brochures, catalog pages, illustrations, diagrams, tables, performance charts, and other material which describe appearance, size, attributes, code and standard compliance, ratings, and other product characteristics. Provide all critical information such as design strengths, mixes, reference standards, performance characteristics, capacities, power requirements, wiring and piping diagrams, controls, component parts, finishes, dimensions, and required clearances.
- B. Where required by specification sections provide basic calculations, analyses, and data to support design decisions and demonstrate compliance with specified requirements. State assumptions and define parameters. Give general formulas and references. Provide sketches as required to illustrate design method and application. Arrange calculations and data in a logical manner with suitable text to explain assumptions, procedures and order. Indicate name, title, and telephone number of individual performing design and include Professional Engineer's seal, registered in the state the project is located in, where applicable or required.
- C. Submit one (1) electronic submittals via email as PDF electronic files.
- D. Mark submittal to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- E. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.10 SHOP DRAWINGS

- A. Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a Professional Engineer, registered in the state the Project is located, responsible for designing components shown on Shop Drawings.
 1. Include signed and sealed calculations to support design
 2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Submit one (1) electronic PDF submittal via email to Engineer.

1.11 SAMPLES

- A. Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Include full range of manufacturer's standard finishes, indicating colors, textures, finishes and patterns for Engineer's selection. Coordinate Sample submittals for interfacing work.
- C. Include identification on each Sample, with full Project information
- D. Submit number of Samples specified in individual Specification Sections; Engineer will retain one (1) Sample.

1.12 TEST REPORTS

- A. Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.13 CERTIFICATES

- A. Submit certification of compliance by manufacturer, installation/application Subcontractor, or Contractor to Engineer.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.14 MANUFACTURER'S INSTRUCTIONS

- A. Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer.
- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation

1.15 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit reports within 5 days of observation to Engineer for information.
- C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.16 ERECTION DRAWINGS

- A. Submit Drawings for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit Drawings for information assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.17 OPERATIONS AND MAINTENANCE MANUALS

- A. Where required by specification section 01 70 00 - Execution and Closeout Requirements, provide operation and maintenance manuals.
- B. Submission:
 - 1. O&M manuals should be submitted electronically when possible. The size of the file shall determine delivery method.
 - 2. Submit for review one draft copy 30 days prior to need date or as otherwise specified. This copy will be returned after review with Engineer's comments. Revise content as required.
 - 3. Once approved, submit three (3) copies of complete, final operation and maintenance manuals. All manuals shall be submitted prior to or in conjunction with equipment start-up.
- C. Contents:
 - 1. Equipment list (name and schedule #) as provided in drawings
 - 2. Operating instructions (normal and emergency), including diagnostic checks
 - 3. Preventive Maintenance Schedule
 - 4. Installation instructions and pre-operational checks for equipment and other products
 - 5. Equipment start-up sheets (by vendor in field)
 - 6. Recommended spare parts list
 - 7. Wiring diagrams, as applicable
 - 8. Shop drawings, as applicable
 - 9. Test and balance (T&B) reports, and other field quality reports
 - 10. Statement of General Contractor's one-year warranty
 - 11. Copies of extended warranties, as applicable
 - 12. Calibration procedures, if applicable
 - 13. Installation, maintenance and care instructions for hardware, coverings and finishes
 - 14. Other material and information as indicated in individual specification sections and as necessary for operation and maintenance

D. Form:

1. Manuals shall be 8-1/2 x 11 inch text pages bound in three ring expansion binders with a hard durable cover with clear plastic pocket on front for title page.
2. Prepare binder covers with printed subject title of manual, title of project, date, and volume number when multiple binders are required. Printed project information shall be on face and spine.
3. Internally subdivide the binder contents with divider sheets with typed tab titles under reinforced plastic tabs. Place dividers at beginning of each chapter, part, section, and appendix.
4. All items in previous sub-section shall be placed in specification section order and shall be placed in tabs for associated equipment or products.
5. Provide pocket folders for folded sheets and/or shop drawings.
6. Provide a table of contents for each volume, with directory listing on sub-sequent pages.

- E. Directory listing shall have names addresses, and telephone numbers of Contractor, subcontractors, equipment suppliers, and nearest service representatives, and design consultant as appropriate.

1.18 OTHER SUBMITTALS

- A. Closeout Submittals: Comply with Section 01 70 00 - Execution and Closeout Requirements.
- B. Submit informational data for Engineer's knowledge as Contract administrator or for Owner.
- C. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.19 CONTRACTOR REVIEW

- A. Review for compliance with Contract Documents and approve submittals before transmitting to Engineer.
- B. Contractor shall be responsible for:
 1. Determination and verification of materials including manufacturer's catalog numbers
 2. Determination and verification of field measurements and field construction criteria
 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents
 4. Determination of accuracy and completeness of dimensions and quantities
 5. Confirmation and coordination of dimensions and field conditions at Site
 6. Construction means, techniques, sequences, and procedures
 7. Safety precautions

- 8. Coordination of submittals to avoid conflicts between various items of Work and performance of Work of all trades
- C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.
- D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

1.20 ENGINEER REVIEW

- A. The Engineer's review of submittals covers only general conformity to the Drawings and Specifications. The Contractor is responsible for quantity determination and no quantities will be verified by the Engineer. The Contractor is responsible for any errors, omissions, or deviations from the Contract Documents and Engineer's review of submittals in no way relieves the Contractor from his obligation to furnish required items according to the Drawings and Specifications. No material or equipment shall be incorporated into the Work or included in monthly pay requests until submittal has been reviewed and approval has been obtained in the specified manner.
- B. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six (6) or more submittals or items in one day or twelve (12) or more submittals or items in one week. If "mass submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner and Contractor.
- C. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.
- D. Submittals made by Contractor that are not required by Contract Documents may be returned without action.
- E. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order.
- F. Owner may withhold monies due to Contractor to cover additional costs beyond the second submittal review.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES:

- A. Quality assurance and control of installation
- B. References
- C. Field samples
- D. Inspection and testing laboratory services
- E. Manufacturers' field services and reports
- F. IBC Code

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures: Submission of Manufacturers' Instructions and Certificates.
- B. Section 01 60 00 – Product Requirements: Requirements for material and product quality.

1.3 REFERENCES

- A. Conform to reference standard by date of issue current on date of Contract Documents or date specified in product Sections.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.4 QUALITY ASSURANCE AND 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' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality 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 workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.5 SUBMITTALS (NOT USED)

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications Sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Engineer.

1.8 INSPECTION AND TESTING LABORATORY SERVICES

- A. The Owner will appoint, employ, and pay for services of an independent firm to perform inspections and testing.
- B. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Engineer.
- C. Reports will be submitted by the independent firm to the Owner, Engineer, and Contractor in duplicate, indicating observations and results of tests and indicating compliance or non compliance with Contract Documents.
- D. The Contractor is to Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
 - 1. Notify Engineer and independent firm 24 hours prior to expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- E. Retesting required because of non conformance to specified requirements shall be performed by the same independent firm on instructions by the Contractor or Engineer. Such additional testing cost will be paid for by Contractor.

1.9 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer.
- B. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.

- C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Submit report in duplicate within 15 days of observation to Engineer for review.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 55 26**TRAFFIC CONTROL****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Section Includes administrative procedures for Traffic Control (Maintenance and protection of vehicular and pedestrian traffic along roadways, driveways, sidewalks and parking areas).

1.2 RELATED WORK

- A. Division 00 – Procurement and Contracting Requirements
- B. Division 01 – General Requirements

1.3 REFERENCES

- A. AASHTO Roadside Design Guide
- B. Texas Manual on Uniform Traffic Control Devices (TMUTCD)
- C. County and Local Standards in the jurisdiction where the project is located

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS**

- A. Conform to requirements of the General Conditions.
- B. Traffic Control Plans
 - 1. Traffic Control Plans shall be prepared by the Contractor by a Licensed/Registered Texas Professional Engineer.
 - 2. Traffic Control Plans, as well as related permit applications, shall be submitted for approval by the Contractor to the State/County/Local agencies that have jurisdiction over the affected roadways.
 - 3. A copy of the approved Traffic Control Plans and permits shall be submitted to the Owner's representative prior to implementation.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)**PART 2 – PRODUCTS****2.1 TRAFFIC CONTROL PLANS SHALL CONFORM TO THE FOLLOWING:**

- A. Current edition of the Texas Manual on Uniform Traffic Control Devices (Texas MUTCD)
- B. TxDOT Bridge Standards

- C. TxDOT Roadway Standards
- D. TxDOT Traffic Engineering Standards
- E. County/Local standards

PART 3 – EXECUTION

- 3.1 The contractor shall conduct his work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways and walks, whether public or private, the contractor shall provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel, and shall give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic shall not be required when the contractor has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.
- 3.2 In making open cut street crossings, the contractor shall not block more than one-half of the street at a time. Whenever possible, the contractor shall widen the shoulder on the opposite side to facilitate traffic flow. Temporary surfacing shall be provided as necessary on shoulders.
- 3.3 Temporary bridges: the contractor shall construct substantial bridges at all points where it is necessary to maintain traffic across open trench construction. Bridges in public streets, roads, and highways shall be acceptable to the authority having jurisdiction thereover. Bridges erected in private roads and driveways shall be adequate for the service to which they will be subjected. Bridges shall be provided with substantial guard rails and with suitably protected approaches. Foot bridges shall be not less than 4 feet wide, provided with handrails and uprights of dressed lumber. Bridges shall be maintained in place as long as the conditions of the work require their use for safety of the public, except that when necessary for the proper prosecution of the work in the immediate vicinity of a bridge, the bridge may be relocated or temporarily removed for such period as engineer may permit.
- 3.4 Detours: where required by the authority having jurisdiction thereover that traffic be maintained over any construction work in a public street, road, or highway, and the traffic cannot be maintained on the alignment of the original roadbed or pavement, the contractor shall, at his own expense, construct and maintain a detour around the construction work. Each detour shall include a bridge across the pipe trench and all necessary barricades, guard rails, approaches, lights, signals, signs, and other devices and precautions necessary for protection of the work and safety of the public.
- 3.5 All open trenches and other excavations shall have suitable barricades, signs, and lights to provide adequate protection to the public. Obstructions such as material piles and equipment shall be provided with similar warning signs and lights.
- 3.6 The contractor shall, at his own cost and expense, furnish and erect such barricades, fences, lights and danger signals, guards, construction signs, torches, etc. And shall provide such watchmen, and shall provide such other precautionary measures for the protection of persons or property and of the work as are necessary. From sunset to sunrise, the contractor shall furnish and maintain sufficient lights at each barricade and sufficient numbers of barricades

shall be erected to keep vehicles from being driven on or into any work under construction. The contractor shall furnish watchmen in sufficient numbers to protect the work.

- 3.7 The contractor will be held responsible for all damage due to failure of barricades, signs, lights and watchmen. The contractor's responsibility for the maintenance of barricades, signs and lights, and for providing watchmen shall not cease until the project has been accepted by the owner.
- 3.8 Security of the work area shall be the responsibility of the contractor. The owner's personnel may be present at the project site during evenings, nights, or weekends, but will not be responsible for work area security at any time.
- 3.9 During the times when the contractor is performing any construction activities, the sum of the amount of trench opened in advance of the completed line and the amount of trench left unfilled at any time shall not exceed 500 linear feet.
- 3.10 Safety fence: to protect pedestrian and vehicular traffic and to help restrict them from the project area, the contractor shall as a minimum requirement install and maintain a safety fence on all sides of the work area in all areas of the project. This fencing shall be in addition to any and all other requirements for barricades and warning signs. The safety fence shall be a high-density polyethylene, high visibility, international orange safety fence with a 2-inch mesh as manufactured by dupont plastic systems or equivalent. The safety fence shall be installed as a minimum in any area where there is any equipment, whether running or not; where there is any open trench, regardless of trench depth; and where there is any material stored or stockpiled, regardless of the type of material.

END OF SECTION

SECTION 01 57 23**TEMPORARY STORMWATER POLLUTION CONTROL****PART 1 – - GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding labor, materials, equipment, and incidentals necessary to provide stormwater pollution prevention for the duration of the construction period including furnishing, installing, and maintaining erosion and sediment control structures and procedures and properly removing the features when no longer required.
- B. Developing, implementing, and maintaining a stormwater pollution prevention plan in compliance with Local, State, and Federal requirements. Provide preventive measures to keep sediment and other pollutants from the construction activity from entering any stormwater system, including open channels. Comply with the Texas Commission on Environmental Quality General Permit (TXR150000) for stormwater discharges from construction activities under the Texas Pollutant Discharge Elimination System (TPDES) program.

1.2 RELATED WORK

- A. Section 01 33 00 - Submittal Procedures
- B. Section 31 25 00 - Erosion and Sediment Controls

1.3 REFERENCES (NOT USED)**1.4 QUALITY ASSURANCE**

- A. Comply with applicable requirements of all governing authorities having jurisdiction.
- B. The Contractor shall develop and implement a stormwater pollution prevention plan in accordance with TCEQ General Permit TXR150000 prior to the beginning of construction activity.
- C. Stormwater pollution prevention measures shall be established prior to the beginning of construction and maintained during the entire length of construction until final stabilization has been achieved for the area protected.
- D. All land-disturbing activities shall be planned and conducted to minimize the area to be exposed at any one time as well as time of exposure, off-site erosion, sedimentation, and adverse water quality impacts.
- E. Surface water runoff originating upgrate of an exposed area shall be managed to minimize erosion and sediment loss during the period of exposure.
- F. Install measures to control both the velocity and rate of release so as to minimize erosion and sedimentation of the receiving water body (i.e., ditch, channel, stream) in accordance with regulatory requirements and as directed by the Owner, the Engineer, or the Owner's representative.

- G. Periodically clean out and dispose of all sediment and other pollutants as necessary to maintain adequate treatment capacity of each pollution control feature. Clean out and properly dispose of all sediment and other stormwater pollutants at the time of completion of the Work.

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00 - Submittal Procedures.
- B. Construction Activity Less Than 1 Acre:
 - 1. Projects with a total disturbed area of less than 1 acre are not subject to TCEQ General Permit requirements.
- C. Construction Activity From 1 Acre To Less Than 5 Acres:
 - 1. For projects with a total disturbed area equal to or greater than 1 acre and less than 5 acres) submit a copy of the Construction Site Notice to the Operator of any Municipal Separate Storm Sewer System (MS4) receiving construction site discharge at least 2 days prior to beginning construction activity.
 - 2. Post a copy of the Construction Site Notice at the construction site in a location where it is readily available for viewing by the general public and Local, State, and Federal authorities prior to starting construction activities and maintain the posting until completion of the construction activities.
- D. Construction Activity For 5 Acres Or Greater:
 - 1. For projects with a total disturbed area of 5 acres or greater submit the following to the TCEQ and the Operator of any Municipal Separate Storm Sewer System (MS4) receiving stormwater discharge from the Site:
 - a. Contractor shall submit Notice of Intent (NOI) at least 7 days prior to beginning construction activity. When submitting an NOI electronically, construction activity may commence immediately upon receipt of confirmation from the TCEQ. Contractor shall be the Primary Operator. Owner shall be the Secondary Operator.
 - b. Notice of Change (NOC) letter within 14 days after the discovery that incorrect information was submitted in the NOI or if relevant information in the NOI changes during the course of construction activity.
 - c. Notice of Termination (NOT) within 30 days following a change in operational control or upon final stabilization and completion of the construction project.
 - 2. Post a copy of the NOI and a Construction Site Notice at the Site in a location where it is readily available for viewing by the general public and Local, State, and Federal authorities prior to starting construction activities and maintain the posting until completion of the construction activities.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 JOB CONDITIONS, CODES, AND ORDINANCES

- A. TCEQ requires that municipalities provide oversight of construction sites' compliance with the TCEQ General Permit (TXR150000) requirements. These municipalities may require more stringent or additional stormwater pollution prevention measures during construction beyond those required by State and Federal regulations. The Contractor shall provide such additional measures at no additional cost.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. All materials used for stormwater pollution prevention shall meet the minimum design and specification requirements identified in Section 31 25 00 Erosion and Sediment Controls for commonly used sediment loss prevention practices.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Prepare a stormwater pollution prevention plan (SWPPP) in accordance with applicable permit requirements for construction activity. Develop the SWPPP in conformance with TPDES General Permit (TXR150000) for Stormwater Discharges from Construction Activities and any applicable Local requirements. Prepare and submit all forms for the Owner to assure compliance with TCEQ General Permit TXR150000 rules on behalf of the contractor and the Owner.
 - 1. SWPPP will be required from municipal separate stormwater sewer system (MS4) operators.
- B. Prepare and implement the SWPPP prior to the beginning of construction activity in accordance with Local, State, and Federal requirements.
- C. Prior to start of construction, submit schedules to the Owner and Engineer for accomplishment of temporary and permanent erosion control work in connection with required clearing and grubbing, grading, construction, and paving. Include a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials in the submittal.

3.2 INSTALLATION

- A. See Section 31 25 00 Erosion and Sediment Controls for installation requirements.

3.3 FIELD QUALITY CONTROL

- A. In the event of conflict between the specified requirements and stormwater pollution control laws, rules, or regulations, or other Local, State, or Federal agencies, the more restrictive laws, rules, or regulations shall apply.

END OF SECTION

SECTION 01 60 00**PRODUCT REQUIREMENTS****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding Products, Transportation and Handling, Storage and Protection, Product Options and Substitutions as specified herein.

1.2 RELATED WORK

- A. Section 00 07 00 – Standard General Conditions of the Construction Contract
- B. Section 01 45 00 – Quality Control

1.3 REFERENCES (NOT USED)**1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS (NOT USED)****1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)****1.7 PRODUCTS**

- A. Products: Means new material, machinery, components, equipment, fixtures, and 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 required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer, for similar components.

1.8 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.9 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather tight, climate controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above ground.

- C. Provide off site storage and protection when site does not permit on site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Store loose granular materials on solid flat surfaces in a well drained area. Provide mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.10 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Submit a request for substitution for any manufacturer not named.

1.11 SUBSTITUTIONS

- A. Substitution requests shall be in accordance with 7.06 Substitutions of Section 00 07 00 – Standard General Conditions of the Construction Contract.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 66 00**PRODUCT STORAGE AND HANDLING REQUIREMENTS****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Scheduling of product delivery
- B. Packaging of products for delivery
- C. Protection of products against damage from:
 - 1. Handling
 - 2. Exposure to elements or harsh environments

1.2 RELATED WORK

- A. Division 00 – Procurement and Contracting Requirements
- B. Division 01 – General Requirements

1.3 REFERENCES (NOT USED)**1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS (NOT USED)****1.6 DELIVERY, STORAGE, AND HANDLING****A. Delivery Requirements**

- 1. Schedule delivery of products or equipment as required to allow timely installation and to avoid prolonged storage
- 2. Provide appropriate personnel and equipment to receive deliveries
- 3. Delivery schedule of the equipment shall be coordinated with the construction contractor, with a copy of all correspondence and memoranda of telephone conversations submitted to Engineer as required in the submittals section
- 4. Construction Contractor and Owner have no obligation to accept products prior to the earliest specified date:
 - a. Store products delivered prior to the earliest specified date in a heated, bonded warehouse
 - b. Deliver to site at specified time
- 5. Deliver products or equipment in manufacturer's original unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage
- 6. Clearly and fully mark and identify as to manufacturer, item and installation location

7. Provide manufacturer's instructions for storage and handling
- B. Handling Requirements
1. Handle products or equipment in accordance with these Contract Documents and manufacturer's recommendations and instructions
- C. Storage Requirements
1. Store materials in accordance with manufacturer's recommendations and requirements of these Specifications
 2. Make necessary provisions for safe storage of materials and equipment
 - a. Place loose soil materials and materials to be incorporated into Work to prevent damage to any part of Work or existing facilities and to maintain free access at all times to all parts of Work and to utility service company installations in vicinity of Work
 3. Keep materials and equipment neatly and compactly stored in locations that will cause minimum inconvenience to other contractors, public travel, adjoining owners, tenants and occupants
 - a. Arrange storage to provide easy access for inspection
 4. Restrict storage to areas available on construction site for storage of material and equipment as shown on Drawings
 5. Provide off-site storage and protection when on-site storage is not adequate
 - a. Provide addresses of and access to off-site storage locations for inspection
 6. Do not use lawns, grass plots or other private property for storage purposes without written permission of owner or other person in possession or control of premises
 7. Store in manufacturers' unopened containers
 8. Neatly, safely and compactly stack materials delivered and stored along line of Work to avoid inconvenience and damage to property owners and general public and maintain at least 3 feet from fire hydrant
 9. Keep public and private driveways and street crossings open
 10. Temporary Storage Building:
 - a. Provide a weatherproof temporary storage building specifically for the purpose of providing for protection of products and equipment. Size building to accommodate anticipated storage items.
 - b. Equip building with lockable doors and lighting, and provide electrical service for equipment space heaters and heating or ventilation as necessary to provide storage environments acceptable to specified manufacturers.
 - c. Provide methods of storage of products and equipment off the ground.
 - d. Provide this structure within 60 days after Notice to Proceed. Locate building on-site where shown on the Drawings or in location approved by Engineer. Remove building from site prior to startup and demonstration period.

1.7 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment

1. No payment will be made to Contractor for equipment or materials not properly stored and insured or without approved submittals and shop drawings.
 - a. Previous payments for items will be deducted from subsequent progress estimate(s) if proper storage procedures are not observed.
 - b. Contractor shall provide, at the request of the Owner, all invoices and other documents to support request for payment of stored materials, whether on site or in a bonded warehouse.

1.8 ADMINISTRATIVE REQUIREMENTS (NOT USED)

1.9 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS (NOT USED)

1.10 CLOSEOUT SUBMITTALS (NOT USED)

1.11 MAINTENANCE MATERIAL SUBMITTALS (NOT USED)

1.12 FIELD [SITE] CONDITIONS (NOT USED)

1.13 WARRANTY (NOT USED)

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 INSTALLERS (NOT USED)

3.2 EXAMINATION (NOT USED)

3.3 PREPARATION (NOT USED)

3.4 ERECTION (NOT USED)

3.5 REPAIR / RESTORATION (NOT USED)

3.6 RE-INSTALLATION (NOT USED)

3.7 FIELD [OR] SITE QUALITY CONTROL

A. Tests and Inspections

1. Inspect all products or equipment delivered to the site prior to unloading.

B. Non-Conforming Work

1. Reject all products or equipment that are damaged, used or in any other way unsatisfactory for use on the project.

C. Storage Areas

1. Monitor storage area to ensure suitable temperature and moisture conditions are maintained.

3.8 SYSTEM STARTUP (NOT USED)

3.9 ADJUSTING (NOT USED)

3.10 CLEANING (NOT USED)

3.11 CLOSEOUT ACTIVITIES (NOT USED)

3.12 PROTECTION

- A. Protect all products or equipment in accordance with manufacturer's written directions
- B. Store products or equipment in location to avoid physical damage to items while in storage
- C. Protect equipment from exposure to elements and keep thoroughly dry
- D. Store pumps, motors, electrical equipment, and other equipment having antifriction or sleeve bearings in weathertight warehouses which are maintained at a temperature of at least 60 Degrees F
- E. When space heaters are provided in equipment, connect and operate heaters during storage until equipment is placed into service

3.13 MAINTENANCE (NOT USED)

3.14 ATTACHMENTS (NOT USED)

END OF SECTION

SECTION 01 70 00**EXECUTION AND CLOSEOUT REQUIREMENTS****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Closeout procedures
- B. Final cleaning
- C. Adjusting
- D. Project record documents
- E. Operation and maintenance data
- F. Warranties
- G. Certificates
- H. Spare parts and maintenance materials

1.2 RELATED WORK (NOT USED)**1.3 REFERENCES (NOT USED)****1.4 QUALITY ASSURANCES (NOT USED)****1.5 SUBMITTALS (NOT USED)****1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)****1.7 CLOSEOUT PROCEDURES**

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for inspection.
- B. Provide submittals that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.8 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. 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. 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 construction facilities from the site.

1.9 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.10 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and Modifications.
- E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish main floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract Drawings.
- F. Submit documents.

1.11 OPERATION AND MAINTENANCE DATA

- A. Submit two sets prior to final inspection, bound in 8 1/2 x 11 inch text pages, three D side ring capacity expansion binders with durable plastic covers.
- B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified type on 24 pound white paper.
- E. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
- F. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - 1. Significant design criteria.
 - 2. List of equipment.
 - 3. Parts list for each component.
 - 4. Operating instructions.
 - 5. Maintenance instructions for equipment and systems.
 - 6. Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
- G. Part 3: Project documents and certificates, including the following:
 - 1. Shop drawings and product data.
 - 2. Air and water balance reports.
 - 3. Certificates.
 - 4. Photocopies of warranties.
- H. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with review comments. Revise content of documents as required prior to final submittal.
- I. Submit final volumes revised, within ten days after final inspection.

1.12 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

- C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
- D. Submit prior to final Application for Payment.
- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.13 CERTIFICATES

- A. Provide Certificate of Occupancy if required by Government.

1.14 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 02 41 00**DEMOLITION, CUTTING, AND PATCHING****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding the removal of existing construction to the limits as indicated and specified. It also includes relocating existing construction as indicated and specified. Contractor shall comply with requirements in specification sections and shown on Contract Drawings for scheduling and completing all demolition work.
- B. Requirements regarding Demolition (the complete or partial removal and turn over to Owner, salvage or disposal of equipment and materials as indicated or specified).
- C. Requirements regarding the relocation of existing construction that includes isolating, draining, cutting, joining, new piping, new fittings, new junction boxes, new conduit, new wiring, etc. as required to reinstall a fully functional system as indicated, as specified, or as required to accommodate the new work.
- D. Requirements regarding the demolition, as well as initial modifications necessary to allow the existing plant to operate during all construction phases and final modifications during activation of the new facility. This section also includes complete or partial removal and disposal of existing structures, foundations, slabs, piping, mechanical, electrical, existing (to be abandoned or removed) buried piping and miscellaneous appurtenances encountered during construction. This section does not purport to cover all of the activities necessary and requires the Contractor to exercise due concern for plant operations and diligently direct all construction activities toward maintaining continuous operation of the existing plant during all construction phases.
- E. Requirements regarding the cutting, core drilling, fitting and patching, including attendant excavation and backfill, required to complete the work or to:
 - 1. Make its several parts fit together properly
 - 2. Uncover portions of the work to provide for installation of ill-timed work
 - 3. Remove and replace defective work
 - 4. Remove and replace work not conforming to requirements of contract documents
 - 5. Remove samples of installed work as specified for testing
 - 6. Provide penetrations of structural and nonstructural surfaces for installation of piping and electrical conduit
- F. Demolition requirement that includes:
 - 1. Complete demolition of existing yard structures which are encountered in the way of new work.
 - 2. Partial demolition as necessary below finished grade of all existing yard structures which are not in-service or required for construction.

3. Temporary modification of structures, piping, equipment, appurtenances, and utilities as necessary to allow for operation of the plant during all construction phases.
4. Demolition of existing structures, foundations and slabs to the limits shown on the drawings.
5. Demolition of equipment, piping, appurtenances and associated electrical to the limits shown on the drawings.
6. Removal and/or plugging of existing yard piping.
7. Removal and replacement of existing chain link fence.
8. Demolition partial removal and cutting of existing masonry or concrete as required for new construction.
9. Temporary modifications of existing piping, fittings, and instrumentation required to maintain plant operations during construction.

G. Related Requirements in Other Parts of the Project Manual. Basic responsibilities of parties: Conditions of the Contract.

1.2 RELATED WORK

- A. Division 01 - General Requirements
- B. Divisions 02 through 46 as applicable

1.3 REFERENCES (NOT USED)

1.4 QUALITY ASSURANCES (NOT USED)

1.5 SUBMITTALS

- A. Schedule: Submit proposed methods and operations of demolition, cutting and patching in accordance with Section 01 33 00 – Submittals Procedures.
- B. The schedule shall include:
 1. Identification of the project
 2. Description of the affected work
 3. The necessity for cutting, alteration or excavation, when applicable
 4. The effect on the work of the Owner or any separate Contractor, or on the structural or weatherproof integrity of the project
 5. Coordination schedule for shut-off, capping and continuation of utility services as required
 6. Description of the proposed work shall include:
 - a. The scope and detailed sequence of cutting, patching, alteration, or excavation
 - b. The trades who will execute the work
 - c. Products proposed to be used

- d. The extent of refinishing to be done
- e. Sequence and methods of removal and disposal of demolished materials
- f. Alternatives to cutting and patching, when applicable
- g. Written permission of any separate Contractor whose work will be affected

C. Submit a written notice to Owner designating the date and the time the work will begin.

1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.7 JOB CONDITIONS

- A. Condition of Structures: Owner assumes no responsibility for actual condition of equipment and portions of structures to be demolished. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable.
- B. Explosives: Use of explosives will not be permitted.
- C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from Owner. Provide alternate routes around closed or obstructed traffic ways if required by Owner.
- D. Recommendation: The support system/shoring plan shall be designed by a licensed Engineer in the State of Texas. Engineer shall seal the plan and a copy of the plan shall remain on site at all-times. Contractor shall be responsible for retaining the services of a licensed Engineer.
- E. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.
- F. Utility Services: Maintain existing utilities required to remain, keep in service, and protect against damage during demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Owner. Provide temporary services during interruptions to existing utilities, as acceptable to Owner.
 - 2. When utility lines are encountered which are not indicated in the plans, the Owner shall be notified.
- G. Operating Facilities
 - 1. Perform Work in a manner which will not disrupt the operation of existing in-service facilities, except as allowed in Section 01 12 16 – Construction Constraints.
 - 2. Provide temporary services to assure uninterrupted operation of existing facilities, except where service disruption is allowed for as specifically specified or specifically noted on the drawings.
 - 3. Stage materials, equipment and Work in a manner which will not obstruct Owner access to operate and maintain existing operating facility components.

4. Sequence and perform Work to minimize disruption of existing facilities.

PART 2 – PRODUCTS

2.1 SPECIFICATIONS AND STANDARDS

- A. Comply with specifications and standards for each specific product involved.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Inspect existing conditions of the project, including elements subject to damage or to movement during demolition, cutting, patching, splicing or relocation.
- B. After uncovering work, inspect the conditions affecting the installation of products or performance of the work.
- C. Report unsatisfactory or questionable conditions to the Owner in writing; do not proceed with the work until the Owner has provided further instructions.
- D. Conditions which are visible without uncovering work shall be reported to the Owner in writing no later than two weeks after site mobilization.
- E. Test equipment for proper function after relocation.
- F. The Contractor shall be liable for any lost or damage items which are to be reused. Any lost or damage items shall be replaced with products identical to the existing items or equivalent, as determined by the Owner. The Owner, along with the Engineer, shall have sole discretion in determining what product is equivalent.

3.2 PREPARATION

- A. Recommendation. The support system/shoring plan shall be designed by the Contractor's Engineer licensed in the State of Texas. The plans shall be sealed by the licensed Engineer in the State of Texas. The plan and a copy of the plan shall remain on site at all-times.
- B. Provide devices and methods to protect other portions of the project from damage.
- C. Provide protection from the elements for that portion of the project which may be exposed by demolition, cutting and patching work, and maintain excavations free from water.

3.3 PERFORMANCE

- A. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.
 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

2. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations, as directed by the Owner or governing authorities. Return adjacent areas to condition existing prior to start of work.
 3. Prior to demolition inside existing structures, provide covers consisting of plastic sheeting and framing over existing pumps, motors, switchgear, and control panels. Maintain covers during demolition operations.
- B. Structure Demolition: Demolish as required and remove from site. Use such methods as required to complete work within limitations of governing regulations.
1. Proceed with demolition in a systematic manner, from top to ground.
 2. Locate demolition equipment throughout structure and remove materials so as to not impose excessive loads to supporting walls, floors or framing.
 3. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs. Torch cutting will not be permitted.
 4. Where physical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Unless otherwise specified, core drill or saw cut openings through all concrete work. Core drilling shall be done utilizing diamond bits. Corners shall not be over cut without prior written approval from the Engineer.
 5. Torch cutting of steel members is not allowed.
- C. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- E. Fit work watertight and airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- F. Patch with seams which are durable and as invisible as possible. Restore exposed finishes of patched areas and, where necessary, extend finish restoration onto retained work, adjoining, in a manner which will eliminate evidence of patching.
- G. Take care in the removal of equipment and materials to be salvaged to prevent damage to such. Equipment to be retained by the Owner shall be sufficiently dismantled to permit thorough cleaning and draining. All valves shall be left in the open position once cleaned. All discontinued piping shall be capped and openings remaining after removal of existing equipment, fittings, valves and/or appurtenances shall be plugged and sealed.
- H. Remove all buried piping encountered during excavation unless otherwise shown on the drawings or directed by the Owner. Pipes indicated to be abandoned but not removed shall have open ends plugged with concrete. The Engineer will determine the location of where pipes shall be plugged.
- I. The Owner is responsible for the lead and asbestos abatement. Contractor shall notify Owner immediately upon encountering lead or asbestos during demolition work.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. The Owner shall retain salvage rights to all material and equipment. All materials and equipment retained by the Owner shall be transported and delivered to a point designated by the Owner in the county where the project resides.
- B. Any material or equipment not retained by the Owner shall be removed from the site and disposed of by the Contractor in accordance with applicable regulations and laws.
- C. END OF SECTION

SECTION 03 11 00**CONCRETE FORMING****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Designing forming systems in accordance with requirements of ACI 347 and the Contract Documents.
- B. Providing forming to accommodate the Work under this and other Sections and building into forming items such as sleeves, anchorage devices, inserts, pipe embedments, reinforcing, and all other items to be embedded in concrete for which placement is not specifically provided under other Sections.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 03 15 00 - Concrete Accessories
- C. Section 03 30 00 - Cast-In-Place Concrete

1.3 REFERENCES

- A. America Concrete Institute:
 - 1. ACI 117 – Specification for Tolerances for Concrete Construction and Materials and Commentary
 - 2. ACI 301 - Specifications for Concrete Construction
 - 3. ACI 347 - Guide to Formwork for Concrete
- B. ASTM International:
 - 1. ASTM C805 - Standard Test Method for Rebound Number of Hardened Concrete
 - 2. ASTM C1074 – Standard Practice for Estimating Concrete Strength by the Maturity Method
- C. National Institute of Standards and Technology:
 - 1. NIST PS 1 - Structural Plywood

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Professional Engineer:
 - a. CONTRACTOR or formwork Supplier shall retain a registered professional engineer legally qualified to practice in same state as the Site. Professional engineer shall have at least five years experience designing formwork and falsework of the type required.

- b. Responsibilities include:
 - 1) Reviewing formwork and falsework performance and design criteria stated in the Contract Documents.
 - 2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to ENGINEER by CONTRACTOR.
 - 3) Preparing or supervising preparation of design calculations verifying compliance of formwork and falsework with requirements of the Contract Documents.
 - 4) Signing and sealing all calculations.
 - 5) Certifying that:
 - a) Design of formwork and falsework was performed in accordance with performance and design criteria stated in the Contract Documents, and
 - b) Design conforms to all Laws and Regulations, and to prevailing standards of practice.
 - c) In place falsework, prior to concrete placement, complies with the intent of the forming design and complies with the Contract Documents.

- B. Mock Ups for Concrete Finishes: Provide forming for mock ups as required for finish work shown and specified for the Work. Place embedded materials in mock up. Construct forms using facing materials such as form liners, where required, to provide specified finishes and to the requirements specified in Section 03 30 00, Cast-In-Place Concrete. Obtain ENGINEER'S acceptance of each mock up prior to starting forming for the Work. Do not remove mock up(s) until directed by ENGINEER.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:
 - 1. Samples:
 - a. Plywood form material used for smooth form finish, four inches square minimum.
 - b. Form liner section sufficiently large to show two full repeating patterns, at least 12 inches square.
 - c. Form Liner Sample Panel:
 - 1) Sample shall show texture and surface pattern, required backing, form tie treatment, and treatment at liner panel joints. Use form material to be used in the Work.
 - 2) Minimum Size: Three feet by four feet.
- B. Informational Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Shop Drawings: When requested by ENGINEER, submit Shop Drawings showing and indicating general construction of individual forms, including:
 - a. Jointing
 - b. Special formed joints or reveals
 - c. Location, pattern, and details of form tie placement, removal, and repair procedures
 - d. Location and details for temporary openings
 - e. Void-form layout drawings and details of installation
 - f. Other items that would visually affect the finished concrete
2. Design of Temporary Measures: Design of formwork and falsework is CONTRACTOR's responsibility. Submit the following:
 - a. Falsework layout drawings with the seal and signature of CONTRACTOR's or Supplier's professional engineer. Layout drawings shall show bracing details, waler arrangements, location of shores, joint forming details, and details at connections to previously placed concrete. ENGINEER's review will be for general conformance to the requirements of the Contract Documents and ACI 347, as indicated for delegated design in the General Conditions.
 - b. Design calculations for formwork and falsework, when requested by ENGINEER.
 - c. Certification letter from CONTRACTOR's or Supplier's professional engineer stating that in-place falsework was inspected and complies with the intent of the falsework design.
3. Product Data: Manufacturer's data for proprietary materials, including form coatings, manufactured form systems, ties and accessories.
4. Manufacturer's Instructions: Installation instructions for proprietary materials, including form coatings, manufactured form systems, ties and accessories.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage:

1. Upon delivery to the Site, place materials in area protected from weather.
2. Store materials in accordance with manufacturer's recommendations.
3. Store materials above ground on framework or blocking. Cover wood for forms and other accessory materials with protective, waterproof covering. Provide for adequate air circulation or ventilation under cover.

B. Handle materials in accordance with the manufacturers' recommendations. Do not damage materials during handling.

PART 2 – PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design Criteria:

1. Design, erect, support, brace and maintain forming in accordance with ACI 347 so that forming safely supports vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by forming system or in place construction that has attained adequate strength for the purpose. Construct forming so that concrete members and structures are of correct size, shape, alignment, elevation, and position.
2. Design forms and falsework to include values of live load, dead load, weight of moving equipment operated on forming, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.
3. Provide shores and struts with positive means of adjustment capable of taking up forming settlement during concrete placing operations, using wedges or jacks, or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
4. Support form facing materials by structural members spaced sufficiently close to prevent beyond tolerance deflection, in accordance with ACI 117. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances. For long-span members without intermediate supports, provide camber in forming as required for anticipated deflections resulting from weight and pressure of fresh concrete and construction loads.
5. Design and construct forming to be readily removable without impact, shock or damage to concrete surfaces and adjacent materials.
6. Provide forming sufficiently tight to prevent leakage of cement paste during concrete placing. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

2.2 FORM MATERIALS

A. Forms for Smooth Finish Concrete:

1. Unless otherwise shown or indicated in the Contract Documents, construct forming for smooth concrete surfaces with plywood, metal, metal framed plywood faced, or other panel type materials acceptable to ENGINEER, to provide continuous, straight, smooth as cast surfaces with no wood grain or other surface texture imparted by forming. Provide in largest practical sizes to minimize number of joints and to conform to joint system shown or specified in the Contract Documents. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

B. Forms for Standard Finish Concrete:

1. Form concrete surfaces designated to have standard formed finish with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least two edges and one side.
- C. Forms for Architecturally Finished Concrete:
1. Form finish concrete surfaces with units of face design, size, arrangement, and configuration as shown or as required to comply with approved Project job mock up. Provide solid backing and form supports to ensure stability of form liners.
 2. Form Material: Overlaid plywood in accordance with NIST PS 1. Provide B B high density overlaid concrete form, Class I.
 3. Form Liners: Rigid PVC or fiberglass in pattern shown or indicated.
 4. Form Reuse: To be determined by ENGINEER at time of installation.
 5. Rustication Joints: Rigid PVC in profile shown or indicated.
 6. Panel Joints: Conceal joints behind rustication joints, unless approved by ENGINEER in writing.
- D. Form Ties:
1. Provide factory fabricated metal form ties, designed to prevent form deflection, and to prevent spalling of concrete surfaces upon removal.
 2. Unless otherwise shown or indicated in the Contract Documents, provide ties so that portion of tie remaining within concrete after removal of exterior parts of tie is at least 1.5 inches from the outer concrete surface. Unless otherwise shown or indicated in the Contract Documents, provide form ties that will leave a hole no larger than one inch diameter in concrete surface.
 3. Ties shall have waterstops on all exterior, below-grade walls, and walls subject to hydrostatic pressure.
 4. Ties shall leave a uniform, circular hole when forms are removed.
 5. Do not use removable ties unless accepted by ENGINEER. Removable ties are not allowed on exterior below-grade walls or walls subject to hydrostatic pressure. If removable ties are accepted, CONTRACTOR shall submit hole repair details for ENGINEER approval.
 6. Wire ties are not allowed.
 7. Do not use reinforcing bars shown by the Drawings as part of the form tie system unless approved by ENGINEER.
 8. Provide stainless steel form ties for areas with architectural finish. When used, tiebreak back point shall be at least one inch from outer concrete surface.
- E. Form Coatings:
1. Provide commercial formulation form coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compounds. For concrete surfaces that will be in contact with potable water or water that will be treated to become potable, form coating shall be a mineral oil base coating.

F. Void-Forms:

1. Void (carton) forms shall be corrugated fiberboard used for creating a void space beneath grade beams and slabs on grade.
2. Manufacturer: Provide void-forms by one of the following:
 - a. Savway Carton Forms
 - b. SureVoid Products
 - c. Or equal
3. Void-forms shall have moisture-resistant treated paper faces, be laminated with waterproof adhesive, and be biodegradable. Void-forms shall have interior fabrication of uniform braced cellular configuration and shall be capable of sustaining minimum working load of 1,000 psf for minimum of ten days after concrete placement.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine substrate and conditions under which the Work will be performed and notify ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 FORM CONSTRUCTION

- A. Construct forms in accordance with ACI 347; to the exact sizes, shapes, lines, and dimensions shown; as required to obtain accurate alignment, location, and grades; to tolerances specified; and to obtain level and plumb work in finish structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes. Finish shall be in accordance with approved mock up or sample panel, when specified.
- B. Allowable Tolerances:
 1. Construct forming to provide completed concrete surfaces complying with tolerances specified in ACI 117, ACI 301, and ACI 347.
 - a. Architectural finish forming, and where shown or indicated on the Drawings, shall be Class A surface, 1/8-inch offset.
 - b. Other surfaces exposed to view shall be Class B surface, 1/4-inch offset.
 - c. Other surfaces shall be Class C surface, 1/2-inch offset.
 2. Tolerances apply to form offsets and to irregularities within the formed surface when measured with a straightedge over a five-foot distance.
- C. Install forming and accessories for facilities in accordance with manufacturer's instructions, Laws and Regulations, and the Contract Documents.
- D. Fabricate forms for easy removal without damaging concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom

forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

- E. E. Provide temporary openings where interior area of forming is inaccessible for cleanout, for inspection before concrete placement, and for placing concrete. Brace temporary closures and set tightly to forms to prevent loss of cement paste. Locate temporary openings on forms in locations as inconspicuous as possible, consistent with requirements of the Work. Form intersecting planes of openings to provide true, clean cut corners, with edge grain of plywood not exposed as form for concrete.
- F. Falsework:
 - 1. Erect falsework and support, brace, and maintain falsework to safely support vertical, lateral, and asymmetrical loads applied until such loads can be supported by in place concrete structures. Construct falsework so that adjustments can be made for take-up and settlement.
 - 2. Provide wedges, jacks or camber strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce finished Work of required dimensions.
- G. Forms for Smooth Finish Concrete:
 - 1. Do not use metal cover plates for patching holes or defects in forms.
 - 2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
 - 3. Use extra studs, walers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material that will produce bow.
 - 4. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
 - 5. Form molding shapes, recesses, rustication joints and projections with smooth finish materials, and install in forms with sealed joints to prevent displacement.
- H. Corner Treatment:
 - 1. Form exposed corners of beams, walls, foundations, bases and columns to produce smooth, solid, unbroken lines, except as otherwise shown or indicated in the Contract Documents. Chamfer exposed corners.
 - 2. Form chamfers with 3/4 inch by 3/4 inch strips, unless otherwise shown or indicated in the Contract Documents, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Use rigid PVC chamfers for architecturally formed concrete. Extend terminal edges to required limit and miter chamfer strips at changes in direction.
 - 3. Reentrant or internal and unexposed corners may be formed either square or chamfered.
- I. Joints:

1. For joint treatment, comply with Section 03 15 00, Concrete Accessories. Locate joints as shown and specified.
- J. Openings and Built In Work:
1. Provide openings in concrete forming shown or required under other Sections. Refer to Paragraph 1.1B of this Section for coordination requirements.
 2. Accurately place and securely support items to be built into forms.
- K. Sealing Forming:
1. Forming joints shall be tight-fitting or otherwise sealed to prevent loss of cement paste.
 2. Provide forming resting against concrete surfaces with compressible gasket material between the concrete and edge of form, to fill irregularities and create tight seal.
- L. Cleaning and Tightening:
1. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms immediately after placing concrete, as required to eliminate cement paste leaks.
- M. Tie Hole Repair:
1. Repair tie holes in accordance with Section 03 30 00 - Cast-In-Place Concrete.

3.3 FORM COATINGS

- A. Coat form contact surfaces with non-staining form coating compound before installing reinforcing materials. Do not allow excess form coating material to accumulate in forms or come into contact with surfaces that will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.
- B. Coat steel forms with non-staining, rust preventative form oil, or otherwise protect against rusting. Do not use rust stained steel forming.

3.4 INSTALLATION OF EMBEDDED ITEMS

- A. Set and build into forming anchorage devices and other embedded items, shown, specified, or required under other Sections. Refer to Paragraph 1.1B of this Section for coordination requirements. Use necessary setting drawings, diagrams, instructions, and directions.
- B. Edge Forms and Screeds Strips for Slabs:
 1. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units to support screeds.

3.5 VOID-FORMS

- A. Install void-forms where shown or indicated in the Contract Documents, to the thickness indicated, in accordance with manufacturer's recommendations.
- B. Where void-form is shown or indicated in the Contract Documents, place void-form to grades and elevations shown over an even, well-compacted subgrade to form continuous void space under entire extent of slab, mat, or grade beam.
- C. For structural slab applications, place 1/8-inch thick masonite or plywood sheet over void-form. Place void-forms in largest pieces practical and secure in place.
- D. Properly surround and void around upper portion of drilled piers at intersection of slab, grade beam or pier cap using premanufactured, non-field cut sealed void-form with curved, radial, vertical edge adjacent to drilled pier.
- E. Void-forms shall remain dry and undamaged prior to concrete placement. Replace damaged pieces prior to placing concrete. Seal all joints and exposed ends to prevent concrete leakage into void space.

3.6 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Before placing concrete, check ties, tie cones, tie waterstops, embedded items, form coatings, forming stability, alignment, and tolerances. Make corrections and adjustments to ensure forming complies with intent of the forming design, proper stability of forming systems, and accurate size and location of concrete members.
 - 2. During concrete placing, check forming and related supports to ensure that forms are not displaced and that completed Work will be within specified tolerances.
 - 3. If forms are unsatisfactory in any way, either before or during concrete placing, stop or postpone placing of concrete until defects are corrected as required by CONTRACTOR's or Supplier's professional engineer and accepted by ENGINEER.

3.7 REMOVAL OF FORMS

- A. Determination of time between placing concrete and removing forms is CONTRACTOR's responsibility. Requirements specified in this Section are minimum times and requirements intended to ensure that concrete will support its own weight, and do not consider additional effects of the construction. Additional effects of the construction shall be accounted for by CONTRACTOR when determining time for removing forming. Time for removing of forms is subject to ENGINEER's acceptance.
- B. Comply with requirements of ACI 301 and ACI 347, except as indicated in the Contract Documents.
- C. Removal of Forms for Walls, Columns, Sides of Beams and Girders, and Slab and Foundation Edges:
 - 1. Comply with requirements of the table below:

Component	Average Daily Ambient Air Temperature (deg F)				Min. Concrete Compressive Strength for Form Removal
	Over 70 F	60 F to 70 F	50 F to 60 F	Below 50 F	
Walls	One day	Two days	Three days	See Paragraph 3.8.C.2 of this Section	750 psi
Columns	Two days	Three days	Four days		1,000 psi
Side of beams and girders	One day	One day	Two days		500 psi
Slab and foundation edges	One day	One day	Two days		500 psi

2. When average daily ambient air temperature is below 50 degrees F, do not remove forms until concrete attains minimum compressive strength indicated in the table above for form removal, and comply with Paragraph 3.7.C.3.b of this Section.
3. Concrete Strength Requirements for Form Removal:
 - a. For other than beams and elevated slabs, do not remove forms until concrete attains minimum concrete compressive strength indicated in Table in 3.7.C.1.
 - b. For beams and elevated slabs, do not remove supporting forms or shoring until concrete attains minimum of 90 percent of its specified compressive strength.
- D. Alternative Criteria for Removing Forms for Walls, Columns, Sides of Beams and Girders, and Slab and Foundation Edges: CONTRACTOR has the option of submitting an alternative removal of forms table, together with supporting data, for ENGINEER's acceptance. Supporting data shall include representative field data for each different placement ambient temperature condition and minimum of three tests per temperature condition to ensure that accurate correlation between concrete strength and placement temperature is obtained.
- E. Determination of In-place Concrete Strength:
 1. Determine compressive strength of in-place concrete by compression test specimens cured at the Site under the same conditions of temperature and moisture as the concrete member under consideration.
 2. Alternately, determine compressive strength of in-place concrete by maturity factor procedure in accordance with ASTM C1074 and approved by ENGINEER. Location of embedded thermistors or thermocouples shall be as approved by ENGINEER.
- F. When high early strength concrete is used, time for removing the forms will be developed at the Site from the age/strength relationships established for the materials and proportions used by tests in accordance with ACI 301.
- G. Leave form facing material in place for minimum of four days after concrete placement, unless otherwise approved by ENGINEER.

- H. Continue curing, including bottom surfaces of slabs and beams, after form removal in accordance with Section 03 30 00 - Cast-In-Place Concrete.

3.8 PERMANENT SHORES

- A. Provide permanent shores in accordance with ACI 347.
- B. Reshores are not allowed.

3.9 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re used in the construction. Do not use split, frayed, delaminated, or otherwise damaged form facing material. Apply form coating compound material to concrete contact surfaces as specified for forming.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use “patched” forms for exposed concrete surfaces. Form surfaces are subject to ENGINEER’s approval.

END OF SECTION

SECTION 03 15 00**CONCRETE ACCESSORIES****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install concrete accessories.

1.2 RELATED WORK:

- A. Section 01 33 00 – Submittal Procedures
- B. Section 03 11 00 – Concrete Forming
- C. Section 03 60 00 – Grouting

1.3 REFERENCES**A. America Concrete Institute:**

- 1. ACI 301 - Specifications for Concrete

B. ASTM International:

- 1. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork, and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
- 2. ASTM C309 – Standard Specification for Liquid Membrane – Forming Compounds for Curing Concrete
- 3. ASTM C510 – Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
- 4. ASTM C661 – Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
- 5. ASTM C793 – Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants
- 6. ASTM C794 – Adhesion-in-Peel Elastomeric Joint Sealants Test Equipment
- 7. ASTM C920 – Standard Specification for Elastomeric Joint Sealants

C. CRD:

- 1. CRD C572 - Corps of Engineers Specifications for Polyvinyl Chloride Waterstop

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS**

- A. Action Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Shop Drawings:
 - a. Layout of construction and expansion joint locations. Submit and obtain approval prior to submitting concrete reinforcement Shop Drawings.
 - b. For construction and expansion joints that require waterstops, submit layout of locations showing waterstop details. Indicate waterstop type, waterstop joint conditions, and details on how joint conditions will be handled.
 - c. Layout of all control joint locations.
2. Samples:
 - a. Submit Sample, at least six inches long each, of each type of waterstop proposed for use.
 - b. Submit Sample of foam rubber and cork expansion joint fillers.
 - c. Submit Sample of each type of prefabricated PVC waterstop joint.
- B. Informational Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:
 1. Manufacturer's Instructions: Manufacturer's specifications and installation instructions for all materials required.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Transportation and Handling of Products:
 1. Deliver materials to Site to ensure uninterrupted progress of the Work.
 2. Comply with Section 01 60 00 - Product Requirements.
- B. Storage and Protection:
 1. Store concrete joint materials on platforms or in enclosures or covered to prevent contact with ground and exposure to weather and direct sunlight. Comply with manufacturer's storage and protection requirements.
 2. Comply with Section 01 60 00 - Product Requirements.

PART 2 – PRODUCTS

2.1 WATERSTOPS

- A. Polyvinyl Chloride (PVC):
 1. Material Requirements:
 - a. Waterstops shall be extruded from elastomeric PVC compound containing plasticizers, resins, stabilizers, and other materials necessary to meet requirements of the Contract Documents and requirements of CRD-C572. Do not use reclaimed or scrap material.
 - b. Tensile strength of finished waterstop: 1,400 psi, minimum.
 - c. Ultimate elongation of finished waterstop: 280 percent, minimum.
 - d. Minimum thickness shall be 3/8-inch over entire width of waterstop.

- e. Provide waterstops with minimum of seven ribs equally spaced at each end on each side. First rib shall be at the edge. Ribs shall be a minimum of 1/8-inch in height.
 - f. Provide waterstops with hog rings or factory-installed grommets anchored to exterior ribs to facilitate tying waterstop in position.
 - 2. Split waterstops are not allowed.
 - 3. Construction Joints: Waterstops shall be flatstrip ribbed type, six-inch minimum width, unless otherwise shown or indicated in the Contract Documents.
 - 4. Expansion Joints: Waterstops shall be centerbulb ribbed type, nine-inch minimum width, unless otherwise shown or indicated in the Contract Documents. Centerbulb shall have minimum outside diameter of 7/8-inch.
 - 5. Retrofit Applications: Waterstops shall be T-profile, centerbulb ribbed type with six-inch minimum projection into new concrete and anchored to the existing concrete via stainless steel anchor bolts and an epoxy bed.
 - 6. Product and Manufacturer: Provide one of the following:
 - a. Durajoint Waterstops
 - b. Greenstreak Waterstop by Sika USA
 - c. Vinylex Waterstops
- B. Hydrophilic Waterstop Materials:
- 1. General Material Properties:
 - a. Bentonite-free, and expandable by minimum of 80 percent of dry volume in presence of water to form watertight joint seal without damaging concrete in which material is cast. Provide only where shown or indicated in the Contract Documents.
 - b. Material shall be composed of resins and polymers that absorb water and cause an increase in volume in completely reversible and repeatable process. Waterstop material shall be dimensionally stable after repeated wet-dry cycles with no deterioration of swelling potential.
 - c. Select materials that are recommended by manufacturer for type of liquid to be contained.
 - 2. Hydrophilic Rubber Waterstop:
 - a. Minimum cross sectional dimensions shall be 3/16-inch by 3/4-inch.
 - b. Product and Manufacturer: Provide one of the following:
 - 1) Adeka Ultraseal MC-2010M by Asahi Denka Kogyo K.K.
 - 2) SikaSwell S2 by Sika Corporation
 - 3. Hydrophilic Sealant:
 - a. Hydrophilic sealant shall adhere firmly to concrete, metal, and PVC in dry or damp condition. When cured sealant shall be elastic indefinitely.
 - b. Product and Manufacturer: Provide one of the following:

1) Adeka Ultra Seal P201 by Asahi Denka Kogyo K.K.

2.2 PREFORMED EXPANSION JOINT FILLER

A. Provide preformed expansion joint filler complying with ASTM D1752, Type I (sponge rubber) or Type II (cork).

2.3 CONCRETE CONSTRUCTION JOINT ROUGHENER

A. Provide water-soluble non flammable, surface retardant roughener.

B. Product and Manufacturer: Provide one of the following for the types of joints specified:

1. Rugasol S by Sika Corporation for horizontal joints only.
2. Concrete Surface Retarder-Formula S, by Euclid Chemical Company for horizontal joints only.
3. Concrete Surface Retarder-Formula F, by Euclid Chemical Company for vertical joints only.

2.4 EPOXY BONDING AGENT

A. Provide a two-component epoxy resin bonding agent.

B. Product and Manufacturer: Provide one of the following:

1. Sikadur 32 Hi Mod LPL by Sika Corporation
2. SureBond J58 by Dayton Superior

2.5 EPOXY-CEMENT BONDING AGENT

A. Provide three component epoxy resin-cement blended formulated as bonding agent.

B. Product and Manufacturer: Provide one of the following:

1. Sika Armatec-110 EpoCem as manufactured by Sika Corporation
2. Master Emaco P124 as manufactured by BASF

2.6 CONCRETE BOND BREAKERS

A. Provide asphalt-saturated rag felt building paper, not less in weight than commercially known as 15 pound felt building paper, which weighs 15 pounds per 100 square feet.

B. Chemical Bond Breaker:

1. Provide medium solids resin solution chemical concrete bond breaker complying with ASTM C309, Type I, Class B.

2.7 RUBBER BONDING AGENT

A. Product and Manufacturer: Provide one of the following:

1. Scotch Grip Rubber Adhesive 1300 as manufactured by 3M Company
2. Or equal

2.8 JOINT SEALANT AND ACCESSORIES

- A. Provide two-component polyurethane sealant.
 - 1. Products and Manufacturers: Provide one of the following:
 - a. Sikaflex-2C NS by Sika Corporation
 - b. Permapol RC-270 Reservoir Sealant by Products Research and Chemical Corporation
 - 2. Polyurethane based, two-component elastomeric sealant complying with:
 - a. ASTM C920, Type M, Grade NS, Class 25
 - b. Adhesion-in-Peel ASTM C794: (Minimum five pounds per linear inch with no adhesion failure): 18 lbs
 - c. Hardness (Standard Conditions), ASTM C661: 25 (Shore A)
 - d. Stain and color change, ASTM C510: No discoloration or stain
 - e. Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weatherometer
 - f. Rheological Vertical Displacement at 120 degrees F
 - g. VOC Content: 220 grams per liter, maximum
- B. Sealant backer rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable nonabsorptive material as recommended for compatibility with caulking and sealant by caulking and sealant manufacturer. Provide size and shape of rod that will control joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide highly-compressible backer to minimize possibility of sealant extrusion when joint is compressed.

PART 3 – EXECUTION

3.1 INSPECTION

- A. CONTRACTOR and installing Subcontractor, if any, shall examine substrate and conditions under which the Work is to be performed and notify ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 CONSTRUCTION JOINTS

- A. Comply with requirements of ACI 301 and the Contract Documents.
- B. Locate and install construction joints as shown or indicated on the Drawings. Where not shown or indicated, locate joints to not impair strength of the structure; position joints at points of minimum shear. Location of joints shall be approved by ENGINEER. In addition to joints shown or indicated on the Drawings, locate construction joints as follows:
 - 1. In foundation mats, locate joints at spacing of approximately 40 feet. Joints shall be located within middle third of element span, unless otherwise shown or

indicated on the Drawings. Element span shall be considered distance between piles or, as determined by ENGINEER, distance between bearing elements, such as columns, exterior walls and interior walls. Place concrete in strip pattern, unless otherwise shown or indicated on the Drawings.

2. In walls, locate joints at a maximum spacing of 40 feet. Locate joints away from wall intersections a minimum of one-quarter of the clear span distance between wall intersections measured horizontally.
3. In structural slabs and beams, joints shall be located within middle third of element span and shall be located in compliance with ACI 301, unless otherwise shown or indicated on the Drawings.
4. In slabs on grade, locate joints at spacing of approximately 40 feet. Place concrete in strip pattern, unless otherwise shown or indicated on the Drawings.

C. Horizontal Joints:

1. Roughen concrete at interface of construction joints by abrasive blasting, hydroblasting, or using surface retardants and water jets to expose aggregate and remove accumulated concrete on projecting rebar immediately subsequent to form stripping, unless otherwise approved by ENGINEER. Immediately before placing fresh concrete, thoroughly clean existing contact surface using stiff brush or other tools and stream of pressurized water. Surface shall be clean and wet, and free from pools of water at time of placing fresh concrete.
2. Remove laitance, waste mortar, and other substances that may prevent complete adhesion. Where joint roughening was performed more than seven days prior to concrete placing or where dirt or other bond reducing contaminants are on surface, perform additional light abrasive blasting or hydroblasting to remove laitance and all bond-reducing materials just prior to concrete placement.
3. Provide over contact surface of concrete a six-inch layer of Construction Joint Grout as specified in Section 03 60 00 - Grouting. Place fresh concrete before grout has attained its initial set. Placement of grout may be omitted if concrete mix has slump increased to at least six inches by addition of high range water reducer.

D. Vertical Joints:

1. Apply roughener to the form in thin, even film by brush, spray, or roller in accordance with manufacturer's instructions. After roughener is dry, concrete may be placed.
2. When concrete has been placed, remove joint surface forms as early as necessary to allow for removal of surface retarded concrete. Forms covering member surfaces shall remain in place as required under Section 03 11 00 - Concrete Forming. Wash loosened material off with high-pressure water spray to obtain roughened surface subject to approval by ENGINEER. Alternately, surface shall be roughened by abrasive blasting or hydroblasting to expose aggregate. Outer one-inch of each side of joint face shall be masked and protected from blasting to avoid damaging member surface.

3.3 EXPANSION JOINTS

- A. Comply with requirements of ACI 301 and this Section.
- B. Locate and install expansion joints as shown and indicated in the Contract Documents. Install joint filler in accordance with manufacturer's instructions. Install sealants as specified in this Section.

3.4 CONTROL JOINTS

- A. Provide control joints in non-water bearing slabs on grade as shown or indicated on the Drawings. Where control joints are not shown or indicated on the Drawings, space control joints at 24 to 36 times thickness of slab in both directions. Locate control joints only at places approved by ENGINEER.
- B. A groove, with depth of at least 25 percent of the member thickness, shall be tooled, formed, or saw-cut in concrete. Groove shall be filled with joint sealant material in accordance this specification.
- C. Where control joint is formed by sawcutting, make sawcut in presence of ENGINEER immediately after concrete has set sufficiently to support the saw and be cut without damage to concrete. Keep concrete continually moist during cutting. Joints shall be approximately 1/8-inch wide.
- D. Control joints may be formed with tool or by inserting joint forming strip. After concrete has achieved design strength, remove upper portion of joint forming strip and fill void with sealant.

3.5 ISOLATION JOINTS

- A. Provide isolation joint where sidewalk or other slab on grade abuts a concrete structure and slab on grade is not shown doweled into that structure. Form isolation joint by 1/2-inch joint filler with upper 1/2-inch of joint filled with sealant.

3.6 WATERSTOPS

- A. General:
 - 1. Comply with ACI 301 and this Section. Make joints in accordance with manufacturer's instructions.
 - 2. Provide PVC waterstops, except where otherwise shown or indicated on the Drawings.
 - 3. Provide waterstops in all joints where concrete construction is below grade or intended to retain liquid. Install waterstop to the higher of: at least 12 inches above grade, or 12 inches above overflow liquid level in tanks.
 - 4. Waterstops shall be fully continuous for extent of joint and with waterstops in intersecting joints. Maintain waterstop continuity at transitions between waterstops in joints at different levels and orientations.
 - 5. In vertical joints in walls that are free at the top, waterstops shall extend no closer than six inches from top of wall.

6. In placing concrete around horizontal waterstops, with waterstop flat face in horizontal plane, work the concrete under waterstops by hand to avoid forming air and rock pockets.

B. Polyvinyl Chloride Waterstop:

1. Waterstops shall be positively held from displacement during concrete placing. Tie waterstops to reinforcement or other rigid supports at maximum spacing of 18 inches so that waterstop is securely and rigidly supported in proper position during concrete placing. Continuously inspect waterstops during concrete placing to ensure proper positioning.
2. Perform splicing in waterstops by heat sealing adjacent waterstop sections in accordance with manufacturer's printed recommendations. The following is required:
 - a. Material shall not be damaged by heat sealing.
 - b. Splices shall have tensile strength of not less than 60 percent of unspliced material's tensile strength.
 - c. Maintain the continuity of waterstop ribs and of its tubular center axis.
3. Only butt-type joints of ends of two identical waterstop sections shall be made while material is in forms.
4. Prefabricated PVC Waterstop Joint:
 - a. Joints with waterstops involving more than two ends to be jointed together, and joints that involve an angle cut, alignment change, or joining of two dissimilar waterstop sections, shall be prefabricated by CONTRACTOR or manufacturer prior to placing in the forms.
 - b. Prefabricated joints shall have minimum of 2.0 feet of waterstop material beyond joint in each direction.
 - c. Install prefabricated joint assembly in the forms and butt-weld each two-foot end to a straight-run portion of waterstop in place in the forms.
5. Where centerbulb waterstop intersects and is jointed with non-centerbulb waterstop, seal end of centerbulb using additional PVC material as required.
6. Symmetrical halves of waterstops shall be equally divided between concrete placements at joints and centered within joint width, unless shown or indicated otherwise in the Contract Documents. Place centerbulb waterstops in expansion joints so that centerbulb is centered on joint filler material.
7. When waterstop is installed in the forms or embedded in first concrete placement and waterstop remains exposed to atmosphere for more than four days, implement suitable precautions to shade and protect exposed waterstop from direct rays of sun during entire exposure, until exposed portion of waterstop is embedded in concrete.
8. Protect waterstop placed in joints intended for future concrete placement from direct rays of the sun by temporary means until permanent cover is installed, so that waterstop is not exposed to direct rays of the sun for more than four days total.

C. Hydrophilic Rubber Waterstop and Sealant:

1. Where a hydrophilic rubber waterstop or sealant is required in accordance with the Contract Documents, or where approved by ENGINEER, install waterstop or sealant in accordance with manufacturer's instructions and recommendations; except, as modified in the Contract Documents.
2. When requested by ENGINEER, provide manufacturer's technical assistance at the Site.
3. Locate waterstop or sealant as near as possible to center of joint. Waterstop or sealant shall be continuous around entire joint. Minimum distance from edge of waterstop to face of the member shall be three inches.
4. Where hydrophilic rubber waterstop is used in combination with PVC waterstop, hydrophilic rubber waterstop shall overlap PVC waterstop for minimum of six inches. Fill contact surface between hydrophilic rubber waterstop and PVC waterstop with hydrophilic sealant.
5. Where wet curing methods are used, apply hydrophilic rubber waterstop and sealant after curing water is removed and just prior to closing up of the forms for concrete placement. Protect hydrophilic rubber waterstop and sealant from direct rays of sun and from becoming wet prior to concrete placement. If material becomes wet and expands, allow material to dry until material has returned to original cross sectional dimensions before placing concrete.
6. Install hydrophilic rubber waterstop in bed of hydrophilic sealant, before skinning and curing begins, so that irregularities in concrete surface are completely filled and waterstop is bonded to sealant. After sealant has cured, install concrete nails, with washers of a diameter equal to waterstop width, to secure waterstop to concrete at maximum spacing of 1.5 feet.
7. Prior to installing hydrophilic sealant, wire brush or sandblast the concrete surface to remove laitance and other materials that may interfere with bonding. Metal and PVC surfaces to receive sealant shall be cleaned of paint and any material that may interfere with bond. When sealant alone is shown or indicated in the Contract Documents, place sealant placed in built-up bead which has a triangular cross section with each side of triangle at least 3/4-inch long, unless otherwise indicated in the Contract Documents. Do not place concrete until sealant has cured as recommended by sealant manufacturer.

3.7 BONDING AGENT

- A. Use epoxy bonding agent for bonding of fresh concrete to concrete that has been in place for at least 60 days, and for bonding to existing concrete.
- B. Use epoxy-cement bonding agent for the following:
 1. Bonding toppings and concrete fill to concrete that has been in place for at least 60 days, and for bonding to existing concrete.
 2. For locations where bonding agent is required and concrete cannot be placed within open time period of epoxy bonding agent.
- C. Use cement-water slurry as bonding agent for toppings and concrete fill to new concrete. Cement water slurry shall be worked into surface with stiff bristle broom and place the concrete before cement-water slurry dries.

- D. Handle and store bonding agent in accordance with manufacturer's printed instructions and safety precautions.
- E. Mix bonding agent in accordance with manufacturer's instructions.
- F. Before placing fresh concrete, thoroughly roughen and clean hardened concrete surfaces and coat with bonding agent not less than 1/16 inch thick. Place fresh concrete while bonding agent is still tacky (within its open time), without removing in place bonding agent coat, and as directed by manufacturer.

3.8 JOINT SEALANT INSTALLATION

- A. Install joint sealants after adjacent areas have been cleaned and before joint has been cleaned and primed, to ensure caulking and sealant joints will not be soiled. Replace caulking and sealant joints soiled after installation.
- B. Prime or seal joint surfaces as shown on approved shop drawings and approved other submittals. Do not allow primer or sealer to spill or migrate onto adjoining surfaces. Allow primer to dry prior to applying sealants.
- C. Apply masking tape before installing primer, in continuous strips in alignment with joint edge to produce sharp, clean interface with adjoining materials. Remove tape immediately after joints have been sealed and tooled as directed.
- D. Do not install sealants without backer rods and bond breaker tape.
- E. Roll back-up rod stock into joint to avoid lengthwise stretching. Do not twist, braid, puncture, or prime backer rods.
- F. Employ only proven installation techniques that will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface slightly below adjoining surfaces. Where horizontal joints are between a horizontal and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
- G. Install sealants to depths recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of bead.
 - 1. For horizontal joints in sidewalks, pavements, and similar locations sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, but not more than 5/8-inch deep or less than 3/8-inch deep.
 - 2. For vertical joints subjected to normal movement and sealed with elastomeric sealants and not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2-inch deep or less than 1/4-inch deep.
- H. Remove excess and spillage of compounds promptly as the work progresses.
- I. Cure caulking and sealant compounds in compliance with manufacturer's instructions and recommendations, to obtain high-early bond strength, internal cohesive strength, and surface durability.

END OF SECTION

SECTION 03 20 00**CONCRETE REINFORCING****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Concrete Reinforcing
- B. Fabrication and placement of reinforcing including bars, ties, and supports, and welded wire fabric for concrete, encasements, and fireproofing

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 03 15 00 – Concrete Accessories
- C. Section 05 05 19 - Anchor Systems

1.3 REFERENCES

- A. America Concrete Institute:
 - 1. ACI 315 – Guide to Presenting Reinforcing Steel Design Details
 - 2. ACI 318 - Building Code Requirements for Structural Concrete
 - 3. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures
- B. American National Standards Institute/American Welding Society
 - 1. ANSI/AWS D1.4 - Structural Welding Code - Reinforcing Steel
- C. American Society for Testing and Materials International
 - 1. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
 - 2. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
 - 3. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 4. ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
 - 5. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars
 - 6. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
 - 7. ASTM E488 – Standard Test Methods for Strength of Anchors in Concrete Elements
- D. Concrete Reinforcing Steel Institute

1. Concrete Reinforcing Steel Institute (CRSI) - Manual of Standard Practice
- E. International Code Council
 1. ICC Evaluation Service (ES) AC 308 – Post – Installed Adhesive Anchors in Concrete Elements

1.4 QUALITY ASSURANCE

- A. Qualifications:
 1. Testing Laboratory: Shall meet requirements of ASTM E329 and shall have experience in the testing welded splices of reinforcing steel and tension testing of reinforcing bars set in adhesive in hardened concrete.
 2. Installer of Adhesive Dowels: Shall be experienced and certified by manufacturer of adhesive as possessing necessary training for installing manufacturer's products. Distributors or manufacturer's representatives shall not provide product training unless qualified as certified trainers by anchor manufacturer.
- B. Certifications:
 1. Weld Procedures: For types of splices and grades of reinforcing used in the Work, weld procedures for welded reinforcing steel splices shall be certified in accordance with ANSI/AWS D1.4.
 2. Welders: For types of splices and grades of reinforcing used in the Work, welders shall be certified for welding reinforcing steel splices in accordance with ANSI/AWS D1.4.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:
 1. Shop Drawings:
 - a. Drawings for fabricating, bending, and placing concrete reinforcing. Comply with ACI 315, Parts A and B.
 - b. For walls, show elevations at minimum scale of 1/4-inch to one foot.
 - 1) Elevations shall show all openings and reference details that identify additional reinforcing required around each opening.
 - 2) Elevations shall denote each wall intersection and reference a detail that identifies additional reinforcing required at wall intersection. As an alternate to providing separate details for each wall intersection, provide overall plan detailing only the additional wall intersection reinforcing for each wall intersection.
 - c. For slabs and mats, show top and bottom reinforcing on separate plan views.
 - 1) Plans shall show all openings and shall reference details that identify additional reinforcing around each opening.

- d. Show bar schedules, stirrup spacing, diagrams of bent bars, location of bar splices, length of lap splices, arrangements, and assemblies, as required for fabricating and placing concrete reinforcing unless otherwise noted.
 - e. Splices shall be kept to a minimum. Avoid, when possible, splices in regions of maximum tensile stresses.
 - f. Drawings detailing location of all construction and expansion joints, as required under Section 03 15 00 - Concrete Accessories, shall be submitted and approved before Shop Drawings for reinforcing are submitted.
 - g. Drawings detailing location, spacing, edge distance, and embedment depth of adhesive dowels. Adhesive system shall be submitted and approved before Shop Drawings with adhesive dowels are submitted.
- 2. Product Data:
 - a. Manufacturer's product data for adhesive, if not submitted under other Sections.
 - b. Adhesive manufacturer's test data and ICC ES report to verify specified capacity of adhesive dowels.
- B. Informational Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:
 - 1. Certificates:
 - a. Steel manufacturer's certificates of mill analysis, tensile, and bend tests for reinforcing steel.
 - b. Certification of welders and weld procedures for splices.
 - c. Adhesive manufacturer's certification verifying that installer is qualified and using proper installation procedures.
 - 2. Manufacturer's Instructions:
 - a. Installation instructions for adhesive systems.
 - 3. Special Procedure Submittals; Description of reinforcing weld locations and weld procedures.

1.6 DELIVERY, HANDLING, AND STORAGE

- A. Deliver concrete reinforcing products to Site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings on approved Shop Drawings.
- B. Store concrete reinforcing products to prevent damage and accumulation of dirt and excessive rust. Store on heavy wood blocking so that reinforcing does not come into contact with the ground.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: Shall be deformed in accordance with ASTM A615 and A775, and as follows:
 - 1. Provide Grade 60 epoxy coated reinforcing for all bars at all locations except locations as specified in item 2 below.
 - 2. Provide Grade 60 standard reinforcing at the locations below:
 - a. All drilled concrete piers
 - b. Sidewalks
- B. Mechanical Couplers: Reinforcement bars may be spliced with mechanical connection. Connection shall be full mechanical connection that shall develop in tension or compression, as required, at least 125 percent of specified yield strength (fy) of bar in accordance with ACI 318 and ACI 350. Where splices at the face of wall are shown or approved by ENGINEER, form saver-type mechanical couplers may be used. Form-saver couplers shall have integral plates designed to positively connect coupler to formwork.
- C. Steel Wire: Shall be in accordance with ASTM A82.
- D. Column Spirals: Hot-rolled rods for spirals, conforming to ASTM A615.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing in place.
 - 1. Use wire bar type supports complying with CRSI MSP recommendations, except as specified in this Section. Do not use wood, brick, or other unacceptable materials.
 - 2. For slabs on grade, use precast concrete blocks, four inches square in plan, with embedded tie wire as specified by CRSI MSP. Precast concrete blocks shall have same or higher compressive strength as specified for concrete in which they are located.
 - 3. For concrete surfaces where legs of supports are in contact with forms, provide supports complying with CRSI MSP as follows:
 - a. At formed surfaces in contact with soil, weather, or liquid, or located above liquid, supports shall be CRSI Class 1 for maximum protection. Plastic coating on legs shall extend at least 0.5-inch upward from form surface.
 - b. At interior dry surfaces (not located above liquid), supports shall be either Class 1 or Class 2 for moderate protection.
 - c. At formed surfaces with an architectural finish, use stainless steel protected legs (Type B).
 - 4. Over waterproof membranes, use precast concrete chairs.
 - 5. For epoxy-coated reinforcing, use wire reinforcing supports coated with dielectric material including epoxy or another polymer for minimum distance of two inches from point of contact with epoxy-coated reinforcement.

2.2 FABRICATION

- A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI MSP. In case of fabricating errors, do not re bend or straighten reinforcing in manner that injures or weakens material.
- B. Unacceptable Materials: Reinforcing with one or more of the following defects is not allowed:
 - 1. Bar lengths, bends, and other dimensions exceeding specified fabrication tolerances.
 - 2. Bends or kinks not shown on approved Shop Drawings.
 - 3. Bars that do not meet or exceed their ASTM specification requirements when hand-wire-brushed, with respect to cross section, nominal weight, or average height of deformations.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine the substrate and conditions under which concrete reinforcing is to be placed and notify ENGINEER in writing of unsatisfactory conditions. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with applicable recommendations of Laws and Regulations, applicable standards, and CRSI MSP for details and methods of reinforcing placement and supports.
- B. Clean reinforcing to remove loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcing against displacement during formwork construction and concrete placing. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
 - 1. Place reinforcing to obtain minimum concrete coverages specified in ACI 318, ACI 350, and the Contract Documents. Arrange, space, and securely tie bars and bar supports together with 16-gage wire to hold reinforcing accurately in position during concrete placing. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
 - 2. Prior to placing concrete, using surveyor's level or string line, demonstrate to ENGINEER that specified cover of reinforcing has been attained.
 - 3. Do not secure reinforcing steel to forms with wire, nails, or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.
- D. Allowable Placing Tolerances: Comply with ACI 318 and ACI 350 except as specified in this Section:

1. Concrete surfaces in contact with liquid shall have minimum of two inches of concrete over reinforcing steel.
- E. Provide sufficient number of supports of strength required to carry reinforcing. Do not place reinforcing bars more than two inches beyond last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- F. Lap Splices:
1. Provide standard reinforcing splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars as shown on the Drawings.
- G. Mechanical Couplers:
1. Mechanical butt splices shall be in accordance with recommendations of mechanical splicing device manufacturer. Butt splices shall develop 125 percent of specified minimum yield tensile strength of spliced bars or of smaller bar in transition splices. Bars shall be flame-dried before butt splicing. Provide adequate jigs and clamps or other devices to support, align, and hold longitudinal centerline of bars being butt spliced in straight line.
- H. Welded Splices:
1. When field welding of reinforcing is required on the Drawings or allowed by ENGINEER in writing, welding of reinforcing bars shall conform to ANSI/AWS D1.4. Preheating and rate of cooling requirements shall be based on bar steel chemistry and ANSI/AWS D1.4. Welded splices shall be sized and constructed to transfer minimum of 125 percent of specified minimum yield tensile strength of spliced bars or of smaller bar in transition splices. Unless otherwise allowed by ENGINEER in writing, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.
 2. Welding of wire to wire, and of wire or welded wire fabric to reinforcing bars or structural steels, shall conform to applicable provisions of ANSI/AWS D1.4 and ENGINEER's requirements for the particular application.
 3. After completing welding on coated reinforcing bars, repair coating damage as specified in this Section. Welds and steel splice members, when used to splice bars, shall be coated with same material used for repair of coating damage.

3.3 FIELD QUALITY CONTROL

A. Site Inspections and Tests:

1. General:
 - a. Do not place concrete until reinforcing is inspected, and permission for placing concrete is granted by ENGINEER. Concrete placed in violation of this provision will be rejected.
 - b. Do not close up formwork for walls and other vertical members until reinforcing is inspected, and permission for placing concrete is granted by ENGINEER. Concrete placed in violation of this provision will be rejected.

- c. Correct defective Work by removing and replacing or correcting, as required by ENGINEER.
 - d. CONTRACTOR shall pay cost of corrections and subsequent testing required to confirm integrity of post-installed anchors.
 - e. Testing laboratory shall submit test results to CONTRACTOR and ENGINEER within 24 hours of completion of test.
2. Site Tests:
- a. OWNER Will employ testing laboratory to perform field quality testing of adhesive dowels at the Site.
 - 1) Testing shall comply with ASTM E488.
 - 2) Test at least ten percent of each type of adhesive dowel. If one or more dowels fail the test, CONTRACTOR shall pay cost to test all dowels of same diameter and type installed on the same day as the failed dowel.
 - 3) Test dowels to 60 percent of specified yield strength. ENGINEER will direct which dowels are to be tested.
 - 4) Apply test loads with hydraulic ram.
 - 5) Displacement of dowels shall not exceed $D/10$, where D is nominal diameter of dowel.
3. Inspection of Welded Splices: OWNER will employ testing laboratory to perform field quality control testing of welded splices. All welded splices shall be visually inspected. Radiographically test minimum of five percent of butt splice welds. Repair defective welds so that welds are completely sound.

END OF SECTION

SECTION 03 30 00**CAST-IN-PLACE CONCRETE****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install cast in place concrete.
- B. Requirements regarding providing concrete consisting of portland cement, fine and coarse aggregate, water, and approved admixtures; combined, mixed, transported, placed, finished, and cured. This Section also includes:
 - 1. Providing openings in concrete to accommodate the Work under this and other Sections, and building into the concrete all items such as sleeves, frames, anchorage devices, inserts, and all other items to be embedded in concrete Work.

1.2 RELATED WORK

- A. Section 01 33 00 Submittal Procedures
- B. Section 03 15 00 Concrete Accessories
- C. Section 03 60 00 Grouting

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO M 182 - Standard Specification for Burlap Cloth Made From Jute or Kenaf and Cotton Mats
 - 2. AASHTO R100M/R100 - Standard Practice for Making and Curing Concrete Test Specimens in the Field
- B. America Concrete Institute (ACI)
 - 1. ACI 117 - Specification for Tolerances for Concrete Construction and Materials and Commentary
 - 2. ACI 214R – Guide to Evaluation of Strength Test Results of Concrete
 - 3. ACI 301 - Specifications for Concrete Concrete
 - 4. ACI 302.1R - Guide for Concrete Floor and Slab Construction
 - 5. ACI 304R – Heavyweight Concrete: Measuring, Mixing, Transporting, and Placing
 - 6. ACI 305R – Guide to Hot Weather Concreting
 - 7. ACI 306R – Guide to Cold Weather Concreting
 - 8. ACI 309R - Guide for Consolidation of Concrete
 - 9. ACI 318 - Building Code Requirements and Commentary

10. ACI 350/350R - Code Requirements for Environmental Engineering Concrete Structures and Commentary

C. America Concrete Institute (ACI)

1. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C33 – Standard Specification for Concrete Aggregates
3. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5. ASTM C94/C94M – Standard Specification for Ready-Mixed Concrete
6. ASTM C109/C109M – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
7. ASTM C138/C138M - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
8. ASTM C143/C143M – Standard Test Method for Slump of Hydraulic-Cement Concrete
9. ASTM C150 – Standard Specification for Portland Cement
10. ASTM C157/C157M- Standard Test Method for Length Change of Hardened Cement Mortar and Concrete
11. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete
12. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete
13. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
14. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete
15. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
16. ASTM C330 – Standard Specification for Lightweight Aggregates for Structural Concrete
17. ASTM C494/C494M – Standard Specification for Chemical Admixtures for Concrete
18. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
19. ASTM C882/C882M - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
20. ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars
21. ASTM C1064/C1064M, Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

22. ASTM C1077 – Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
23. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures
24. ASTM D1042 - Standard Test Method for Linear Dimensional Changes of Plastics Caused by Exposure to Heat and Moisture
25. ASTM D3574 - Standard Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams
26. ASTM E96/E96M – Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
27. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection or Special Inspection
28. ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
29. ASTM E1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

D. National Sanitation Foundation/America National Standards Institute

1. NSF/ANSI 61 - Drinking Water System Components - Health Effects

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Concrete Testing Laboratory:

- a. Employ independent testing laboratory experienced in design and testing of concrete materials and mixes to perform material evaluation tests and to design concrete mixes. Employ different laboratories for design of concrete mixes and field testing.
 - 1) Testing agency shall be in accordance with ASTM E329 and ASTM C1077.
 - 2) Testing laboratory shall have been inspected and passed within previous two years by Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology for: testing concrete aggregates, and for preparing and testing concrete trial batches with or without admixtures. Testing laboratory shall provide documentation indicating how deficiencies, if any, in most recent CCRL inspection report were corrected.
 - 3) Selection of testing laboratory is subject to OWNER's acceptance.
 - 4) Submit written description of proposed concrete testing laboratory giving qualifications of personnel, laboratory facilities, and equipment, and other information requested by ENGINEER.

2. Water Reducing Admixture Manufacturer:

- a. Water reducing admixtures shall be manufactured under strict quality control in facilities operated under a quality assurance program. Submit copy of manufacturer's quality assurance handbook to document program existence.
- b. Manufacturer shall maintain a concrete testing laboratory approved by CCRL at NIST.
- c. Manufacturer shall be capable of providing services of qualified field service representatives at the Site.

B. Laboratory Trial Batch:

- 1. Each concrete mix design specified shall be verified by laboratory trial batch, unless indicated otherwise.
- 2. For classes of concrete that require air-entrainment, test the trial batch at highest percentage of air allowed for that class of concrete.
- 3. Perform the following testing on each trial batch:
 - a. Aggregate gradation for fine and coarse aggregates
 - b. Fly ash testing to verify meeting specified properties, unless fly ash Supplier submits certification by an independent testing laboratory
 - c. Slump
 - d. Air content
 - e. Compressive strength based on three cylinders each tested at seven days and at 28 days
 - f. Shrinkage test in accordance with this Section, for Class "A" concrete
- 4. Submit for each trial batch the following information:
 - a. Project identification name and number (if applicable)
 - b. Date of test report
 - c. Complete identification of aggregate source of supply
 - d. Tests of aggregates for compliance with the Contract Documents
 - e. Scale weight of each aggregate
 - f. Absorbed water in each aggregate
 - g. Brand, type, and composition of cementitious materials
 - h. Brand, type, and amount of each admixture
 - i. Amounts of water used in trial mixes
 - j. Proportions of each material per cubic yard
 - k. Gross weight and yield per cubic yard of trial mixtures
 - l. Measured slump
 - m. Measured air content

- n. Compressive strength developed at seven days and 28 days, from not less than three test cylinders cast for each seven day and 28 day test, and for each design mix
- o. Shrinkage test results where required and as specified in this Section. Report results and averages for original length and at zero, seven, 14, 21, and 28 days of drying

C. Shrinkage Test:

1. Perform drying shrinkage tests for trial batch as specified in this Section.
2. Drying shrinkage specimens shall be four-inch by four-inch by 11-inch prisms with effective gage length of ten inches; fabricated, cured, dried, and measured in accordance with ASTM C157 modified as follows: remove specimens from molds at an age of 23 hours, plus-or-minus one hour, after trial batching; shall be placed immediately in water at 70 degrees F plus-or-minus three degrees F for at least 30 minutes; and shall be measured within 30 minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F plus-or-minus three degrees F. Measurement to determine expansion expressed as percentage of original length shall be made at age of seven days. Length at age of seven days shall be base length for drying shrinkage calculations (zero days drying age). Immediately afterward store specimens in humidity-controlled room maintained at 73 degrees F plus-or-minus three degrees F, and 50 percent (plus-or-minus four percent) relative humidity for remainder of test. Obtain measurements to determine shrinkage expressed as percentage of base length and report measurements separately for 7, 14, 21, and 28 days of drying after seven days of moist curing.
3. Determine drying shrinkage deformation of each specimen as the difference between base length (at zero days drying age) and length after drying at each test age. Determine average drying shrinkage deformation of specimens to nearest 0.0001-inch at each test age. If drying shrinkage of a specimen departs from average of that test age by more than 0.0004-inch, results obtained from that specimen shall be disregarded. Report results of shrinkage test to nearest 0.001 percent of shrinkage. Compression test specimens shall be taken in each case from same concrete used for preparing drying shrinkage specimens. Tests shall be considered part of normal compression tests for the Work. Allowable shrinkage limitations shall be as specified in PART 2 of this Section.

D. Component Supply and Compatibility:

1. Provide all admixture materials from a single manufacturer.

E. Sample Panels:

1. Provide Sample panels of wall finishes, each at least 12 inches by 12 inches by 3 inches thick. Revise Sample panels to produce acceptable finished concrete surfaces.
 - a. Provide additional Sample panels as required if original results are unsatisfactory as determined by ENGINEER.

2. Continuity of color and texture for exposed concrete surfaces is important. Maintain such controls and procedures, in addition to those specified, as necessary to provide continuous match of concrete Work with approved Samples.

F. Mock-up Panels:

1. Provide mock-up panels representative of specified finished surfaces after sample form panels are approved, at locations on the Site directed by ENGINEER. Form, reinforce, mix, cast, cure, and finish mock-up panels using selected materials and construction methods proposed for the Work. Provide mock-up panels as follows:
 - a. Wall section of L shaped panels, approximately four feet high by three feet each side by eight inches thick and set on an eighteen-inch wide by eight-inch thick base, unless otherwise shown or indicated. Form faces to represent each specified formed surface finish. Include not less than two form ties, two form panel intersections, one vertical construction joint, and one horizontal construction joint. Construction joints are in Section 03 15 00, Concrete Accessories.
 - b. Column section, approximately four feet high and not less than twelve-inch diameter for round sections, and not less than twelve inches in the least dimension for rectangular sections, for each specified formed finish, unless otherwise shown or indicated. Set column sections on a six-inch thick concrete base extending eight inches beyond column. Chamfer exposed edges of rectangular Sample columns.
 - c. Slab on grade section, approximately four feet square and minimum of four inches thick for each applied finish, with at least one construction joint and one expansion joint, if used.
 - d. Pan formed section using at least two pan form units. Set units to illustrate method of blending exposed pan joints.
2. Reinforce mock-up panels as required to prevent cracking and to be structurally stable or as shown or indicated; reinforcing steel shall not be less than 0.25 percent of the gross concrete cross section in each direction.
3. Protect mock-up panels from damage and do not remove approved mock-up panels without written ENGINEER's permission. When directed by ENGINEER, demolish mock-up panels and remove from the Site.

G. Concrete Coordination Conference:

1. Conduct concrete coordination conference to review detailed requirements of CONTRACTOR's proposed concrete design mixes, to discuss procedures for producing proper concrete construction, and to clarify roles of the parties involved. CONTRACTOR shall organize and schedule the conference, and prepare and distribute to all parties attending conference minutes of the conference.
2. Conduct concrete coordination conference no later than 14 days after the date the Contract Times commence running. Conference shall be held at mutually agreed upon date and time; conference shall be held at the Site unless otherwise mutually agreed upon. Notify all parties to attend concrete coordination conference not less than five days prior to scheduled date of conference.

3. All parties involved in the concrete Work shall attend concrete coordination conference including, but not limited to, the following:
 - a. CONTRACTOR
 - b. Field testing services representative
 - c. Concrete Subcontractor (if any)
 - d. Reinforcing steel Subcontractor (if any) and reinforcing steel Supplier and detailer
 - e. Concrete Supplier
 - f. Admixture manufacturer's representative
 - g. ENGINEER
 - h. Resident Project Representative (if any)

1.5 SUBMITTALS

- A. Action Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:
 1. Shop Drawings:
 - a. List of concrete materials and proportions for the proposed concrete mix designs. Include data sheets, test results, certifications, and mill reports to qualify the materials proposed for use in the mix designs. Do not start laboratory trial batch testing until this submittal is approved by ENGINEER.
 - b. Laboratory Trial Batch Reports: Submit laboratory test reports for concrete cylinders, materials, and mix design tests.
 - c. Ready-mixed Concrete: Submit the following information.
 - 1) Physical capacity of mixing plant
 - 2) Trucking facilities available
 - 3) Estimated average amount of the specified concrete that can be produced and delivered to the Site during a normal, eight-hour day, excluding output to other customers
 2. Product Data:
 - a. Manufacturers' specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.
 3. Samples:
 - a. Submit Samples of materials as specified and as requested by ENGINEER. Include with each Sample names of product and Supplier, and description.
 - b. Colored Cement Pigment Color Samples: Submit complete selection of manufacturer's standard and custom colors for final selection by ENGINEER.

B. Informational Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:

1. Certifications:
 - a. Notarized certification of conformance to reference standards used in this Section, when required by ENGINEER.
2. Delivery Tickets: Copies of all delivery tickets for each load of concrete delivered to or mixed at the Site. Delivery tickets shall contain the information in accordance with ASTM C94 along with project identification name and number (if any), date, mix type, mix time, quantity and amount of water introduced.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Transportation, Delivery, and Handling:

1. Materials used for concrete shall be clean and free from foreign matter during transportation and handling, and kept separate until measured and placed into concrete mixer.
2. Implement suitable measures during hauling, piling, and handling to ensure that segregation of coarse and fine aggregate particles does not occur and grading is not affected.

B. Storage:

1. For storage, provide bins or platforms with hard, clean surfaces.

1.7 COORDINATION

A. Review installation procedures under other Sections and coordinate installation of items to be installed in the concrete Work.

1.8 CLASSIFICATIONS OF CONCRETE

A. Class “A” concrete shall be steel-reinforced and includes the following:

1. All concrete, unless otherwise shown or indicated.

B. Class “B” concrete shall be placed without forms or with simple forms, with little or no reinforcing, and includes the following, unless otherwise shown or indicated:

1. Concrete fill within structures
2. Duct banks
3. Unreinforced encasements
4. Curbs and gutters
5. Sidewalks
6. Thrust blocks

C. Class “D” concrete shall be unreinforced and used where required as concrete fill under foundations, filling abandoned piping, and for pipe backfill.

D. Lightweight Structural Concrete: Shall be used where shown or indicated.

PART 2 – PRODUCTS

2.1 CEMENTITIOUS MATERIALS

A. Cement:

1. Portland cement shall be Type II(MH) ASTM C150. Type I or Type II may be used in lieu of Type II(MH) when approved by ENGINEER.
2. Portland cement shall be produced by one facility. Alternate cement sources may be used provided that mix design has been approved and acceptable trial batch verifying performance has been made.
3. Do not use cement that has deteriorated because of improper storage or handling.

B. Fly Ash Mineral Admixture:

1. Mineral admixtures, when used, shall conform to the requirements of ASTM C618 Class C or F, except as follows:
 - a. The loss on ignition shall be a maximum of four percent.
 - b. The maximum percent of sulfur trioxide (SO₃) shall be 4.0.
2. Fly ash shall be considered to be a cementitious material.
3. Laboratory trial batches shall be tested to determine compliance with strength requirements, times of setting, slump, slump loss, and shrinkage characteristics.
4. If fly ash is to be used in place of cement, no more than 20% percent of the cement may be replaced.

C. For all classes of concrete, when Type II(MH) Cement is used, fly ash may be used within the following percentages by weight. When Type II Cement is used, fly ash shall be used within the following percentages by weight. When Type I Cement is used, in lieu of Type II(MH) Cement, fly ash shall be used such that total tricalcium aluminate content (C3A) of the resulting cementitious material is not greater than eight percent.

1. When fly ash is used, material shall have maximum of 20 percent of total weight of cementitious material.

2.2 AGGREGATES

A. General:

1. Aggregates shall conform to ASTM C33, Class Designation 4S, and as specified in this Section.
2. Do not use aggregates containing soluble salts or other substances, such as iron sulfides, pyrite, marcasite, ochre, or other materials, that can cause stains on exposed concrete surfaces.

B. Fine Aggregate:

1. Provide clean, sharp, natural sand free of loam, clay, lumps, and other deleterious substances.
2. Dune sand, bank run sand, and manufactured sand are unacceptable.

C. Coarse Aggregate:

1. Provide clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone.
 - b. Washed gravel, either natural or crushed. Slag, pit gravel, and bank run gravel are unacceptable.
 - c. Lightweight Aggregate: ASTM C330.

2.3 WATER

- A. Water used in producing and curing concrete shall be clean and free of injurious quantities of oils, acids, alkalis, organic materials, and other substances that may be deleterious to concrete and steel.

2.4 CONCRETE ADMIXTURES

- A. Provide admixtures in accordance with product manufacturer's published instructions. Admixtures shall be compatible with each other. Admixtures shall not contain thiocyanates, shall not contain more than 0.05 percent chloride ion, and shall be non-toxic in the concrete mix after 30 days. Do not use admixtures that have not been incorporated and tested in the accepted mixes, unless otherwise approved by ENGINEER.
- B. Air Entraining Admixtures: ASTM C260.
 1. Air entraining admixture shall be vinsol resin or vinsol resin-based.
- C. Water Reducing Admixture: ASTM C494, Type A or D.
 1. Proportion Class "A" and Class "B" concrete with non air entraining, normal setting, water reducing, aqueous solution of modified organic polymer. Admixture shall not contain lignin, nitrates, or chlorides added during manufacturing.
- D. High Range Water Reducing Admixture (HRWR): ASTM C494, Type F or G.
 1. Use high range water reducing admixture in the concrete classifications so specified or indicated. Use of HRWR admixture is allowed at CONTRACTOR's option in all other classifications of concrete. When used, HRWR admixture shall be added to concrete in accordance with admixture manufacturer's published instructions. Specific admixture formulation shall be as recommended by admixture manufacturer for Project conditions. Add mixture shall be added to the concrete mix at the concrete batch plant. A representative of the HRWR manufacturer shall be present during any large placement, placement of slabs, or during times of unusual circumstance which may require changes to the product formulation.
- E. Set Control Admixtures: In accordance with ASTM C494. Use the following as required:
 1. Type B, Retarding.
 2. Type D, Water reducing and Retarding.

- F. Calcium Chloride: Do not use calcium chloride.
- G. Shrinkage Reducing Admixture:
 - 1. Shrinkage reducing admixture may be used in mix design when necessary to conform to specified shrinkage limitations, provided that specified strength requirements are complied with and there is no reduction in sulfate resistance in the concrete and no increase in concrete permeability.
- H. Corrosion-Inhibiting Admixtures:
 - 1. Corrosion-inhibiting admixture shall be calcium nitrite solution containing minimum of 30 percent calcium nitrite. Admixture shall be added at dosage rate of five gallons per cubic yard of concrete.
 - 2. Product and Manufacturer: Provide one of the following:
 - a. DCI or DCI-S, by Grace Construction Products
 - b. Master Life CI 30, by Master Builders Solutions
 - c. Eucon CIA, by Euclid Chemical Company
 - d. Or equal
 - 3. Adjust quantity of mix water to account for water portion of calcium nitrite solution
 - 4. Provide retarding admixtures as required, if set time is accelerated
- I. Colored Cement Pigments:
 - 1. Provide the following, where shown or indicated: Commercial iron oxide, manganese dioxide, ultramarine blue, chromium oxide, or carbon black compounded for use in concrete.
 - 2. Product and Manufacturer: Provide one of the following:
 - a. Truetone Mortar Colors by Davis Colors, subsidiary of Rockwood Industries, Inc.
 - b. Or equal
 - 3. Do not exceed pigment-to-cement ratios, by weight, of 1-to-35 for carbon black, and 1-to-7 for other pigments.
 - 4. ENGINEER will select colors from manufacturer's full range of standard colors.

2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare concrete design mixes in accordance with the table below:

TABLE 03 30 00-A - CONCRETE DESIGN MIX CRITERIA

Concrete Class	Coarse Aggregate ⁽¹⁾		Minimum	Max. W/CM ⁽⁴⁾	Slump ⁽²⁾	Air (%)	Min. Comp Strength ⁽³⁾ (psi)
	Size A	Size B	Cementitious (lbs/cu yd)				
Class "A"	No. 57	No. 8	564	0.42	4" max.	6 +/- 1	5,000
Class "B"	No. 57 or No. 67		517	0.50	4" max.	6 +/- 1	3,000
Class "D"	Any ASTM C33	← No requirements →					1,500

Notes Applicable to Table:

1. Coarse aggregate size numbers refer to ASTM C33. Where Size A and B are designated in Table 03 30 00-A-Concrete Design Mix Criteria, it is intended that the smaller Size B aggregate is to be added, replacing a portion of the coarse or fine aggregate, in the minimum amount necessary to make a workable and pumpable mix with sand content not exceeding 41 percent of total aggregate.
 2. Slumps indicated are prior to addition of high range water reducer (super plasticizer).
 3. Mix designs shall be made for all but Class "D", which does not require trial batch, so that the compressive strength achieved for laboratory trial batches will not be less than 125 percent of specified design strength. Concrete shall be capable of developing two thirds of the required 28-day strength within 7 days.
 4. Quantity of water to be used in the determination of water-cementitious materials (W/CM) ratio shall include free water on aggregates in excess of SSD and water portion of admixtures.
- B. Lightweight Concrete: Proportion the mix as specified in this Section.
1. Specified 28 day Compressive Strength: 4,000 psi
 2. Maximum Water Cement Ratio by Weight: 0.45
 3. Maximum Coarse Aggregate Size: ¾ inch
 4. Minimum Cement Content: 564 pounds per cubic yard of concrete
 5. Percent Air Content: 6% +/- 1%
 6. Dry weight of not less than 95 pounds per cubic foot or not more than 110 pcf after 28 days
 7. Limit dry shrinkage to 0.05% at 28 days
- C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by CONTRACTOR when characteristics of materials, site conditions, weather, test results, or other circumstances warrant; at no additional cost to OWNER and as approved by ENGINEER. Before using adjusted concrete mixes, laboratory test data and strength results shall be submitted to and approved by ENGINEER.
- D. Admixtures:

1. Use air-entraining admixture in concrete, unless otherwise shown or indicated. Add air-entraining admixture at admixture manufacturer's prescribed rate to produce concrete at point of placement having air content within prescribed limits.
 2. Use water-reducing or high-range water-reducing admixtures in all Class "A" concrete.
 3. Use amounts of admixtures recommended by admixture manufacturer for climatic conditions prevailing at the Site at time of placing. Adjust quantities and types of admixtures as required to maintain quality.
- E. If adding water at the Site is desired, withhold water at the batch plant so that specified water-cement (or cementitious material) ratio is not exceeded. Addition of water shall be accordance with ASTM C94. After high-range water-reducing admixture is incorporated into the batch, addition of water is not allowed.
- F. Slump Limits with High-Range Water Reducer:
1. Slump shall not exceed four inches prior to adding high-range water reducer and shall not exceed eight inches, measured at point of placement, after adding high-range water reducer.
- G. Shrinkage Limitation:
1. Concrete shrinkage for specimens cast in laboratory from trial batch with total water of 30.2 gallons per cubic yard or less, as measured at 21-day drying age and at 28-day drying age shall not exceed 0.039 percent and 0.045 percent, respectively. For trial batch with total water of 32.7 gallons per cubic yard or greater respective limits shall not exceed 0.035 percent and 0.040 percent. Limits in between shall be linear interpolated. Use mix design for construction that complies with trial batch shrinkage requirements. Shrinkage limitations apply to Class "A" concrete.
 2. Trial Batch Does Not Comply with Shrinkage Limitation:
 - a. If trial batch results do not comply with shrinkage limitation specified in the Contract Documents, redesign the mix to reduce shrinkage.
 - b. After mix has been repeatedly redesigned and ENGINEER is satisfied that all reasonable means to provide concrete mix that complies with shrinkage requirement have been exercised; and mix design still fails to comply with shrinkage limitation in the Contract Documents, ENGINEER reserves the right to accept the higher-shrinkage mix, provided that the quantity of shrinkage reinforcing in structures is increased.
 - c. "Reasonable means" will be construed as reducing the total water content to a maximum of 27 gallons per cubic yard, having the large aggregate blended so that eight percent to 18 percent of combined aggregate is retained on each sieve, using an alternate aggregate source, and a combination of these means.
 - d. Basis for shrinkage reinforcing increase will be proportional to amount that shrinkage value is over the specified shrinkage limitation and will be determined by ENGINEER. The cost of providing additional shrinkage reinforcement will be paid by the Owner.

- H. Color: Provide colored concrete where shown and indicated. Incorporate pigments into concrete mix according to pigment manufacturer's written instructions. Match color of Sample approved by ENGINEER.

2.6 BONDING AGENT

- A. Provide epoxy and epoxy-cement bonding agents in accordance with Section 03 15 00, Concrete Accessories.

2.7 CONCRETE CURING MATERIALS

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M 182, Class 3.
- B. Curing Mats: Shall be heavy carpets or cotton mats, quilted at four inches on centers, and weighing minimum of twelve ounces per square yard when dry.
- C. Moisture-Retaining Cover: Provide one of the following, complying with ASTM C171:
 - 1. Waterproof paper
 - 2. Polyethylene film
 - 3. White burlap polyethylene sheet

2.8 FINISHING AIDS

- A. Evaporation Retardant:
 - 1. Product and Manufacturer: Provide one of the following:
 - a. MasterKure ER 50 by Master Builders
 - b. Eucobar by Euclid Chemical Company
 - c. Sika Film by Sika Corporation
 - d. Or equal

2.9 CRACK INJECTION MATERIALS

- A. Structural Crack Repair System:
 - 1. Epoxy for Injection: Low-viscosity, high-modulus moisture insensitive type.
 - 2. Products and Manufacturers: Provide one of the following:
 - a. Sikadur 35 Hi-Mod LV and Sikadur 31 Hi-Mod Gel by Sika Corporation
 - b. Eucopoxy Injection Resin by Euclid Chemical Company
 - c. Or equal
- B. Non-structural Crack Repair System:
 - 1. Hydrophobic Polyurethane Chemical Grout:
 - a. Provide hydrophobic polyurethane that forms a flexible gasket.
 - b. Products and Manufacturers: Provide one of the following:

- 1) SikaFix HH LV by Sika Chemical Company
- 2) Hydro Active Flex SLV by De Neef Construction Chemicals, Inc.
- 3) Or equal
- c. Shrinkage limit shall not exceed 4.0 percent in accordance with ASTM D1042.
- d. Minimum elongation of 250 percent in accordance with ASTM D3574.
- e. Minimum tensile strength of 150 psi in accordance with ASTM D3574.
2. Hydrophilic Acrylate-Ester Resin:
 - a. Hydrophilic crack repair system shall be acrylate-ester resin that forms a flexible gasket and increase in volume a minimum of 50 percent when in contact with water.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Duroseal Multigel 850 manufactured by BBZ USA, Inc.
 - 2) Or equal

2.10 CONCRETE REPAIR MATERIALS

- A. Concrete repair mortar shall be pre-packaged, polymer-modified cementitious repair mortar with the following minimum properties:
 1. Compressive Strength at 1 Day: 2,000 psi (ASTM C109)
 2. Compressive Strength at 28 Days: 6,000 psi (ASTM C109)
 3. Bond Strength at 28 Days: 1,800 psi (ASTM C882 modified)
- B. Products and Manufacturers: Provide one of the following:
 1. Five Star Structural Concrete, by Five Star Products, Inc. Use formulation recommended by manufacturer for the specific application conditions.
 2. SikaTop - 122 Plus, SikaTop - 123 Plus, SikaTop - 111 Plus, or Sikacem - 133, by Sika Corporation. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.
 3. Emaco S88-CI or S466-CI, by Master Builders Inc. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.
 4. Verticoat or Verticoat Supreme by Euclid Chemical Company. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.
 5. Or equal
- C. Cement Mortar: Shall consist of mix of one part cement to 1.5 parts sand with sufficient water to form trowelable consistency. Minimum compressive strength at 28 days shall be 4,000 psi. Where required to match the color of adjacent concrete surfaces, blend white portland cement with standard portland cement so that, when dry, patching mortar matches the color of surrounding concrete.

2.11 CHEMICAL HARDENER

- A. Provide clear chemical hardener of fluosilicate family.
- B. Product and Manufacturer: Provide one of the following:
 - 1. Lapidolith, by Sonneborn ChemRex Inc.
 - 2. Or equal.

2.12 SHAKE-ON METALLIC HARDENER

- A. Provide metallic hardener formulated, processed, and packaged under stringent quality control at metallic hardener manufacturer-owned and -controlled factory. Hardener shall be a mixture of specially-processed and graded aggregate, selected portland cement, and plasticizing agents.
- B. Product and Manufacturer: Provide one of the following:
 - 1. Euco-Plate H.D. by Euclid Chemical Company.
 - 2. Mastertop 200 by Master Builders, Inc.
 - 3. Or equal

2.13 VAPOR RETARDER

- A. Vapor Retarder:
 - 1. Vapor retarder membrane shall comply with the following.
 - a. Water Vapor Transmission Rate, ASTM E96: 0.04 perms or lower.
 - b. Water Vapor Retarder, ASTM E1745: Meets or exceeds Class C.
 - c. Thickness of Retarder (plastic), ACI 302.1R: Not less than 10 mils.
 - 2. Products and Manufacturers: Provide one of the following:
 - a. Stego Wrap 10-mil Vapor Retarder by Stego Industries LLC
 - b. Griffolyn 10-mil by Reef Industries, Inc.
 - c. Moistop Ultra 10 by Fortifiber Industries
 - d. Or equal
- B. Accessories:
 - 1. Provide accessories by same manufacturer as vapor retarder.
 - 2. Seam Tape:
 - a. Tape shall have water vapor transmission rate (ASTM E96) of 0.3 perms or lower.
 - b. Products and Manufacturers: Provide one of the following:
 - 1) Stego Tape by Stego Industries LLC
 - 2) Fab Tape by Reef Industries
 - 3) Moistop Tape by Fortifiber Industries

4) Or equal

3. Vapor Proofing Mastic:

- a. Mastic shall have a water vapor transmission rate ASTM E96, 0.3 perms or lower.

4. Pipe Boots:

- a. Construct pipe boots from vapor barrier material, pressure sensitive tape, mastic, or a combination thereof, in accordance with manufacturer's recommendations.

2.14 SOURCE QUALITY CONTROL

- A. Concrete materials may require testing, as directed by ENGINEER, at any time during the Work if concrete quality is in question. Provide access to material stockpiles and facilities at all times. Tests shall be done at no expense to OWNER.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine the substrate and conditions under which the Work will be performed and notify ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 CONCRETE MIXING

A. General:

- 1. Concrete may be produced at batch plants or by the ready mixed process. Batch plants shall comply with recommendations of ACI 304R and have sufficient capacity to produce concrete of qualities required and in quantities required to comply with the accepted Progress Schedule. All plant facilities are subject to acceptance of ENGINEER.
- 2. Mixing:
 - a. Mix concrete with a rotating type batch machine, except where hand mixing of very small quantities is approved by ENGINEER.
 - b. Remove hardened accumulations of cement and concrete from drum and blades to ensure proper mixing action.
 - c. Replace mixer blades upon loss of ten percent of mixer blades' original height.

B. Ready Mix Concrete:

- 1. Comply with ASTM C94 and the Contract Documents.
 - a. Plant Equipment and Facilities: Conform to requirements of NRMCA certification.
 - b. Mix concrete in revolving-type truck mixers that are in good condition and produce thoroughly-mixed concrete conforming to the Contract Documents.

- c. Do not exceed rated capacity of mixer.
 - d. Mix concrete for minimum of two minutes after arrival at the Site, or as recommended by mixer manufacturer.
 - e. Do not allow drum to mix while in transit.
 - f. Mix at proper speed until concrete is discharged from mixer.
 - g. Maintain adequate facilities at the Site for continuous delivery of concrete at required rates.
 - h. Provide access to mixing plant for ENGINEER upon request.
2. When silica fume is used in dry compacted form, comply with the following mix requirements and ensure full dispersion:
- a. For all types of mixing equipment, increase mix times by 40 percent over minimum mix time required to achieve mix uniformity defined in ASTM C94.
 - b. For truck mixed and central-mixed concrete, maximum allowable batch size shall be 80 percent of maximum in accordance with ASTM C94.
- C. Maintain equipment in proper operating condition, with drums cleaned before charging each batch. Schedule rates of delivery to prevent delay of placing concrete after mixing, or holding dry mixed materials too long in mixer before the adding water and admixtures.

3.3 TRANSPORTING CONCRETE

- A. Transport and place concrete not more than 90 minutes after water has been added to the dry ingredients.
- B. Avoid spilling and separation of concrete mixture during transportation.
- C. Do not place concrete in which the ingredients have separated.
- D. Do not retemper partially set concrete.
- E. Use suitable equipment for transporting concrete from mixer to forms.

3.4 PREPARATION FOR CONCRETING

- A. Submit to ENGINEER laboratory trial batch test results for proposed mixes at least 15 days prior to start of Work. Do not begin concrete production until associated laboratory trial batch test result submittal has been approved by ENGINEER.
- B. Notify ENGINEER a minimum of 24 hours in advance of placing concrete to allow for inspection of form work, joints, waterstops, reinforcement, embedded items, and vapor retarders. The section to be placed shall be fully prepared for concrete placement at the time of notice. Confirm inspection status with ENGINEER a minimum of 4 hours prior to concrete placement. Do not begin placing concrete until Work is in conformance with the Contract Documents.

- C. Subgrade surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- D. Reinforcing steel and embedded items shall be completely cleaned of mortar, loose rust, form release compounds, dirt, or any other substance which would interfere with proper bonding with concrete. Protective coatings on embedded aluminum items shall continuously cover the surface to be in contact with concrete. Any defects in the coating shall be repaired.
- E. Do not place concrete until flow of water entering space to be filled with concrete has been properly stopped or has been diverted by pipes, or other means, and carried out of the forms, clear of the Work. Do not deposit concrete underwater, and do not allow water to rise on concrete surfaces until concrete has attained its initial set. Do not allow water to flow over concrete surface in manner and or velocity that will injure concrete surface finish. Provide temporary pumping or other dewatering operations for removing water as required.
- F. Prepare joint surfaces in accordance with Section 03 15 00, Concrete Accessories.
- G. Installation of Vapor Retarder:
 - 1. Provide vapor retarder under slabs-on-grade and outside walls to receive resilient floor finishes, carpet, ceramic and slate tile, chemical resistant coatings, and where shown or indicated on the Drawings.
 - 2. Install in accordance with manufacturer's instructions, ASTM E1643, and the following:
 - a. Unroll vapor retarder with longest dimension parallel with direction of the pour.
 - b. Lap vapor retarder over footings and seal to foundation walls.
 - c. Overlap vapor retarder joints by six inches and seal with vapor retarder manufacturer's tape.
 - d. Seal penetrations, including pipes, in accordance with vapor retarder manufacturer's instructions.
 - e. Penetration of vapor retarder is not allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas of vapor retarder by providing, for each damaged area, patch of vapor retarder material and overlapping damaged area with the patch by six inches on each side, and securely and continuously taping all four sides of patch to undamaged vapor retarder.

3.5 CONCRETE PLACEMENT

- A. General:
 - 1. Place concrete continuously, so that no concrete will be placed on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within

the section. If section cannot be placed continuously, provide construction joints in accordance with Section 03 15 00, Concrete Accessories.

2. Deposit concrete as nearly as practical in its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to action that may cause segregation.
3. Screed concrete that is to receive other construction to proper level to avoid excessive skimming or grouting.
4. Do not use concrete that becomes non plastic and unworkable, or does not conform to required quality limits, or that has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the Site and dispose of it in conformance with Laws and Regulations.
5. Do not place concrete until forms, bracing, reinforcing, and embedded items are each in final position and secure.
6. Do not place footings in freezing weather unless adequate precautions are taken against frost action.
7. Do not place footings, piers or pile caps on frozen soil.
8. Unless otherwise instructed, place concrete only when ENGINEER is present.
9. Allow minimum of three days between adjoining concrete placements.

B. Bonding for Next Concrete Pour:

1. Prepare for bonding of fresh concrete to concrete that has set but is not fully cured, as follows:
 - a. Thoroughly wet the surface but allow no free-standing water.
 - b. For horizontal surfaces place a six-inch layer of Construction Joint Grout, as specified in Section 03 60 00 Grouting over the hardened concrete surface.
 - c. Place fresh concrete before the grout has attained its initial set.
2. Accomplish bonding of fresh concrete to fully cured, hardened, existing concrete by using a bonding agent as specified in Section 03 15 00 Concrete Accessories.

C. Concrete Conveying:

1. Handle concrete from point of delivery at the Site, transfer to concrete conveying equipment, and transfer to locations of final deposit as rapidly as practical by methods that prevent segregation and loss of concrete mix materials.
2. Provide mechanical equipment for conveying concrete to ensure continuous flow of concrete at delivery end of conveyor. Provide runways for wheeled concrete conveying equipment from concrete delivery point to locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.
3. Do not use chutes for distributing concrete, unless accepted by ENGINEER.
4. Pumping concrete is allowed, however do not use aluminum pipe for conveying concrete.

D. Placing Concrete into Forms:

1. Deposit concrete in forms in horizontal layers not deeper than 18 inches each and in manner that avoids inclined construction joints. Where placement consists of several layers, place concrete at such rate that concrete being integrated with fresh concrete while still plastic.
2. Do not allow concrete to free-fall within the form from height exceeding four feet. Where high-range water reducer is used to extend slump to at least six inches, maximum allowable free-fall of concrete is six feet. Use “elephant trunks” to prevent free-fall and excessive splashing of concrete on forms and reinforcing. Discontinue free-falls in excess of four feet if there is evidence of segregation.
3. Remove temporary spreaders in forms when concrete placing has reached elevation of such spreaders.
4. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidating concrete in accordance with applicable recommended practices in ACI 309R. Vibration of forms and reinforcing is not allowed unless otherwise accepted by ENGINEER.
5. Where height of concrete placement in walls exceeds 14 feet, provide temporary windows in formwork to facilitate vibration. Properly close temporary windows when height of concrete approaches windows. Determine location, size, and spacing of temporary windows to suit equipment used.
6. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly-spaced locations not farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate the layer of concrete and at least six inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcing and other embedded items without causing segregation of concrete mix.
7. Do not place concrete in beam and slab forms until concrete previously placed in columns and walls is no longer plastic.
8. Prevent voids in the concrete. Force concrete under pipes, sleeves, openings, and inserts from one side until visible from the other side.

E. Placing Concrete Slabs:

1. Deposit and consolidate concrete slabs in continuous operation, within limits of construction joints, until placing of a slab panel or section is completed.
2. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcing and other embedded items and into corners.
3. Consolidate concrete placed in beams and girders of supported slabs, and against bulkheads of slabs on ground, as specified in this Article for formed concrete structures.

4. Bring slab surfaces to correct elevation and level. Smooth the surface, leaving surface free of humps or hollows. Do not sprinkle water on surface while concrete is plastic. Do not disturb slab surfaces prior to commencing concrete finishing.
5. Where slabs are placed in conditions of high temperature or wind that could lead to formation of plastic shrinkage cracks, provide evaporation retardant applied in accordance with retardant manufacturer's recommendations, when required by ENGINEER.

F. Quality of Concrete Work:

1. Concrete shall be solid, compact, and smooth, and free of laitance, cracks, and cold joints.
2. Concrete for liquid-retaining structures, and concrete in contact with earth, water, or exposed directly to the elements shall be watertight.
3. Cut out and properly replace to extent directed by ENGINEER, or repair to satisfaction of ENGINEER, surfaces with cracks or voids, that are unduly rough, or are defective in any other way. Thin patches or plastering are unacceptable.
4. Leaks through concrete that exhibit flowing water, and cracks, holes, or other defective concrete in areas of potential leakage, shall be repaired and made watertight.
5. Repair, removal, and replacement of defective concrete as directed by ENGINEER shall be at no additional cost to OWNER.

G. Cold Weather Placing:

1. If air temperature is at or below 40 degrees F, cold weather concreting shall be performed in accordance with ACI 306R.
2. No concrete shall be mixed or placed when the atmospheric temperature is at or below 35 degrees F. The temperature shall be taken in the shade away from artificial heat.
3. In cases where the temperature drops below 40 degrees F after the concreting operations have been started, sufficient canvas and framework or other type of housing shall be furnished to enclose and protect the structure, in accordance with the requirements of ACI 306R. Sufficient heating apparatus such as stoves, salamanders, or steam equipment and fuel to provide heat shall be supplied. The concrete shall be protected when placed under all weather conditions. Should concrete placed under such conditions prove unsatisfactory, remove and replace the concrete at no cost to the OWNER.
4. When mixing with the air temperature below 40 degrees F, water used for mixing shall be heated to raise the concrete temperature to 70 degrees F. The temperature of the mixing water shall not exceed 165 degrees F when entering the mixer.
5. If heating the mixing water only does not raise the placing temperature of the concrete to 70 degrees F, the aggregate must also be heated, either by steam or dry heat, to raise the placing temperature of the concrete to the required temperature. In no case shall the aggregate temperature exceed 150 degrees F as it enters the mixer. The heating apparatus shall heat the mass of the aggregate uniformly and preclude the occurrence of hot spots which burn the material.

6. Salts, chemicals, or other foreign materials shall not be mixed with the concrete to prevent freezing. Calcium chloride is not permitted.

H. Hot Weather Placing:

1. Hot weather is defined as any combination of high air temperature, low relative humidity and wind velocity that impairs the quality of the concrete. Hot weather concreting shall be in accordance with ACI 305R. Concrete shall be placed in the forms without the addition of any more water than that required by the design (slump). No excess water shall be added on the concrete surface for finishing. Control of initial set of the concrete and extending the time for finishing operations may be accomplished with the use of approved water-reducing and set-retarding admixture, as specified.
2. Maximum time intervals between the addition of mixing water and/or cement to the batch, and the placing of concrete in the forms shall not exceed the following (excluding HRWR admixture use):

Concrete Temperature	Maximum Time From Water Batch to Placement
Non-Agitated Concrete	
Up to 80 degrees F	30 Minutes
Over 80 degrees F	15 Minutes
Agitated Concrete	
Up to 75 degrees F	90 Minutes
75 to 89 degrees F	60 Minutes

3. The use of an approved set-retarding admixture will permit the extension of the above time maximums by 30 minutes, for agitated concrete only.
4. The use of an approved HRWR admixture will allow placement time extensions as determined by the manufacturer.
5. The maximum temperature of concrete shall not exceed 90 degrees F at the time the concrete is placed. The temperature of the mixing water shall be reduced by the use of chilled water or ice.
6. The maximum temperature of concrete with HRWR admixture shall not exceed 100 degrees F at the time concrete is placed.
7. Under extreme heat, wind, or humidity conditions, concreting operations may be suspended if the quality of the concrete being placed is not acceptable.

3.6 FINISHING OF FORMED SURFACES

A. Standard Form Finish:

1. Standard form finish shall be basically smooth and even but is allowed to have texture imparted by the form material used. Repair defects in accordance with the Contract Documents.
2. Use standard form finish for the following:
 - a. Exterior vertical surfaces from foundation up to one foot below grade
 - b. Vertical surfaces not exposed to view

- c. Other areas shown or indicated

B. Smooth Form Finish:

1. Produce smooth form finish by selecting form materials that will impart smooth, hard, uniform texture. Arrange panels in orderly and symmetrical manner with minimum of seams. Repair and patch defective areas in accordance with the Contract Documents.
2. Use smooth form finish for the following:
 - a. Exterior surfaces exposed to view
 - b. Surfaces to be covered with coating material. Coating material may be applied directly to concrete or may be a covering bonded to concrete such as waterproofing, dampproofing, painting, or other similar system
 - c. Interior vertical surfaces of liquid-containers
 - d. Interior and exterior exposed beams and undersides of slabs
 - e. Surfaces to receive abrasive blasted finish
 - f. Surfaces to receive smooth rubbed or grout cleaned finish
 - g. Other areas shown or indicated

C. Grout Cleaned Finish:

1. Provide grout cleaned finish to concrete surfaces that have received smooth form finish and where defects have been repaired, as follows:
 - a. Combine one part portland cement to 1.5 parts fine sand by volume, and mix with water to consistency of thick paint. Blend standard portland cement and white portland cement, in proportions determined by trial patches, so that final color of dry grout will closely match adjacent concrete surfaces.
 - b. Thoroughly wet concrete surface and apply grout uniformly by brushing or spraying immediately to wetted surfaces. Scrub surface with cork float or stone to coat surface and fill surface holes. Remove excess grout by scraping, followed by rubbing with clean burlap to remove visible grout film. Keep grout damp during setting period by using fog spray on surface for at least 36 hours after final rubbing. Complete each area the same day the area is started, with limits of each area being natural breaks in the finished surface.
2. Use grout cleaned finish for the following:
 - a. Interior exposed walls and other vertical surfaces
 - b. Exterior exposed walls and other vertical surfaces down to one foot below grade
 - c. Interior and exterior horizontal surfaces, except exterior exposed slabs and steps
 - d. Interior exposed vertical surfaces of liquid-containing structures down to one foot below normal operating liquid level

e. Other areas shown

D. Abrasive Blasted Finish:

1. Provide abrasive blasted finish where shown or indicated.
2. Where abrasive blasted finish is required, apply finish to smooth formed finish after end of curing period, with defects repaired, to match approved finish provided on mock-up or Sample panel, as applicable.
3. Heavy Abrasive Blasted Finish: Abrasive blast to uniformly expose coarse aggregate.
4. Light Abrasive Blasted Finish: Abrasive blast to uniformly expose fine aggregate.

E. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise shown or indicated.

3.7 SLAB FINISHES

A. Float Finish:

1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently. Check and level the surface plane to tolerance not exceeding 1/4-inch in ten feet when tested with a ten-foot straightedge placed on surface at not less than two different angles. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to uniform, smooth, granular texture.
2. Use float finish for the following:
 - a. Interior exposed horizontal surfaces of liquid-containing structures, except those to receive grout topping
 - b. Exterior below-grade horizontal surfaces
 - c. Surfaces to receive additional finishes, except as shown or indicated

B. Trowel Finish:

1. After floating, begin first trowel finish operation using power driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over the surface.
2. Consolidate concrete surface by the final hand troweling operation. Finish shall be free of trowel marks, uniform in texture and appearance, and with surface plane tolerance not exceeding 1/8-inch in ten feet when tested with a ten foot straight edge. Grind smooth surface defects that would otherwise project through applied floor covering system.
3. Use trowel finish for the following:
 - a. Interior exposed slabs, unless otherwise shown or indicated

C. Non Slip Broom Finish:

1. Immediately after float finishing, slightly roughen concrete surface by brooming in direction perpendicular to main traffic route. Use fine fiber bristle broom, unless otherwise directed by ENGINEER. Coordinate required final finish with ENGINEER before applying finish.
2. Use non slip broom finish for the following:
 - a. Exterior exposed horizontal surfaces subject to lightweight foot traffic.
 - b. Interior and exterior concrete steps and ramps.

D. Scratched Finish:

1. After providing float finish, roughen concrete surface with rake before concrete's final set. Amplitude of surface shall be minimum of 1/4-inch.
2. Provide scratched finish for the following:
 - a. Horizontal surfaces that will receive grout topping or concrete equipment pad
 - b. Surfaces so indicated on the Drawings or elsewhere in the Contract Documents

3.8 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying, excessive cold or hot temperatures, and maintain without drying at relatively constant temperature for period necessary for hydration of cement and proper hardening of concrete.
2. Start curing after placing and finishing concrete, as soon as free moisture has disappeared from concrete surface. Keep surface continuously moist during entire curing period. Cure for a minimum of 10 days and in accordance with ACI 301 procedures. For concrete sections over 30-inches thick, the curing period shall be for a minimum of 14 days. Avoid rapid drying at end of final curing period.
3. For curing, use water that is free of impurities that could etch or discolor exposed concrete surfaces.
4. Confine water for curing to area being cured.

B. Curing Methods: Curing methods are specified below. Curing methods to be used on each type of concrete surface are specified elsewhere in this Article.

1. Water Curing. Cure by one of the following methods:
 - a. Keep concrete surface continuously wet.
 - b. Ponding or immersion.
 - c. Continuous water fog spray.
 - d. Covering concrete surface with curing mats, thoroughly saturating mats with water, and keeping mats continuously wet with sprinklers or porous hoses. Place curing mats to cover concrete surfaces and edges with four inch horizontal lap over adjacent mats; provide eight-inch lap over

adjacent mats at vertical surfaces. If necessary, weigh down curing cover to maintain contact with concrete surface.

2. Form Curing. Cure by one of the following methods:
 - a. Forms shall be maintained and loosened during curing period.
 - b. Immediately after forms are loosened or removed, continue with the required curing method as applicable, for remainder of curing period.
 - c. Where wood forms are kept in place, apply water to keep forms wet.
 3. Moisture Retaining Cover Curing. Cure as follows:
 - a. Cover concrete surfaces with the required moisture retaining cover for curing concrete, placed in widest practical width with sides and ends lapped at least three inches and sealed using waterproof tape or adhesive. Immediately repair holes or tears during curing period using cover material and waterproof tape.
- C. Formed Surfaces: Use the following curing methods:
1. Walls That Will Retain Liquid or That are Under Ground Surface:
 - a. If forms are wood, form curing is allowed for entire curing period. If forms are steel, form curing is allowed for maximum of three days after which forms shall be removed so that concrete is free of the forms for remainder of the curing process.
 - b. Immediately after the forms are loosened or removed, continue with water curing for remainder of curing period.
 2. Formed Slab Underside and Beam Surfaces Where Will Retain Liquid:
 - a. Form curing is allowed for the full curing period.
 - b. Immediately after forms are loosened or removed, continue with water curing for remainder of curing period.
 3. Vertical Joint Surfaces and Surfaces to Receive Surface Treatment:
 - a. Form curing is allowed for entire curing period.
 - b. Immediately after forms are loosened or removed, continue with water curing for remainder of curing period.
 4. Cure other formed surfaces using an appropriate curing method specified in the Contract Documents.
- D. Unformed Surfaces: Treat with one of the following curing methods:
1. Slabs and Mats That Will Retain Liquid or are Below Ground Surface:
 - a. Water curing.
 - b. Moisture-retaining cover curing when allowed by ENGINEER.
 2. Construction Joint Surfaces and Slab and Mat Surfaces to Receive Surface Treatment:
 - a. Water curing.
 - b. Moisture-retaining cover curing.

3. Cure other formed surfaces using an appropriate curing method specified in the Contract Documents.

E. Temperature of Concrete During Curing:

1. When ambient temperature is 40 degrees F or less, continuously maintain concrete temperature between 50 degrees F and 70 degrees F throughout curing period. When necessary, before concrete placing provide for temporary heating, covering, insulation, or housing as required to continuously maintain specified temperatures and moisture conditions throughout concrete curing period. Provide cold weather protection in accordance with ACI 306R.
2. When the ambient temperature is 80 degrees F and above, or during other climatic conditions that would cause too-rapid drying of concrete, before starting concrete placing, provide wind breaks and shading as required, and fog spraying, wet sprinkling, or moisture retaining coverings as required. Continuously protect concrete throughout concrete curing period. Provide hot weather protection in accordance with ACI 305R, unless otherwise specified.
3. Maintain concrete temperature as uniformly as possible, and protect from rapid ambient temperature changes. Avoid concrete temperature changes that exceed 5 degrees F in one hour and 50 degrees F in 24-hour period.

F. Protection:

1. During curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and damage by rain and flowing water. Protect finished concrete surfaces from damage by subsequent construction operations.

3.9 CONCRETE INSTALLATION TOLERANCES

A. Installation Tolerances:

1. Concrete placement tolerances, unless otherwise specified in the Contract Documents, shall be in accordance with ACI 117.
2. Notify ENGINEER in writing when concrete placement does not conform with required tolerances, as soon as the condition is known to CONTRACTOR.
3. When concrete installation does not conform to required tolerances, do not repair or correct by grinding unless specified in the Contract Documents or approved by ENGINEER in writing.
4. Verification Measurements:
 - a. If surfaces where tolerances are in question, obtain measurements to verify conformance with tolerances in manner acceptable to ENGINEER.
 - b. If surfaces tolerances are in question, cost of obtaining measurements shall be at no additional cost to the OWNER.
 - c. Before obtaining measurements, obtain ENGINEER's acceptance of method proposed for obtaining measurements.
 - d. After obtaining measurements, submit measurements to ENGINEER.

5. Submit with verification measurements submittal proposed method to rectify out-of-tolerance concrete. Do not start repair Work without obtaining ENGINEER's approval.

3.10 FIELD QUALITY CONTROL

A. Field Testing Services:

1. OWNER will employ testing laboratory to perform field quality control testing for concrete. ENGINEER will direct the testing requirements.
2. Testing laboratory will make standard compression test cylinders and entrained air tests as specified in this Article, under observation of ENGINEER or Resident Project Representative.
3. Testing laboratory will provide all labor, material, and equipment required for sampling and testing concrete, including: scale, glass tray, cones, rods, molds, air tester, thermometer, and other incidentals required.
4. CONTRACTOR shall provide all curing and necessary cylinder storage as specified in Section 01 45 00 Quality Control.

B. Quality Control Testing During Construction:

1. Perform sampling and testing for field quality control during placement of concrete, as follows:
 - a. Testing Frequency: Obtain 1 composite sample for each day's placements of each concrete mixture exceeding 5 cubic yard, but less than 25 cubic yard, plus 1 set for each additional 50 cubic yard or fraction thereof.
 - b. Testing Location: Concrete that is pumped shall be sampled at the point of discharge from the truck for information, including slump; and shall be sampled at the point of placement for acceptance of slump, air content, temperature and compressive strength.
 - c. Slump: ASTM C143: 1 test for each composite sample, but not less than 1 test for each day's placement of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - d. Air Content: ASTM C231, pressure method, for normal-weight concrete; 1 test for each composite sample, but not less than 1 test for each day's placement of each concrete mixture.
 - e. Concrete Temperature: ASTM C1064: 1 test hourly when air temperature is 40 degrees F and below and when 80 degrees F and above, and 1 test for each composite sample.
 - f. Compression Test Specimens: ASTM C31.
 - 1) Cast and laboratory cure 4 cylinders for each composite sample.
 - a) Do not transport field cast cylinders until they have cured for a minimum of 24 hours.
 - g. Compressive-Strength Tests: ASTM C39
 - 1) Test 1 cylinder at 7 days
 - 2) Test 2 cylinders at 28 days

3) Hold 1 cylinder for testing at 56 days as needed

- h. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- i. Strength of each concrete mixture will be satisfactory if every average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- j. Report test results in writing to ENGINEER, concrete manufacturer, and CONTRACTOR within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in WORK, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- k. Additional Tests: Testing and inspection agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by ENGINEER. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by ENGINEER.
 - 1) When the strength level of the concrete for any proportion of the structure, as indicated by cylinder tests, falls below the specified requirement, provide improved curing conditions and/or adjustments to the mix design as required to obtain the required strength. If the average strength of the laboratory control cylinders falls so low as to be deemed unacceptable, follow the core test procedure set forth in ACI 301, Chapter 17. Locations of core tests shall be provided by the ENGINEER. Core sampling and testing shall be at CONTRACTOR's expense.
 - 2) If the results of the core tests indicate that the strength of the structure is inadequate, any replacement, load testing, or strengthening as may be ordered by the ENGINEER shall be provided by the CONTRACTOR without cost to the OWNER.
- l. Additional testing and inspecting, at CONTRACTOR's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- m. Correct deficiencies in the work that test reports and inspections indicate does not comply with the contract documents.

C. Evaluation of Field Quality Control Tests:

- 1. Do not use concrete delivered to final point of placement having slump, concrete temperature, total air content or unit weight outside specified values.
- 2. Water/Cementitious Materials Ratio:
 - a. When water content testing indicates water/cementitious materials ratio to exceed specified requirements by greater than 0.02, remaining batches

required to complete concrete placement shall have water content decreased in the mix and water reducing admixture dosage increased as required to bring subsequently-batched concrete within specified water/cementitious materials ratio.

- b. Perform additional testing to verify compliance with specified water/cementitious materials ratio.
- c. Do not resume concrete production for further concrete placement until CONTRACTOR has identified cause of excess water in the mix and revised batching procedures, or adjusted the mix design (and obtained ENGINEER's associated approval) to bring water/cementitious materials ratio into conformance with the Contract Documents.

3. Compressive Strength:

- a. Compressive strength tests for laboratory cured cylinders will be acceptable if the averages of all sets of three consecutive compressive strength tests results equal or exceed specified 28-day design compressive strength of the associated type or class of concrete, and no individual strength test falls below required compressive strength by more than 500 psi.
- b. Questionable Field Conditions During Concrete Placement:
 - 1) Where questionable field conditions exist during concrete placement or immediately thereafter, strength tests of specimens cured under field conditions will be required by ENGINEER to check adequacy of curing and protecting of concrete placed. Specimens shall be molded at the same time and from the same samples as laboratory-cured specimens.
 - 2) Provide improved means and procedures for protecting concrete when 28-day compressive strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders.
 - 3) When laboratory cured cylinder strengths are appreciably higher than minimum required compressive strength, field cured cylinder strengths need not exceed minimum required compressive strength by greater than 500 psi even though the 85 percent criterion may not be met.
 - 4) If individual tests of laboratory cured specimens produce strengths more than 500 psi below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection and curing, provide additional measures to ensure that load bearing capacity of the structure is not jeopardized or impaired. If likelihood of low strength concrete is confirmed and evaluations indicate load bearing capacity may have been reduced, perform tests of cores from the concrete in question at CONTRACTOR's expense.
- c. If compressive strength tests fail to indicate compliance with minimum requirements of the Contract Documents, concrete represented by such tests will be considered defective.

D. Testing Concrete Structure for Strength:

1. When there is evidence that strength of in place concrete does not comply with the Contract Documents, CONTRACTOR shall employ the services of concrete testing laboratory to obtain cores from hardened concrete for compressive strength determination. Cores and tests shall comply with ASTM C42 and the following:
 - a. Obtain at least three representative cores from each concrete member or suspect area of concrete at locations directed by ENGINEER.
 - b. Strength of concrete for each series of cores will be acceptable if average compressive strength is at least 85 percent of specified compressive strength and no single core is less than 75 percent of required 28-day required concrete compressive strength.
 - c. Testing laboratory shall submit test results to ENGINEER on same day that tests are completed. Include in test reports Project name and number (if any), date of sampling and testing, CONTRACTOR name, name of concrete testing laboratory, exact location of test core in the Work, type or class of concrete represented by core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength, and type of break (corrected for length diameter ratio), direction of applied load to core with respect to horizontal plane of concrete as placed, and moisture condition of the core at time of testing.
2. Fill core holes solid with non shrink grout in accordance with Section 03 60 00 Grouting, and finish to match adjacent concrete surfaces.
3. If results of core tests are unacceptable or if it is impractical to obtain cores, perform static load test and evaluations complying with ACI 318 and ACI 350, as directed by ENGINEER.

E. Concrete Tolerance Verification Measurements: Refer to Article 3.9 of this Section.

F. Supplier's Services:

1. Water Reducing Admixture Manufacturer: Furnish services of qualified concrete technician employed by admixture manufacturer to assist in proportioning concrete for optimum use of admixture. Concrete technician shall advise on proper addition of admixture to concrete and on adjustment of concrete mix proportions to meet changing conditions at the Site.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Temporary Openings:

1. Openings in concrete walls and slabs required for passage of Work are allowed only upon approval of ENGINEER.
2. Temporary openings made in concrete shall be provided with waterstop in below-ground or liquid-retaining members and structures. Reinforcement going through and around the opening shall be made continuous to provide continuity and shall be approved by the ENGINEER.
3. Temporary openings that remain in concrete structures shall be filled with the same class of concrete as the adjoining construction, after the Work causing need for temporary opening is complete, unless otherwise shown or directed by ENGINEER. Mix, place, and cure concrete as specified in this Section to blend

with in place construction. Provide miscellaneous concrete filling shown or required to complete the Work.

B. Bases or Pads for Piping, Panels, and Equipment:

1. Unless specifically shown or indicated otherwise, provide concrete bases or pads for equipment, floor-mounted panels, and floor-mounted supports for piping and similar construction. Provide all concrete pad and base Work not specifically included under other Sections.
2. Dimensions and Elevations:
 - a. Coordinate and construct bases and pads to dimensions shown or indicated, or as required to comply with equipment, panel, or piping manufacturer's requirements and elevations indicated on the Drawing.
 - b. Unless otherwise shown or indicated, place concrete bases for equipment up to one-inch below the equipment manufacturer's base or mounting plate.
 - c. Where specific dimensions or elevations are not shown or indicated, bases and pads shall be six inches thick and extend three inches outside dimensions of the equipment, panel, or supports.
3. Finish: Bases and pads outside of areas to receive non-shrink grout shall have smooth trowel finish, unless special finish such as terrazzo, ceramic tile, quarry tile, or heavy-duty concrete topping is required. In such cases, provide appropriate concrete finish. Surfaces of bases and pads to receive non-shrink grout shall have broom finish.

C. Curbs:

1. Provide monolithic finish to interior curbs by stripping forms while concrete is still green followed by steel troweling surfaces to hard, dense finish with corners, intersections, and terminations slightly rounded.
2. Exterior curbs shall have rubbed finish for vertical surfaces and broomed finish for top surfaces.

3.12 REPAIR OF CONCRETE PLACED UNDER THIS CONTRACT

A. Repair of Formed Surfaces:

1. Repair the following defects in all formed finishes:
 - a. Spalls, air bubbles, rock pockets, form depressions, and other defects that are more than 1/4-inch in depth.
 - b. Holes from tie rods and other form tie systems.
 - c. Fins, offsets, and other projections that extend more than 1/4-inch beyond designated concrete member surface.
 - d. Structural cracks, as defined by ENGINEER.
 - e. Non-structural cracks greater than 0.010-inch wide as defined by ENGINEER. In liquid-retaining structures, elevated slabs subject to the elements or washdowns, below-grade members, and cracks that evidence

leakage. Where it is not possible to verify whether a crack is leaking, repair the crack.

2. Repair the following defects in smooth-finish surfaces, in addition to those listed above in this Section:
 - a. Spalls, air bubbles, rock pockets, form depressions, and other defects that extend to more than 1/2-inch in width in any direction, no matter how deep.
 - b. Spalls, air bubbles, rock pockets, form depressions, and other defects of any size that exceed 3 in number in a 12-inch by 12-inch area, or 12 in number in a 3-foot by 3-foot area.
 - c. Fins, offsets, and other projections shall be completely removed and smoothed.
 - d. Scratches and gouges in concrete surface.
 - e. Texture and color irregularities. In liquid-retaining surfaces, texture and color irregularities need not be repaired when greater than 12 inches below minimum normal operating liquid surface elevation, except where such defects are indicative of reduced durability.
3. Where smooth rubbed or grout cleaned finish is specified, minor surface defects repairable by the finishing process need not be repaired prior to finish application, when approved by ENGINEER.

B. Method of Repair of Formed Surfaces:

1. Immediately after removing forms, repair and patch defective areas with cement mortar or concrete repair mortar as directed by ENGINEER. Make repairs made to liquid-retaining structures and below-grade surfaces with repair mortar only. Repair form tie holes in liquid-retaining or below-grade surfaces with non-shrink grout in accordance with Section 03 60 00, Grouting.
2. Honeycombs, Rock Pockets, and Holes Left by Tie Rods and Bolts:
 - a. Cut out honeycomb, rock pockets, voids, and holes left by tie rods and bolts, down to solid concrete but, in no case, to depth less than one-inch for cement mortar and 1/2-inch for repair mortar. Make edges of cuts perpendicular to concrete surface.
 - b. Before placing cement mortar, thoroughly clean and brush coat area to be patched with specified bonding agent.
 - c. When using concrete repair mortar, use of bonding agent is optional; prepare the surface and place mortar in accordance with mortar manufacturer's recommendations.
 - d. Repairs at exposed-to-view surfaces shall match the color of surrounding concrete, except color matching is not required for interior surfaces of liquid-retaining surfaces up to one foot below typical minimum liquid level. Impart texture to repaired surfaces to match texture of existing adjacent surfaces. Provide test areas at inconspicuous locations to verify mixture, texture, and color match before proceeding with patching.

- e. Compact mortar in place and strike off slightly higher than the surrounding surface.
 3. Structural Cracks: Pressure-grout structural cracks using injectable epoxy installed using pressurized system. Apply in accordance with epoxy manufacturer's directions and recommendations.
 4. Non-structural Cracks: Shall be pressure-grouted using hydrophobic or hydrophilic resin. Install in accordance with resin manufacturer's directions and recommendations.
 5. Determination of the crack type shall be made by the ENGINEER.
 6. Holes Through Concrete:
 - a. Using plunger type gun or other suitable device, fill holes extending through concrete from least-exposed face, using flush stop held at exposed face; completely fill the hole with specified repair material.
 - b. At below-grade and liquid-containing members, fill holes with concrete repair mortar and use color-matched cement mortar for outer two inches at exposed-to-view surfaces.
 7. Where powerwashing or scrubbing is not adequate, abrasive blast exposed to view surfaces that require removal of stains, grout accumulations, sealing compounds, and other substances marring the surfaces. Use sand finer than No. 30 and air pressure from 15 to 25 psi.
- C. Repair of Unformed Surfaces:
1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to specified tolerances for each surface and finish. Correct low and high areas in accordance with this Section.
 2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using template having the required slope. Correct high and low areas in accordance with this Section.
 3. Repair finish of unformed surfaces containing defects that adversely affect concrete durability. Surface defects include crazing, cracks in excess of 0.01 inch wide, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 4. Repair structural cracks in all structures and non-structural cracks in liquid-retaining structures. In liquid-retaining structures, where dry face of concrete member can be observed, repair all cracks evidencing any rate of water flow through crack. Where dry face of member cannot be observed, repair all cracks.
- D. Methods of Repair of Unformed Surfaces:
1. Correct high areas in unformed surfaces by grinding, after concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.
 2. Correct low areas in unformed surfaces, during or immediately after completion of surface finishing, by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Where repairs are required and concrete has already set, sawcut around perimeter of area to be repaired to depth of 1/2-inch and remove concrete so that minimum thickness of repair is 1/2-

inch. Apply specified concrete repair mortar in accordance with repair mortar manufacturer's directions and recommendations.

3. Repair defective areas, except random cracks and single holes not exceeding one-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4 inch clearance all around. Minimum thickness of repair shall be 1.5 inches. Dampen concrete surfaces in contact with patching concrete and brush with specified bonding agent. Place patching concrete while bonding agent is tacky. Mix patching concrete of same materials and proportions to provide concrete of same classification as original, adjacent concrete. Place, compact, and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
4. Repair isolated, random, non-structural cracks (in members that are not below grade or liquid-retaining), and single holes not greater than one-inch diameter, by dry pack method. Groove top of cracks, and cut out holes to sound concrete, and clean repair area of dust, dirt, and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry pack before cement grout takes its initial set. Mix dry pack, consisting of one part portland cement to 2.5 parts fine aggregate passing No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for at least 72 hours.
5. Structural cracks shall be pressure-grouted using injectable epoxy. Apply in accordance with epoxy manufacturer's directions and recommendations.
6. Non-structural cracks in below-grade and liquid-retaining structures shall be pressure-grouted using hydrophilic resin. Apply in accordance with resin manufacturer's directions and recommendations.
7. Determination of crack type will be by ENGINEER.
8. Ensure that surface is acceptable for flooring material to be installed in accordance with flooring manufacturer's recommendations.

E. Other Methods of Repair:

1. Repair methods not specified in this Section may be used when approved by ENGINEER.

END OF SECTION

SECTION 03 60 00**GROUTING****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding all labor, materials, equipment, and incidentals required to furnish and install grout and perform grouting Work as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 03 15 00 - Concrete Accessories
- C. Section 03 30 00 - Cast-In-Place Concrete

1.3 REFERENCES

- A. America Concrete Institute:
 - 1. ACI 211.1 – Selecting Proportions for Normal – Density and High-Density Concrete - Guide
 - 2. ACI 301 – Specifications for Concrete Construction
- B. American Society for Testing and Materials International
 - 1. ASTM C33/C33M - Standard Specification for Concrete Aggregates
 - 2. ASTM C109/C109M Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
 - 3. ASTM C143/C143M – Standard Test Method for Slump of Hydraulic-Cement Concrete
 - 4. ASTM C172/C172M – Standard Practice for Sampling Freshly Mixed Concrete
 - 5. ASTM C230/C230M - Specification for Flow Table for Use in Tests of Hydraulic Cement
 - 6. ASTM C231/C231M – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
 - 7. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
 - 8. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
 - 9. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures

10. ASTM C882/C882M - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear
11. ASTM C939 – Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
12. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
13. ASTM C1181 - Standard Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts

C. National Sanitation Foundation/America National Standards Institute

1. NSF/ANSI 61, Drinking Water System Components - Health Effects

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Grout Testing Laboratory:
 - a. Independent testing laboratory employed for design and testing of grout materials and mixes shall comply with testing laboratory requirements in Section 03 30 00 - Cast-in-Place Concrete and other applicable requirements in the Contract Documents.
2. Manufacturer: Shall have a minimum of five years experience of producing products substantially similar to that required and shall be able to submit documentation of at least five satisfactory installations that have been in successful operation for at least five years each.
3. Manufacturer's Field Service Technician: When required, provide services of manufacturer's full-time employee, factory-trained in handling, use, and installing the products required, with at least five years of experience in field applications of the products required.

B. Trial Batch:

1. Each grout fill and construction joint grout mix proportion and design shall be verified by laboratory trial batch or field experience methods. Comply with ACI 211.1 and submit to ENGINEER a report with the following data:
 - a. Complete identification of aggregate source of supply
 - b. Tests of aggregates for compliance with specified requirements
 - c. Scale weight of each aggregate
 - d. Absorbed water in each aggregate
 - e. Brand, type, and composition of cement
 - f. Brand, type, and amount of each admixture
 - g. Amounts of water used in trial mixes
 - h. Proportions of each material per cubic yard
 - i. Unit weight and yield per cubic yard of trial mixtures
 - j. Measured slump

- k. Measured air content
 - l. Compressive strength developed at seven days and 28 days, from not less than three test specimens cast for each seven-day and 28 day test, and for each design mix
- 2. Laboratory Trial Batches: When laboratory trial batches are used to select grout proportions, prepare test specimens and conduct strength tests as specified in ACI 301.
- 3. Field Experience Method: When field experience methods are used to select grout proportions, establish proportions as specified in ACI 301.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:
 - 1. Shop Drawings:
 - a. Schedule of Project-specific grout applications, installation locations, and the grout type proposed for each.
 - b. List of grout materials and proportions for the proposed mix designs. Include data sheets, test results, certifications, and mill reports to qualify the materials proposed for use in the mix designs. Do not start laboratory trial batch testing until submittal is approved by ENGINEER.
 - c. Trial Batch Reports: Submit laboratory test reports for grout materials and mix design tests.
 - 2. Product Data:
 - a. Data sheets, certifications, and manufacturer's specifications for all materials proposed for use.
- B. Informational Submittals: Submit the following in accordance with Section 01 33 00 – Submittal Procedures:
 - 1. Manufacturer's Instructions:
 - a. Special instructions for shipping, storing, protecting, and handling.
 - b. Installation instructions for the materials.
 - 2. Supplier Reports:
 - a. Submit written report of results of each visit to Site by Supplier's field service technician, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.
 - 3. Qualifications Statements:
 - a. Testing laboratory, when not submitted under other Sections.
 - b. Manufacturer, when submittal of qualifications is required by ENGINEER.
 - c. Manufacturer's field service technician, when submittal of qualifications is required by ENGINEER.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Storage of Materials: Store grout materials in a dry location, protected from weather and protected from moisture.

1.7 APPLICATION AND GROUT MATERIAL

- A. The following is a listing of grouting applications and the corresponding type of grout material to be provided for the associated application. Unless shown or indicated otherwise in the Contract Documents, provide grout in accordance with the following:

Table 03 60 00 - A - GROUT APPLICATIONS AND MATERIAL TYPES

Application	Required Grout Material Type
Base plates for storage tanks and other non-motorized equipment, and motorized equipment or machinery less than 50 horsepower	Class I Non-Shrink (unless otherwise recommended by equipment manufacturer)
Motorized equipment or machinery equal to and greater than 50 horsepower, and motorized equipment or machinery equipment less than 50 horsepower subject to severe shock loads or high vibration	Class III Non-Shrink Epoxy (unless otherwise recommended by equipment manufacturer)
Filling blockout spaces for embedded items such as railing posts, guide frames for hydraulic gates, and similar applications	Class II Non-Shrink (Class I where placement time exceeds 15 minutes)
Grout fill or grout toppings less than four inches thick	Grout Fill
Grout fill greater than four inches thick	Class "B" Concrete in accordance with Section 03 30 00 - Cast-In-Place Concrete
Applications not listed above, where grout is indicated on the Drawings	Class I Non-Shrink, unless shown or indicated otherwise

PART 2 – PRODUCTS

2.1 NON-SHRINK GROUT MATERIALS

- A. General: Non-shrink grout shall be a prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or container in which the materials are packaged. Specific formulation for each type or class of non-shrink grout specified in this Section shall be that recommended by the grout manufacturer for the particular application.
- B. Class I Non-Shrink Grout:
1. Class I non-shrink grouts shall have a minimum 28-day compressive strength of 7,000 psi. Use grout for precision grouting and where water-tightness and non-shrink reliability in both plastic and hardened states is critical, in accordance with Table 03 60 00 – A – Grout Applications and Material Types in this Section.
 2. Products and Manufacturer: Provide one of the following:
 - a. MasterFlow 928, by Master Builders, Inc.

- b. Five Star Grout, by Five Star Products, Inc.
 - c. Hi-Flow Grout, by Euclid Chemical Company.
 - 3. Comply with ASTM C1107/C1107M, Grade C and B (as modified below) when tested using amount of water required to achieve the following properties:
 - a. Fluid consistency (20 to 30 seconds) shall be in accordance with ASTM C939.
 - b. At temperatures of 45, 73.4, and 95 degrees F.
 - 4. Length change from placing to time of final set shall not have shrinkage greater than the expansion measured at three or fourteen days. Expansion at three or fourteen days shall not exceed the 28-day expansion.
 - 5. Non-shrink property shall not be based on chemically-generated gas or gypsum expansion.
 - 6. Fluid grout shall pass through the flow cone, with continuous flow, one hour after mixing.
- C. Class II Non-Shrink Grout:
- 1. Class II non-shrink grouts shall have minimum 28-day compressive strength of 7,000 psi. Use grout for general-purpose grouting applications in accordance with Table 03 60 00 – A – Grout Applications and Material Types in this Section.
 - 2. Products and Manufacturer: Provide one of the following:
 - a. Construction Grout, by Master Builders, Inc.
 - b. FSP Construction Grout, by Five Star Products, Inc.
 - c. High Flow Grout, by Euclid Chemical Company.
 - 3. Comply with ASTM C1107/C1107M and the following when tested using the quantity of water required to achieve the following properties:
 - a. Flowable consistency (140 percent flow in accordance with ASTM C230/C230M, five drops in 30 seconds).
 - b. Fluid working time of at least 15 minutes.
 - c. Flowable for at least 30 minutes.
 - 4. When tested, grout shall not bleed at maximum allowed water.
 - 5. Non-shrink property shall not be based on chemically-generated gas or gypsum expansion.
- D. Class III Non-Shrink Epoxy Grout:
- 1. Epoxy grout shall be a pourable, non-shrink, 100-percent solids system.
 - 2. Products and Manufacturer: Provide one of the following:
 - a. E3 by Euclid Chemical Company
 - b. Sikadur - 42 Grout Pak LE, by Sika Corporation
 - c. HP Epoxy Grout, by Five Star Products, Inc.

3. Epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all pre-measured and prepackaged. Resin component shall not contain non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are unacceptable. Variation of component ratios is not allowed without specific recommendation by manufacturer. Manufacturer's instructions shall be printed on each container in which products are packaged.
4. The following properties shall be attained with the minimum quantity of aggregate allowed by epoxy grout manufacturer.
 - a. Vertical volume change at all times before hardening shall be between zero percent shrinkage and 4.0 percent expansion when measured in accordance with ASTM C827 (modified for epoxy grouts by using an indicator ball with specific gravity between 0.9 and 1.1).
 - b. Length change after hardening shall be less than 0.0006-inch per inch and coefficient of thermal expansion shall be less than 0.00003-inch per inch per degree F when tested in accordance with ASTM C531.
 - c. Compressive creep at one year shall be less than 0.001-inch per inch when tested under a 400-psi constant load at 140 degrees F in accordance with ASTM C1181.
 - d. Minimum seven-day compressive strength shall be 14,000 psi when tested in accordance with ASTM C579
 - e. Grout shall be capable of maintaining at least a flowable consistency for minimum of 30 minutes at 70 degrees F.
 - f. Shear bond strength to portland cement concrete shall be greater than shear strength of concrete when tested in accordance with ASTM C882/C882M.
 - g. Minimum effective bearing area shall be 95 percent.

2.2 GROUT MATERIALS OTHER THAN NON-SHRINK GROUT

- A. General: Materials for grouts (other than non-shrink grouts) shall be in accordance with Section 03 30 00 - Cast-In-Place Concrete, except as otherwise specified in this Section.
- B. Grout Fill:
 1. Grout fill shall be comprised of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed in accordance with this Section.
 - a. Minimum Compressive Strength: 4,000 psi at 28 days.
 - b. Maximum Water Cement Ratio: 0.45 by weight.
 - c. Coarse Aggregate: ASTM C33/C33M, No. 8 size.
 - d. Fine Aggregate: ASTM C33/C33M, approximately 60 percent by weight of total aggregate.
 - e. Air Content: Seven percent (plus or minus one percent).
 - f. Minimum Cement Content: 564 pounds per cubic yard.
 - g. Slump for grout fill shall be adjusted to match placing and finishing conditions, and shall not exceed four inches.

C. Construction Joint Grout:

1. Construction joint grout shall be comprised of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned with similar cementitious characteristics as Class "A" concrete specified in Section 03 30 00 - Cast-In-Place Concrete. Mix design shall result in grout that is flowable with high mortar content. Mix requirements are:
 - a. Minimum Compressive Strength: 4,500 psi at 28 days
 - b. Maximum Water Cement Ratio: 0.42 by weight
 - c. Coarse Aggregate: ASTM C33/C33M, No. 8 size
 - d. Fine Aggregate: ASTM C33/C33M, approximately 60 percent by weight of total aggregate
 - e. Air Content: Seven percent (plus or minus one percent)
 - f. Minimum Cement Content: 752 pounds per cubic yard
 - g. Slump for Construction Joint Grout: Seven inches (plus or minus one inch)

2.3 CURING MATERIALS

- A. Curing materials shall comply with Section 03 30 00 - Cast-in-Place Concrete, and shall be as recommended by the manufacturer of prepackaged grouts.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine substrate and conditions under which grouting will be performed and notify ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:

1. Place grout as shown and indicated, and in accordance with Laws and Regulations and grout manufacturer's instructions. If manufacturer's instructions conflict with the Contract Documents, obtain clarification or interpretation from ENGINEER before proceeding.
2. Consistency of non-shrink grouts shall be as required to completely fill the space to be grouted for the particular application. Do not install grout for dry-packing without approval of ENGINEER. When dry-packing is approved by ENGINEER, dry-pack consistency shall be such that grout has sufficient water to ensure hydration and grout strength development, and remains plastic, moldable, and that does not flow.
3. Grouting shall comply with temperature and weather limitations in Section 03 30 00 - Cast-In-Place Concrete.
4. Cure grout in accordance with grout manufacturer's instructions for prepackaged grout and Section 03 30 00 - Cast-In-Place Concrete, for grout fill.

B. Equipment Bases:

1. Install equipment in accordance to manufacturer's recommendations, Laws, and Regulations, and the Contract Documents. After shimming equipment to proper elevation, securely tighten anchors. Properly form around base plates, allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of equipment base and top of concrete base to ensure that voids are completely filled with non-shrink grout.

C. Handrail Posts:

1. After posts have been properly inserted into holes or sleeves, fill annular space between posts and sleeve with non shrink grout. Bevel grout at juncture with post so that water will flow away from post.

D. Construction Joints:

1. Place a six inch minimum thick layer of construction joint grout over contact surface of concrete at interface of horizontal construction joints in accordance with Section 03 15 00 - Concrete Accessories, and Section 03 30 00 - Cast-In-Place Concrete.

E. Grout Fill:

1. All mechanical, electrical, and finish work shall be completed prior to placing grout fill. Base slab shall be provided with a scratched finish in accordance with Section 03 30 00 - Cast-In-Place Concrete. Roughen existing slabs shall by abrasive blasting or hydroblasting exposing aggregates to ensure bonding to base slab.
2. Minimum thickness of grout fill shall be one-inch. Where finished surface of grout fill is to form an intersecting angle of less than 45 degrees with concrete surface against which grout will be placed, form a key in the concrete surface at the intersection point. Key shall be minimum of 3.5 inches wide by 1.5 inches deep.
3. Thoroughly clean and wet base slab prior to placing grout fill. Do not place grout fill until slab is completely free of standing water. A thin coat of neat Type II cement slurry shall be broomed into surface of slab. Place grout fill while slurry is wet. Grout fill shall be compacted by rolling or tamping, brought to elevation, and floated. In tanks and basins where scraping-type equipment will be installed, grout fill shall be screeded by blades attached to revolving mechanism of equipment in accordance with procedures recommended by equipment manufacturer after grout is brought to elevation.
4. Grout fill placed on sloping slabs shall be installed uniformly from bottom of slab to top, for full width of placement.
5. Test grout fill surface with a straight edge to detect high and low spots; immediately correct high and low spots in grout fill. When grout fill has hardened sufficiently, grout fill shall be steel troweled to provide a smooth surface free of bug holes and other imperfections. While an acceptable type of mechanical trowel may be used in this operation, the last pass over the grout fill surface shall be by hand troweling. During finishing, do not apply the following to the grout fill surface: water, dry cement, or mixture of dry cement and sand.

6. Cure and protect grout fill in accordance with Section 03 30 00 - Cast-In-Place Concrete.

3.3 FIELD QUALITY CONTROL

A. Field Testing Services:

1. OWNER will employ testing laboratory to perform field quality control testing for grout. ENGINEER will direct the testing requirements.

B. Quality Control Testing During Construction:

1. Grout Fill: Perform sampling and testing for field quality control during grout fill placing as follows:
 - a. Sampling Fresh Grout Fill: ASTM C172.
 - b. Slump: ASTM C143; one test for each load of grout at point of placement.
 - c. Air Content: ASTM C231; one sample for every two grout loads at point of placement, and when a change in the grout is observed.
 - d. Compression Test Specimens:
 - 1) In accordance with ASTM C109/C109M; make one set of compression cubes for each 50 cubic yards of grout, or fraction thereof, of each mix design placed each day. Each set shall be four standard cubes, unless otherwise directed by ENGINEER.
2. Non-shrink Grout: Perform sampling and testing for field quality control during non-shrink grout placing as follows:
 - a. Perform compression testing of non-shrink grout in accordance to ASTM C109/C109M at intervals during construction as selected by ENGINEER. Make a set of four specimens for testing compressive strength at a period of time selected by the ENGINEER.
 - b. Perform compression tests on epoxy grout and fabricate specimens for epoxy grout testing in accordance with ASTM C579, Method B, at intervals during construction as selected by the ENGINEER. Make a set of four specimens for testing compressive strength at a period of time selected by ENGINEER.

C. Evaluation of Field Quality Control Tests:

1. Do not use grout, delivered to final point of placement, having slump or total air content that does not comply with the Contract Documents.
2. Compressive strength tests for laboratory-cured cubes will be acceptable if averages of all sets of three consecutive compressive strength test results equal or exceed the required 28-day design compressive strength of the associated type of grout.
3. If the compressive strength tests do not comply with the requirements in the Contract Documents, the grout represented by such tests will be considered defective and shall be removed and replaced, or subject to other action required by ENGINEER, at CONTRACTOR's expense.

D. Manufacturer's Services:

1. Manufacturers of proprietary materials shall make available upon 72 hours notification the services of qualified, full time employee, experienced in serving as a field service technician for the products required, to aid in assuring proper use of products under the actual conditions at the Site.

END OF SECTION

SECTION 03 74 00**MODIFICATIONS TO EXISTING CONCRETE****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding all labor, materials, equipment, and incidentals required and cut, remove, repair, or otherwise modify parts of existing concrete structures or appurtenances as shown on the Drawings and as specified herein. Work under this Section shall also include bonding new concrete to existing concrete.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 03 11 00 - Concrete Forming
- C. Section 03 15 00 - Concrete Accessories
- D. Section 03 20 00 - Concrete Reinforcement
- E. Section 03 30 00 - Cast-in-Place Concrete
- F. Section 03 60 00 - Grouting
- G. Section 05 50 00 - Miscellaneous Metal Fabrications

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - 2. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
 - 3. ASTM D570 - Standard Test Method for Water Absorption of Plastics
 - 4. ASTM D638 - Standard Test Method for Tensile Properties of Plastics
 - 5. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics
 - 6. ASTM D732 - Standard Test Method for Shear Strength of Plastics by Punch Tool
 - 7. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

1.4 QUALITY ASSURANCE

- A. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the ENGINEER or where directed in the Drawings.
- B. When removing materials or portions of existing structures and when making openings in existing structures, all precautions shall be taken and all necessary barriers, shoring

and bracing, and other protective devices shall be erected to prevent damage to the structures beyond the limits necessary for the new work, protect personnel, control dust, and to prevent damage to the structures or contents by falling or flying debris. Unless otherwise permitted, shown, or specified, line drilling will be required in cutting existing concrete.

- C. **Manufacturer Qualifications:** The manufacturer of the specified products shall have a minimum of 10 years experience in the manufacture of such products and shall have an ongoing program of training, certifying, and technically supporting the CONTRACTOR's personnel.

1.5 SUBMITTALS

- A. Submit to the ENGINEER, in accordance with Section 01 33 00 – Submittal Procedures and Section 02 41 00 - Demolition, Cutting, and Patching and the detailed methods of demolition to be used at each location.
- B. Submit manufacturer's technical literature in accordance with Section 01 33 00 – Submittal Procedures on all product brands proposed for use to the ENGINEER for review. The submittal shall include the manufacturer's installation and/or application instructions.
- C. When substitutions for acceptable brands of materials specified herein are proposed, submit brochures and technical data of the proposed substitutions to the ENGINEER for approval before delivery to the project.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver the specified products in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers.
- B. Store and condition the specified product as recommended by the manufacturer.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **General**
 - 1. Materials shall comply with this Section and any state or local regulations.
- B. **Epoxy Bonding Agent**
 - 1. **General**
 - a. The epoxy bonding agent shall be a two-component, solvent-free, asbestos-free, moisture-insensitive epoxy resin material used to bond plastic concrete to hardened concrete complying with the requirements of ASTM C881, Type V, and the additional requirements specified herein.
 - 2. **Material**
 - a. **Properties of the cured material:**
 - 1) **Compressive Strength (ASTM D695):** 8,500 psi minimum at 28 days

- 2) Tensile Strength (ASTM D638): 4,000 psi minimum at 14 days
 - 3) Flexural Strength (ASTM D790 - Modulus of Rupture): 6,300 psi minimum at 14 days
 - 4) Shear Strength (ASTM D732): 5,000 psi minimum at 14 days
 - 5) Water Absorption (ASTM D570 - 2 hour boil): 1 percent maximum at 14 days
 - 6) Bond Strength (ASTM C882) Hardened to Plastic: 1,500 psi minimum at 14 days moist cure
 - 7) Color: Gray
3. Approved manufacturers include: Sikadur 32 Hi-Mod, Sika USA, Lyndhurst, New Jersey; Concsive Liquid (LPL), Master Builder's, Cleveland, Ohio; or W.R. Meadows, Fort Worth, Texas.
- C. Epoxy Paste
1. General
 - a. Epoxy Paste shall be a two-component, solvent-free, asbestos free, moisture insensitive epoxy resin material used to bond dissimilar materials to concrete such as setting railing posts, dowels, anchor bolts, and all-threads into hardened concrete and shall comply with the requirements of ASTM C881, Type I, Grade 3, and the additional requirements specified herein.
 2. Material
 - a. Properties of the cured material:
 - 1) Compressive Properties (ASTM D695): 10,000 psi minimum at 28 days
 - 2) Tensile Strength (ASTM D638): 3,000 psi minimum at 14 days. Elongation at Break - 0.3 percent minimum
 - 3) Flexural Strength (ASTM D790 - Modulus of Rupture): 3,700 psi minimum at 14 days
 - 4) Shear Strength (ASTM D732): 2,800 psi minimum at 14 days
 - 5) Water Absorption (ASTM D570): 1.0 percent maximum at 7 days
 - 6) Bond Strength (ASTM C882): 2,000 psi at 14 days moist cure
 - 7) Color: Concrete grey
 3. Approved manufacturers include:
 - a. Overhead applications: Sikadur 31 Hi-mod LV, Sika USA, Lyndhurst, New Jersey; Concsive 1438, Master Builder's, Cleveland, Ohio; or W.R. Meadows, Fort Worth, Texas.
 - b. Sikadur 32 Hi-mod LV, Sika USA, Lyndhurst, New Jersey; Concsive 1438, Master Builder's, Cleveland, Ohio; or W.R. Meadows, Fort Worth, Texas.
- D. Non-Shrink Precision Cement Grout, Non-Shrink Cement Grout, and Non-Shrink Epoxy Grout are included in Section 03 60 00 Grouting.

- E. Repair Mortars: See Section 03 01 30 Repair and Rehabilitation of Cast-in-Place Concrete.

PART 3 – EXECUTION

3.1 GENERAL

- A. Cut, repair, reuse, demolish, excavate, or otherwise modify parts of the existing structures or appurtenances, as indicated on the Drawings, specified herein, or necessary to permit completion of the Work. Finishes, joints, reinforcements, sealants, etc., are specified in respective Sections. All work shall comply with other requirements of this of Section and as shown on the Drawings.
- B. All commercial products specified in this Section shall be stored, mixed, and applied in strict compliance with the manufacturer's recommendations.
- C. In all cases where concrete is repaired in the vicinity of an expansion joint or control joint the repairs shall be made to preserve the isolation between components on either side of the joint.
- D. When drilling holes for dowels/bolts at new or existing concrete, drilling shall stop if rebar is encountered. As approved by the ENGINEER, the hole location shall be relocated to avoid rebar. Rebar shall not be cut without prior approval by the ENGINEER. Where possible, rebar locations shall be identified prior to drilling using "rebar locators" so that drilled hole locations may be adjusted to avoid rebar interference.

3.2 CONCRETE REMOVAL

- A. Concrete designated to be removed to specific limits as shown on the Drawings or directed by the ENGINEER, shall be done by line drilling at limits followed by chipping or jack-hammering as appropriate in areas where concrete is to be taken out. Remove concrete in such a manner that surrounding concrete or existing reinforcing to be left in place and existing in place equipment is not damaged. Sawcutting at limits of concrete to be removed shall only be done if indicated on the Drawings, or after obtaining written approval from the ENGINEER.
- B. Where existing reinforcing is exposed due to saw cutting/core drilling and no new material is to be placed on the sawcut surface, a coating or surface treatment of epoxy paste shall be applied to the entire cut surface to a thickness of 1/2-in. Rebar shall be drilled and grinded to establish minimum cover requirements prior to application of the surface treatment as detailed in the Drawings.
- C. In all cases where the joint between new concrete or grout and existing concrete will be exposed in the finished work, except as otherwise shown or specified, the joint shall be grooved and grouted after the new concrete placement has fully cured as directed in the Drawings.
- D. Concrete specified to be left in place that is damaged shall be repaired by approved means to the satisfaction of the ENGINEER.

- E. The ENGINEER may from time to time direct the CONTRACTOR to make additional repairs to existing concrete. These repairs shall be made as specified or by such other methods as may be appropriate.
- F. All demolished concrete and other demolished materials shall be removed offsite by the CONTRACTOR.

3.3 CONNECTION SURFACE PREPARATION

- A. A. Connection surfaces shall be prepared as specified below for concrete areas requiring patching, repairs or modifications as shown on the Drawings, specified herein, or as directed by the ENGINEER.
- B. B. Remove all deteriorated materials, dirt, oil, grease, and all other bond inhibiting materials from the surface by dry mechanical means, i.e., sandblasting, grinding, etc., as approved by the ENGINEER. Be sure the areas are not less than 1/2-in in depth. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded into parent concrete, subject to final inspection.
- C. C. If reinforcing steel is exposed, it must be mechanically cleaned to remove all contaminants, rust, etc., as approved by the ENGINEER. If half of the diameter of the reinforcing steel is exposed, chip out behind the steel. The distance chipped behind the steel shall be a minimum of 1-in. Reinforcing to be saved shall not be damaged during the demolition operation.
- D. D. Reinforcing from existing demolished concrete that is shown to be incorporated in new concrete shall be cleaned by mechanical means to remove all loose material and products of corrosion before proceeding with the repair. It shall be cut, bent, or lapped to new reinforcing as shown on the Drawings and provided with 1-in minimum cover all around.
- E. E. The following are specific concrete surface preparation "methods" to be used where called for on the Drawings, specified herein, or as directed by the ENGINEER. Adhesive doweling shall be in accordance with Section 03 20 00.
 - 1. Method A: After the existing concrete surface at connection has been roughened and cleaned, thoroughly moisten the existing surface with water. Brush on a 1/16-in layer of cement and water mixed to the consistency of a heavy paste. Immediately after application of cement paste, place new concrete or grout mixture as detailed on the Drawings.
 - 2. Method B: After the existing concrete surface has been roughened and cleaned, apply epoxy bonding agent at connection surface. The field preparation and application of the epoxy bonding agent shall comply strictly with the manufacturer's recommendations. Place new concrete or grout mixture to limits shown on the Drawings within time constraints recommended by the manufacturer to ensure bond.
 - 3. Where no method is specified, Method B shall be used.

END OF SECTION

SECTION 05 05 19

ANCHOR SYSTEMS

PART 1 – GENERAL

1.1 SECTION INCLUDES:

- A. Requirements regarding labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install anchor systems.
- B. Requirements regarding anchor systems required for the Work, but not specified under other Sections.

1.2 RELATED WORK (NOT USED)

1.3 REFERENCES

A. American Concrete Institute:

- 1. ACI 318 - Building Code Requirements for Structural Concrete
- 2. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures
- 3. ACI 355.2 - Qualification of Post-Installed Mechanical Anchors in Concrete

B. ASTM International:

- 1. ASTM A194/A194M – Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
- 2. ASTM A276 – Standard Specification for Stainless Steel Bars and Shapes
- 3. ASTM A493 – Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging
- 4. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts
- 5. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- 6. ASTM B633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- 7. ASTM C307 – Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing
- 8. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
- 9. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- 10. ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics

11. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
12. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
13. ASTM E488 - Standard Test Methods for Strength of Anchors in Concrete Elements
14. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
15. ASTM F594 - Standard Specification for Stainless Steel Nuts
16. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength

C. Federal Specifications:

1. FS A-A-1922A - Shield, Expansion (Caulking Anchors, Single Lead)
2. FS A-A-1923A – Shield Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)
3. FS A-A-1925A - Shield, Expansion (Nail Anchors)
4. FS A-A-55614 - Shield, Expansion (non-drilling expansion anchors)

D. International Code Council:

1. ICC-ES AC01 - Expansion Anchors in Masonry Elements
2. ICC-ES AC58 - Adhesive Anchors in Masonry Elements
3. ICC-ES AC193 - Mechanical Anchors in Concrete Elements
4. ICC-ES AC308 - Post-Installed Adhesive Anchors in Concrete Elements

E. International Organization for Standardization:

1. ISO 3506-1 - Mechanical Properties of Corrosion-Resistant Stainless Steel Fasteners -- Part 1: Bolts, Screws and Studs with Specified Grades and Property Classes

F. American National Standards Institute:

1. ANSI/MSS SP-58 - Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation
2. ANSI B212.15 - Carbide-Tipped Masonry Drills and Blanks for Carbide-Tipped Masonry Drills

G. National Science Foundation:

1. NSF/ANSI 61 - Drinking Water System Components – Health Effects

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Testing Laboratory: Shall comply with ASTM E329 and shall be experienced in tension testing of post-installed anchoring systems.
2. Post-installed Anchor Installer: Shall be experienced and trained by post-installed anchor system manufacturer in proper installation of manufacturer's products. Product installation training by distributors or manufacturer's representatives is unacceptable unless the person furnishing the training is qualified as a trainer by the anchor manufacturer.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Listing of all anchor systems products intended for use in the Work including product type, intended location in the Project, and embedded lengths.
2. Product Data:
 - a. Manufacturer's specifications, load tables, dimension diagrams, acceptable base material conditions, acceptable drilling methods, and acceptable bored hole conditions.
 - b. When required by ENGINEER, copies of valid ICC ES reports that presents load-carrying capacities and installation requirements for anchor systems.

B. Informational Submittals: Submit the following:

1. Certificates:
 - a. For each type of anchor bolt or threaded rod, submit copies of laboratory test reports and other data required to demonstrate compliance with the Contract Documents.
 - 1) Reports shall demonstrate compliance with ductile steel element definition of ACI 350, Appendix D, Section D.1.
 - b. Post-installed anchor system manufacturer's certification that installer received training in the proper installation of manufacturer's products required for the Work.
2. Manufacturer's Instructions:
 - a. Installation instructions for each anchor system product proposed for use, including bore hole cleaning procedures and adhesive injection, cure and gel time tables, and temperature ranges (storage, installation and in-service).
3. Field Quality Control Submittals:
 - a. Submit results of field quality control testing and inspections performed by testing laboratory.

1.6 Delivery, Storage and Handling

A. Storage and Protection:

1. Keep materials dry during delivery and storage

2. Store adhesive materials within manufacturer's recommended storage temperature range
3. Protect anchor systems from damage at the Site. Protect products from corrosion and deterioration

PART 2 – PRODUCTS

2.1 System Performance

A. General:

1. At locations where conditions dictate that Work specified in other Sections is to be of corrosion resistant materials, provide associated anchor systems of stainless steel materials, unless other corrosion-resistant anchor system material is specified. Provide anchor systems of stainless steel materials where stainless steel materials are required in the Contract Documents.
2. Stainless Steel Nuts:
 - a. For anchor bolts and adhesive anchors, provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts for stainless steel anchors used for anchoring equipment, gates, and weirs, and other locations, if any, where the attachment will require future removal for operation or maintenance. Provide lock washer or double nuts on each anchorage device provided for equipment, as required by equipment manufacturer.
 - b. For other locations, provide for each anchorage device a nut as specified or as required by anchor manufacturer. When ASTM A194/A194M, Grade 8S (Nitronic 60) nuts are not required for anchor bolts and adhesive anchors as specified in this Section, provide anti-seizing compound where stainless steel rods are used with stainless steel nuts of the same type.
3. Materials that can contact potable water or water that will be treated to become potable shall be listed in NSF/ANSI 61.

B. Design Criteria

1. Size, Length, and Load-carrying Capacity: Comply with the Contract Documents. When size, length or load-carrying capacity of anchor system is not otherwise shown or indicated, provide the following:
 - a. Anchor Bolts: Provide size, length, and capacity required to carry design load based on values and requirements of Paragraph 3.2A of this Section. For conditions outside limits of critical edge distance and spacing in Paragraph 3.2A of this Section, minimum anchor bolt embedment as shown or indicated in Paragraph 3.2A of this Section apply and capacity shall be based on requirements of Laws and Regulations, including applicable building codes.
 - b. Adhesive Anchors, Expansion Anchors, or Concrete Inserts: Provide size, length, type, and capacity required to carry design load. Anchor capacity shall be based on the procedures required by the building code in effect at the Site. Where Evaluation Service Reports issued by the ICC Evaluation Service are required in this Section, anchor capacities shall be based on

design procedure required in the applicable ICC Evaluation Service Report.

- 1) General: Determine capacity considering reductions due to installation and inspection procedures, embedment length, strength of base fastening materials, spacing, and edge distance, as indicated in the manufacturer's design guidelines. For capacity determination, concrete shall be assumed to be in the cracked condition, unless calculations demonstrate that the anchor system will be installed in an area that is not expected to crack under any and all conditions of design loading.
 - 2) Concrete Adhesive Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by ENGINEER, provide minimum embedment depth of the greater of the following: required to develop tensile strength of anchor, or a minimum embedment of 10 anchor diameters; and minimum anchor spacing and edge distance of 12 anchor diameters.
 - 3) Concrete Masonry Adhesive Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by ENGINEER, provide minimum anchor spacing and edge distance as indicated in anchor manufacturer's instructions.
 - 4) Concrete Expansion Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by ENGINEER, provide minimum embedment depth of six anchor diameters, and minimum anchor spacing and edge distance of seven anchor diameters.
 - 5) Concrete Masonry Expansion Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by ENGINEER, provide minimum anchor spacing and edge distance as indicated in anchor manufacturer's instructions.
 - 6) Concrete Undercut Anchors: Unless otherwise shown or indicated in the Contract Documents, or approved by ENGINEER, provide minimum anchor spacing and edge distance as tabulated in anchor manufacturer's instructions.
2. Design Loads. Comply with the Contract Documents. When design load of supported material, equipment, or system is not otherwise shown or indicated, provide the following:
- a. Equipment Anchors: Use design load recommended by equipment manufacturer. When equipment can be filled with fluid, use loads that incorporate equipment load and load imposed by fluid.
 - b. Pipe Hangers and Supports: Use full weight of pipe, and fluid contained in pipe that are tributary to the support plus the full weight of valves and accessories located between the hanger or support being anchored and the next hanger or support.
 - c. Hangers and Supports for Electrical Systems, and HVAC, Plumbing, and Fire Suppression Systems and Piping: Use the full weight of supported system that is tributary to the support plus the full weight of accessories

located between the hanger or support being anchored and the next hanger or support. When piping or equipment is to be filled with fluid, anchor systems shall be sized to support such loads in addition to the weight of the equipment, piping, or system, as applicable.

- d. Delegated Design: When anchor systems are used for supporting materials, equipment, or systems delegated to a design professional retained by CONTRACTOR, Subcontractor, or Supplier, provide anchor system suitable for loads indicated in delegated design documents and consistent with the design intent expressed in the Contract Documents.

C. Application:

1. Anchor Bolts:

- a. Where anchor bolt is shown or indicated, use cast-in-place anchor bolt unless another anchor type is approved by ENGINEER.
- b. Provide anchor bolts as shown or indicated, or as required to secure structural element to appropriate anchor surface.

2. Concrete Adhesive Anchors:

- a. Use where adhesive anchors are shown or indicated for installation in concrete.
- b. Suitable for use where subject to vibration.
- c. Suitable for use in exterior locations or locations subject to freezing.
- d. Suitable for use in submerged, intermittently submerged, or buried locations.
- e. Do not use in overhead applications, unless otherwise shown or approved by ENGINEER.
- f. Do not use for pipe hangers, unless otherwise shown or approved by ENGINEER.

3. Drop-in Expansion Anchors:

- a. Use drop-in expansion anchors installed in concrete where light-duty anchors are required to support piping or conduit two-inch diameter or smaller.
- b. Do not use for attaching safety-related systems, such as piping conveying hazardous or potentially hazardous materials, or fire suppression systems.
- c. Do not use where subject to vibration.
- d. Do not use at submerged, intermittently submerged, or buried locations.
- e. Do not use in exterior locations or locations subject to freezing.
- f. Suitable for use in overhead applications.

2.2 Materials

A. Anchor Bolts:

- 1. Interior Dry Non-corrosive Locations: Provide straight threaded carbon steel rods complying with ASTM F1554, Grade 36, with heavy hex nuts complying with

- ASTM A563 Grade A, unless otherwise shown or indicated on the Drawings. Hooked anchor bolts are unacceptable.
2. Exterior, Buried, Submerged Locations, or When Exposed to Wastewater: Provide stainless steel straight threaded rods complying with ASTM F593, AISI Type 316, Condition A, with ASTM F594, AISI Type 316, stainless steel nuts. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts where required. Other AISI types may be used when approved by ENGINEER. Hooked bolts are unacceptable.
 3. Stainless steel straight threaded rod shall comply with ductility requirements of ACI 350 or ACI 318 Appendix D, Section D.3.3.
 4. Equipment: Provide anchor bolts complying with material requirements of this Section and equipment manufacturer's requirements relative to size, embedment length, and anchor bolt projection. Anchor bolts shall be straight threaded rods with washers and nuts as specified in this Section. Hooked bolts are unacceptable.
- B. Anchoring of Structural Elements: Provide anchor bolts of size, material, and strength shown or indicated in the Contract Documents.
- C. Concrete Adhesive Anchors:
1. General:
 - a. Adhesive anchors shall consist of threaded rods anchored into hardened concrete using an adhesive system.
 2. Products and Manufacturers: Provide one of the following:
 HIT-RE 500-SD Injection Epoxy Adhesive Anchoring System, by Hilti Fastening Systems, Inc.
 SET-XP Epoxy-Tie Adhesive, by Simpson Strong-Tie Company, Inc.
 Or equal
 Adhesive:
 Adhesive system shall use two-component adhesive mix.
 Epoxy adhesives shall comply with physical requirements of ASTM C881/C881M, Type IV, Grade 2 and 3, Class A, B, and C, except gel times.
 Adhesives shall have a current evaluation report by ICC Evaluation Service for use in both cracked and uncracked concrete with seismic recognition for SDC A through F as tested and assessed in accordance with ICC-ES AC308.
 Adhesives shall have minimum bond strength and minimum design bond strength (bond strength multiplied by strength reduction factor) in accordance with Table 05 05 19-A:

TABLE 05 05 19-A:-ADHESIVE BOND STRENGTH ^{1,2}

Anchor	Uncracked Concrete		Cracked Concrete	
Rod Diameter / Dowel Size	Bond Strength (psi)	Design Bond Strength (psi)	Bond Strength (psi)	Design Bond Strength (psi)

3/8-inch / #3	2040	1300	1090	700
1/2-inch / #4	1920	1200	920	560
5/8-inch / #5	1830	1150	710	390
3/4-inch / #6	1760	1050	710	460
7/8inch / #7	1670	900	610	340
1-inch / #8	1650	1050	850	460
1.125-inch / #9	1900	1000	800	400
1.25-inch / #10	1580	1000	730	400

Table Notes:

1. Bond strengths listed for hammer-drilled, dry hole.
2. Bond strengths listed for maximum short term concrete temperature of 110 degrees F and maximum long term concrete temperature of 75 degrees F.

4. Anchor:

Provide continuously-threaded, AISI Type 316 stainless steel adhesive anchor rod. Threaded rods shall comply with the concrete adhesive anchor manufacturer's specifications as included in the ICC Service Evaluation Report for the anchor submitted. Nuts shall have specified proof load stresses equal to or greater than the minimum tensile strength of the stainless steel threaded rod used. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts where required.

Stainless steel threaded rod shall comply with ductility requirements of ACI 350 or ACI 318 Appendix D, Section D.3.3.

D. Drop-in Expansion Anchors:

General:

Drop-in expansion anchors shall each consist of an internally threaded, deformation-controlled expansion anchor with pre-assembled expander plug.

Products and Manufacturers: Provide one of the following:

HDI Drop-In Anchors by Hilti Fastening Systems, Inc.

Drop-In Anchor by Simpson Strong-Tie Company, Inc.

Or equal

Provide carbon steel anchors complete with nuts and washers, zinc plated, in accordance with ASTM B633, complying with physical requirements of FS A-A-55614, Type I. Anchors shall be flush or shell type. Provide low-profile anchors for use in precast concrete planks.

- E. Unless approved by ENGINEER, do not use power-actuated fasteners or other types of bolts and fasteners not specified in this Section.

F. Anti-Seizing Compound:

Products and Manufacturers: Provide one of the following:

Pure Nickel Never-Seez by Bostik

Nickel-Graf by Anti-Seize Technology

Or equal

Provide pure nickel anti-seizing compound.

PART 3 – - EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials will be installed and advise ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

Anchor Bolts:

Provide anchor bolts as shown or indicated in the Contract Documents, or as required to secure structural element to the appropriate anchor surface.

Locate and accurately set anchor bolts using templates or other devices as required, prior to placing concrete. Wet setting of anchor bolts is unacceptable.

Protect threads and shank from damage during installation and subsequent construction operations.

Unless otherwise shown or approved by ENGINEER anchor bolts shall comply with Table 05 05 19-B:

TABLE 05 05 19-B: SINGLE ANCHOR ALLOWABLE LOADS ON ANCHOR BOLTS ¹

Bolt Diameter (inch)	F1554 Grade 36				F1554			
	F593 Type 316, Condition A				Grade 55			
	Minimum Embedment (inch)	Minimum Edge Distance and Spacing ²	Shear ^{3,4} (lb)	Tension ³ (lb)	Minimum Embedment (inch)	Minimum Edge Distance and Spacing ²	Shear ³ (lb)	Tension ³ (lb)
1/2	6	9	947	1,815	8.5	12.75	1,245	2,393
5/8	7.5	11.25	1,508	2,895	10.5	15.75	1,980	3,810
3/4	9	13.5	2,231	4,290	13	19.5	2,933	5,640
7/8	10.5	15.75	3,080	5,918	15	22.5	4,050	7,793
1	12	18	4,040	7,770	17	25.5	5,318	10,088
1 1/8	13.5	20.25	5,090	9,789	19	28.5	8,930	12,435

Table Notes:

1. Table is based on ACI 318 and ACI 350, Appendix D, $f'_c = 4000$ psi. Table 05 05 19-B is not applicable to anchor bolts embedded in grouted masonry.
2. Critical edge distance and spacing are indicated in the table. Capacity of anchor bolts for other combination of edge distances and spacing shall be evaluated in accordance with ACI 318 and ACI 350, Appendix D.
3. Values for shear and tension listed are not considered to act concurrently. Interaction of tension and shear will be evaluated by ENGINEER in accordance with ACI 318 and ACI 350, Appendix D.

B. Adhesive Anchors, Undercut Anchors, and Expansion Anchors – General:

Prior to drilling, locate existing reinforcing steel in vicinity of proposed holes. If reinforcing conflicts with proposed hole location, obtain ENGINEER's approval of alternate hole locations to avoid drilling through or damaging existing reinforcing bars.

C. Adhesive Anchors:

Comply with manufacturer's written installation instructions and the following.

Drill holes to adhesive system manufacturer's recommended drill bit diameter to the specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits that comply with the tolerances of ANSI B212.15. Core-drilled holes are unacceptable.

Before setting adhesive anchor, hole shall be made free of dust and debris by method recommended by adhesive anchor system manufacturer. Hole shall be brushed with adhesive system manufacturer-approved brush and blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.

Before injecting adhesive, obtain ENGINEER's concurrence that hole is dry and free of oil and other contaminants.

Prior to injecting adhesive into the drilled hole, dispense, to a location appropriate for such waste, an initial amount of adhesive from the mixing nozzle, until adhesive is uniform color.

Inject adhesive into hole through injection system-mixing nozzle and necessary extension tubes, placed to bottom of hole. Discharge end shall be withdrawn as adhesive is placed but kept immersed to prevent formation of air pockets. Fill hole to depth that ensures that excess material is expelled from hole during anchor placement.

Twist anchors during insertion into partially-filled hole to guarantee full wetting of rod surface with adhesive. Insert rod slowly to avoid developing air pockets.

Provide adequate curing in accordance to adhesive system manufacturer's requirements prior to continuing with adjoining Work that could place load on installed adhesive anchors. Do not begin adjoining Work until adhesive anchors are successfully tested or when allowed by ENGINEER.

Limitations:

Installation Temperature: Comply with manufacturer's instructions for installation temperature requirements. Provide temporary protection and other measures, such as heated enclosures, necessary to ensure that base material temperature complies with anchor systems manufacturer's requirements during installation and curing of adhesive anchor system.

Oversized Holes: Advise ENGINEER immediately if size of drilled hole is larger than recommended by anchor system manufacturer. Cost of corrective measures, including but not limited to redesign of anchors due to decreased anchor capacities, shall be paid by CONTRACTOR.

Embedment depths shall be based on installation in normal-weight concrete with compressive strength of 2,500 psi when embedded in existing concrete, and 4,000 psi when embedded in new concrete.

D. Expansion Anchors:

Comply with expansion anchor manufacturer's written installation instructions and the following:

Drill holes using anchor system manufacturer's recommended drill bit diameter and to the specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits complying with tolerances of ANSI B212.15. Core-drilled holes are unacceptable.

Before installing anchor, hole shall be made free of dust and debris by method recommended by anchor system manufacturer. Hole shall be brushed with anchor system manufacturer-approved brush and blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles.

Before installing anchor, obtain ENGINEER's concurrence that hole is dry and free of oil and other contaminants.

Protect threads from damage during anchor installation. Drive anchors not less than four threads below surface of the attachment. Set anchors to anchor manufacturer's recommended torque using a torque wrench.

E. Concrete Undercut Anchors:

Comply with undercut anchor manufacturer's written installation instructions and the following.

Protect threads from damage during anchor installation.

Drill hole to anchor manufacturer's specified depth and diameter using a drill bit matched to the specific anchor.

Before setting the undercut anchor, hole shall be free of dust and debris using method recommended by undercut anchor system manufacturer. Hole shall be blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles.

Insert the anchor by hand until anchor reaches bottom of hole.

Set anchor in accordance with manufacturer's instructions using anchor manufacturer's specified setting tool.

Verify that the setting mark is visible on the threaded rod above the sleeve.

Anchor shall be set to manufacturer's recommended torque, using a torque wrench.

F. Anti-Seizing Compound:

Provide anti-seizing compound in accordance with anti-seizing compound manufacturer's installation instructions.

Do not use anti-seizing compound at locations where anchor bolt or adhesive anchor will contact potable water or water that will be treated to become potable.

3.2 CLEANING

A. After embedding concrete is placed, remove protection and clean bolts and inserts.

3.3 FIELD QUALITY CONTROL

A. Site Tests:

OWNER Will employ testing agency to perform field quality tensile testing of post-installed anchors at the Site.

Testing shall comply with ASTM E488.

Test at least ten percent of all types of post-installed anchors. If one or more post-installed anchors fail the test, CONTRACTOR shall pay cost of testing, or at ENGINEER's option CONTRACTOR may arrange for testing paid by CONTRACTOR, for all post-installed anchors of same diameter and type installed on the same day as the failed anchor. If anchors installed on the same day as the failed anchor also fail the test, ENGINEER may require retesting of all anchors of the same diameter and type installed in the Work. CONTRACTOR shall be responsible for retesting costs.

Test post-installed anchors to 50 percent of ultimate tensile capacity of post-installed anchor. ENGINEER will direct which anchors are to be tested.

Apply test loads with hydraulic ram.

Displacement of post-installed anchors shall not exceed $D/10$, where D is nominal diameter of anchor being tested.

Correct defective Work by removing and replacing or correcting, as directed by ENGINEER.

CONTRACTOR shall pay for all corrections and subsequent testing required to confirm integrity of post-installed anchors.

Testing agency shall submit test results to CONTRACTOR and ENGINEER within 24 hours of completion of test.

A. Manufacturer's Services:

Provide at the Site services of qualified adhesive manufacturer's representative during initial installation of adhesive anchor systems to train CONTRACTOR's personnel in proper installation procedures. Manufacturer's representative shall observe to confirm that installer demonstrates proper installation procedures for adhesive anchors and adhesive material.

END OF SECTION

SECTION 05 50 00**MISCELLANEOUS METAL FABRICATIONS****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown on the Drawings, specified and required to furnish miscellaneous metal fabrications, including surface preparation and shop priming.
- B. Requirements regarding The extent of miscellaneous metal fabrications Work is shown on the Drawings and includes items fabricated from iron, steel and aluminum shapes, plates, bars, castings and extrusions, which are not a part of the structural steel or other metal systems covered by other Sections of these Specifications. The types of miscellaneous metal items include, but are not limited to the following: Ladders, Extruded Aluminum Stair Nosings, Bollards, Miscellaneous Framing and Supports, Miscellaneous Accessories and Fasteners, and Seat Angles, Supports, and Brackets.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 05 05 19 - Anchor Systems

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM A36 – Standard Specification for Carbon Structural Steel
 - 2. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - 3. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 4. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications
 - 5. ASTM A276 – Standard Specification for Stainless and Steel Bars and Shape
 - 6. ASTM A320 – Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service
 - 7. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - 8. ASTM B211 – Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire
 - 9. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes
- B. American National Standards Institute:

1. ANSI A14.3 – Ladders-Fixed-Safety Requirements
- C. American Welding Society:
 1. AWS D1.1 - Structural Welding Code
- D. National Association Of Architectural Metal Manufacturers:
 1. NAAMM - Metal Finishes Manual
- E. Occupational Safety And Health Administration:
 1. OSHA Applicable Standards

1.4 QUALITY ASSURANCE

- A. Field Measurements:
 1. Take field measurements where required prior to preparation of Shop Drawings and fabrication to ensure proper fitting of the Work.
- B. Shop Assembly:
 1. Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.5 SUBMITTALS

- A. Shop Drawings: Submit for approval the following in accordance with Section 01 33 00 – Submittal Procedures:
 1. Fabrication and erection details of all assemblies of miscellaneous metal Work. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Include setting drawings and templates for location and installation of miscellaneous metal items and anchorage devices.
 2. Copies of manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions for products to be used in miscellaneous metal Work.

1.6 DELIVERY, STORAGE AND HANDLING

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Steel Plates, Shapes and Bars: ASTM A36
- B. Aluminum:
 1. Alloy and Temper: Provide alloy and temper as shown on the Drawings or specified, or as otherwise recommended by the aluminum producer or finisher.
 2. Profiles and Tubes: ASTM B241
 3. Plate and Sheet: ASTM B209

- 4. Bars, Rod, and Wire: ASTM B211
- C. Stainless Steel Plates, Sheets and Bars: ASTM A 276, Type 316 stainless steel.
 - 1. Use Type 316 stainless steel unless shown otherwise in the Drawings.
- D. Stainless Steel Fasteners and Fittings: ASTM A320
- E. Surface Preparation and Shop Priming: All steel shall be primed in the shop.
- F. Galvanizing: All galvanizing of fabricated steel items shall comply with the requirements of ASTM A123.
- G. Aluminum Finish: Provide an Architectural Class I anodized finish for all aluminum work unless specifically shown or specified to be mill or other finish.

2.2 MISCELLANEOUS METAL ITEMS

- A. Ladders:
 - 1. Fabricate ladders for the locations shown on the Drawings, with dimensions, spacings, details and anchorages as shown on the Drawings, and specified. Comply with the requirements of ANSI A14.3, except as otherwise shown on the Drawings or specified.
 - a. Unless otherwise shown on the Drawings, provide 1 1/2-inch diameter Schedule 40 side rails, spaced 18-inches apart, minimum.
 - b. Provide extruded square rungs, spaced 12-inches on centers, maximum with non-slip surface on the top of each rung. Adhesive strips for non-slip surfaces will not be allowed.
 - 2. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
 - 3. Support each ladder at top and bottom and at intermediate points spaced not more than five feet on centers. Use welded or bolted brackets, designed for adequate support and anchorage, and to hold the ladder clear of the wall surface with a minimum of 7-inches clearance from wall to centerline of rungs. Unless otherwise shown on the Drawings, or approved by the ENGINEER, extend rails 42-inches above top rung, and return rails to wall or structure, unless other secure handholes are provided. If the adjacent structure does not extend above the top rung, goose neck the extended rails back to the structure to provide secure ladder access.
 - 4. For aluminum ladders, use extruded aluminum conforming to alloy and temper of the 5000 series alloys. For stainless steel ladders, use 316 SS.
- B. Fall Prevention System: All ladders greater than 12-feet-0-inches in height shall be provided with a fall prevention system. The system shall meet OSHA standards.
 - 1. The system shall consist of a rail permanently attached to the ladder to which a harness belt is attached. The rail shall be notched and constructed of aluminum. Ladder attachments shall be provided as required by the manufacturer. A removable extension section shall be provided at the top of the ladder.
 - 2. Product and Manufacturer: Provide one of the following:
 - a. Saf-T-Climb by Miller

- b. Vi-Go Ladder Climbing Safety System by Miller
- C. Aluminum Stairs:
 - 1. Stringers: 6061-T6 aluminum alloy
 - 2. Stair Treads:
 - a. Aluminum of same type specified under Aluminum Grating
 - b. Of sizes indicated on the Drawings and 1-3/4 inch minimum depth with cast abrasive type safety nosings
 - 3. Handrails and Guardrails: Aluminum pipe specified under Aluminum Handrails and Guardrails (Nonwelded Pipe)
 - 4. Fasteners: Type 316 stainless steel
- D. Extruded Aluminum Stair Nosings:
 - 1. Fabricate of sizes and configurations required for the Work
 - a. Unless otherwise shown on the Drawings, provide ribbed abrasive filled type, using black abrasive filler
 - 2. Provide anchors for embedding in concrete, either integral or applied to treads, as standard with the manufacturer
 - 3. Product and Manufacturer: Provide stair nosings by one of the following:
 - a. Wooster Products Incorporated
 - b. Or Equal
- E. Bollards: Unless shown otherwise in the Drawings, provide 8-inch diameter, Schedule 40 galvanized steel pipe, 4-feet-0-inches above grade, 4-feet-0-inches below grade. Fill with concrete and mound top. Bollards shall be primed in the shop. Surface preparation and painting shall conform to the requirements of Section 09 91 00 – Painting and Coating.
- F. Miscellaneous Framing and Supports:
 - 1. Provide miscellaneous metal framing and supports, which are not a part of the structural steel framework and are required to complete the Work.
 - 2. Fabricate miscellaneous units to the sizes, shapes and profiles shown on the Drawings or, if not shown on the Drawings, of the required dimensions to receive adjacent grating, plates, tanks, doors, or other work to be retained by the framing. Except as otherwise shown on the Drawings, fabricate from structural shapes, plates, and bars, of all welded construction using mitered corners, welded brackets and splice plates and a minimum number of joints for field connection. Cut, drill and tap units to receive hardware and similar items to be anchored to the Work.
 - 3. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
 - a. Except as otherwise shown on the Drawings, space anchors, 24-inches on centers, and provide units the equivalent of 1 1/4 by 1/4 by 8 inch strips.

- b. All material shall be Type 316 stainless steel unless noted otherwise in the Drawings.
- G. Fasteners and Fittings: Provide Type 316 stainless steel, for all aluminum fabrications, and zinc coated hardware for all galvanized fabrications, unless otherwise shown on the Drawings or specified.
- H. Surface Preparation and Shop Priming: All miscellaneous metal fabrications shall be primed in the shop.
- I. Aluminum Finish: Provide an Architectural Class 1 anodized finish, AA M32C22 A41, clear, as specified in NAAMM Manual.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Set miscellaneous metal fabrications accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Brace temporarily or anchor temporarily in formwork where fabrications are to be built into concrete, masonry or similar construction.
- B. Anchor securely as shown on the Drawings or as required for the intended use, using concealed anchors wherever possible.
- C. Fit exposed connections accurately together to form tight hairline joints. Weld steel connections, which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind steel joints smooth and touch up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units, which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- D. Protection of Aluminum from Dissimilar Materials:
 - 1. Coat all surfaces of aluminum in contact with dissimilar materials, such as concrete, grout, masonry and steel or other dissimilar metals with the following:
 - a. Cast Aluminum: Heavy coat of bituminous paint
 - b. Extruded Aluminum: Two coats of clear lacquer
 - 2. Do not extend coating beyond contact surfaces. Remove coating where exposed-to-view in the finished Work.
- E. All welds to be coated shall be grinded smooth according to NACE “Surface Preparation of Welds Prior to Coating”.

END OF SECTION

SECTION 09 91 00**PAINTING AND COATING****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding all labor, materials and equipment to prepare surfaces and to apply protective coatings to new equipment, pumps, piping and valves, structural steel, masonry, concrete, and miscellaneous items, complete and in place, as shown on the Drawings and as specified herein.
- B. The term "paint" as used in this section means the protective coatings specified. Other paintings may be required in other sections of the specifications. All paint for concrete or metal surfaces shall be especially adapted for use around a moist and humid environment and shall be applied in conformance with the Manufacturer's published specifications.

1.2 RELATED WORK

- A. Division 01 – General Requirements
- B. Section 01 33 00 – Submittal Procedures
- C. Division 03 – Concrete
- D. Division 05 – Metals
- E. Division 23 – Heating, Ventilating and Air Conditioning (HVAC)
- F. Division 26 – Electrical
- G. Division 40 – Process Interconnections
- H. Division 41 – Material Processing and Handling Equipment
- I. Division 43 – Process Gas and Liquid Handling, Purification, and Storage Equipment
- J. Division 46 – Water and Wastewater Equipment

1.3 REFERENCE STANDARDS

- A. ASTM International
 - 1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
- B. International Code Council
 - 1. IBC – International Building Code
- C. The Society for Protective Coatings
 - 1. Painting Manual Volume 1 & 2

D. Code of Federal Regulations

1. Food and Drug Administration (FDA) Document, Title 21, Section 175.300

1.4 QUALITY ASSURANCE (NOT USED)

1.5 SUMMITTALS

- A. Product Data and Shop Drawings: Submit product data, shop drawings, certificates and instructions on all protective coatings items as specified herein and in accordance with Division 01 - General Requirements and Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit complete data on each type and kind of paint and primer for review. Submittal data shall show where and for what uses each paint product is to be used, with cross reference made to paragraphs of the specifications or the coating schedule. Data submitted on each type and kind of paint product shall include information to show that the product meets the detailed requirements of these specifications.
- C. Manufacturer's Instructions: Submit the Manufacturer's published instructions for use as a guide in specifying and applying the Manufacturer's proposed paint. Paint shall not be delivered to the job site before review of the Manufacturer's instructions by the Owner's Representative. A Manufacturer's paint will not be considered for use unless that Manufacturer's published instructions meet the following requirements:
 1. The instructions must have been written and published by the Manufacturer for the purpose and with the intent of giving complete instruction for the use and application of the proposed paint in the locality and for the conditions for which the paint is specified or shown to be applied under this contract.
 2. All limitations, precautions and requirements that may adversely affect the paint; that may cause unsatisfactory results after the painting application; or that may cause the paint not to serve the purpose for which it was intended, that is, to protect the covered material from corrosion, shall be clearly and completely stated in the instructions. These limitations and requirements shall include, but not be limited to, the following:
 - a. Surface preparation
 - b. Methods of application
 - c. Number of coats
 - d. Thickness of each coat
 - e. Total thickness
 - f. Drying time of each coat, including primer
 - g. Drying time of final coat before placing in service
 - h. Time allowed between coats
 - i. Primer required to be used
 - j. Primers not permitted
 - k. Use of a primer

- l. Compatible topcoats
- m. Thinner and use of thinner
- n. Weather limitations during and after application (temperature, humidity, wind velocity)
- o. Protection from sun
- p. Physical properties of paint, including percent solids content by volume, ingredient analysis, and weight per unit surface per dry mil thickness
- q. Cathodic disbonding limitations, if any
- r. Equipment settings (air cap, fluid tip, equipment pressure settings, etc.)

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in original, unopened, and labeled containers; inspect to verify acceptability.
- B. Container label to include Manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Store materials in an approved location which meets the Manufacturer's storage requirements. Recommended storage temperatures and ventilation shall be maintained. Keep the storage area clean and repair any damage done. Remove oily rags, waste, or other fire hazards from buildings each night; take adequate precautions to avoid damage by fire. Place cloths and cotton waste which might constitute a fire hazard in metal containers or destroy at the end of each workday.

1.7 MAINTENANCE/SPARE PARTS

- A. At the end of the project, the Contractor shall turn over to the Owner a gallon of each type and color of paint, primer, thinner, or other coatings used in the field painting. The material shall be delivered in unopened labeled cans, just as it comes from the factory. If the Manufacturer does not package the material in gallon cans, and in the case of special colors, the materials shall be delivered in new gallon containers, properly closed with typed labels indicating brand, type, color, etc. Where multiple component materials are used, the Contractor shall supply an unopened kit of the necessary materials in the Manufacturer's smallest standard packaging size (i.e., a 2-component epoxy with a 1:1 mix ratio would require a 1-gallon can of resin and a 1-gallon can of curing agent). The Manufacturer's literature describing the materials and giving directions for their use shall be furnished in three bound copies. A typewritten inventory list shall be furnished at the time of delivery.

1.8 SUBSTITUTIONS

- A. Wherever a product is designated by trade name with provision for an equal, the product specified must be used unless a written request for substitution is submitted to the Engineer for review and approval. The request for substitution must include the Manufacturer's complete technical data sheets on the proposed product with a certified ingredients analysis signed by an officer of the Manufacturer and sufficient information,

including applicable case history information, for making a complete comparison between specified and proposed product.

- B. Consideration will be given only to those which have been used in water and wastewater treatment plant service for at least 10 years. The request for substitution must include a list of at least 10 applications where the product has been in continuous use for at least 5 years. Furnish the Owner's name, the Owner's representative and the name of the product used.

1.9 SAFETY AND HEALTH REQUIREMENTS

- A. General: In accordance with requirements set forth by regulatory agencies applicable to the construction industry and Manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of personal protective lifesaving equipment for persons working on or about the project site.
- B. Head and Face Protection and Respiratory Devices: Equipment shall include protective helmets which shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work site during sandblasting shall wear eye and face protection devices and air purifying, half mask or mouthpiece respirators with appropriate filters. Barrier creams shall be used on any exposed areas of skin.
- C. Ventilation: Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminants to the degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.
- D. Sound Levels: Whenever the occupational noise exposure exceeds maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.
- E. Illumination: Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Construction Manager, Engineer or Owner's Representative, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination purposes shall be determined by the Construction Manager, Engineer or Owner's Representative.

1.10 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame and smoke rating requirements for finishes.

1.11 COATING SYSTEM COMPATIBILITY

- A. The Contractor shall apply coatings from only one manufacturer. Application of coatings by more than one painting contractor will not be allowed. Submit color charts to Owner at least 60 days prior to paint application to allow time for color selection.

PART 2 – PRODUCTS

2.1 COLOR SCHEDULE

- A. Final color selection will be made by the Owner from color chips submitted by the Contractor; colors selected may or may not be a Manufacturer's standard color. Submit color charts to Owner at least 60 days prior to paint application to allow time for color selection.
- B. Shop Painted Equipment: Motors, equipment, pumps, valve bodies and metal pump bases shall be shop painted.
 - 1. Motors, equipment, pumps, pump bases and valve bodies shall be painted color as selected by the Owner.
 - 2. All bronze or stainless-steel valve bodies shall not be painted.
- C. Exposed Moving Parts and Guards
 - 1. All exposed moving parts such as couplings, shafts, etc., shall be painted OSHA red.
 - 2. All guards and shields such as belt guards, chain guards, etc., shall be painted OSHA orange.

2.2 TEST EQUIPMENT

- A. The Owner's Representative will use, but is not limited to, the following pieces of equipment to determine film thickness and presence of flaws. The Contractor shall provide, maintain and calibrate the following equipment for the Owner's Representative's use for testing the coating system. All costs related to the testing equipment shall be borne by the Contractor.
- B. Electronic Digital Readout Gage: 0.40 mils film thickness gage including a set of 0.5 Department of Commerce, Bureau of Standards Film Thickness Calibration Standards from 0-8 mils and 10-25 mils or equivalent
- C. Wet Sponge Holiday Detector: Low voltage (67-1/2 volts) flow detector (holiday detector)
- D. Clemtex Comparator: Surface anchor profile standard
- E. Wet Film Thickness Gage
- F. Sling Psychrometer

2.3 MATERIAL

- A. Paint shall arrive on the job ready-mixed, except for the tinting of undercoats, field catalyzed coatings, and possible thinning.
- B. All coating shall meet all Federal, State, United States Corps of Engineers, Environmental Quality Board, and any other local governmental ordinances and regulations for allowable Volatile Organic Compounds and other hazardous contents.

- C. When thinning coating, the amount of thinner used shall not exceed the limit recommended by the Manufacturer, nor shall it cause the paint to exceed the allowable limits for VOCs. Only thinners recommended by the Manufacturers, or approved equal, shall be used.

2.4 COATING SCHEDULE

A. General:

1. Coat materials as called for in the Drawings and as specified in this Section
2. All finished coatings on horizontal surfaces must be non-skid, slip resistant
3. DFT: Dry Film Thickness

B. Ferrous Metal, Interior, Non-Immersed, Subject to Non-Abrasive Conditions:

1. General: All interior above ground ferrous surfaces subject to dry non-abrasive conditions shall be painted in accordance to the following provisions. This includes, but is not limited to: exposed pumps, exterior of valves, pipes, motors, machinery, and miscellaneous metals such as structural steel.
2. Surface Preparation: SSPC SP-6 Commercial Blast Cleaning, Reference Part 3.2 Surface Preparation, item D for description.
3. Coating (Epoxy-Polyamide)

Minimum Coverage	Manufacturer
Primer 5.0 mils DFT	Tnemec N69-1211 HB Epoxoline II Primer Carboline 893 Polyamide Epoxy Primer Devco Devran 224 HS Sherwin-Williams MacroPoxy 646 PW
Finish Coat 4.0 mils DFT	Tnemec N69-12-Color High-Build Epoxoline II Carboline 134 HS Polyurethane Devco Devran 224 HS Sherwin-Williams MacroPoxy 646 PW

C. Ferrous Metal, Exterior, Non-Immersed, Subject to Non-Abrasive Conditions:

1. General: All exterior ferrous surfaces not submerged, and subject to non-abrasive conditions shall be painted in accordance to the following provisions. This includes but is not limited to: Exterior of non-submerged equipment, valves, pipes, pipe sleeves, brackets, grates, structural steel, light poles, man doors and frames, etc. Surfaces intermittently or partially submerged will be treated as submerged.
2. Surface Preparation: SSPC SP-6 Commercial Blast Cleaning. Reference Part 3.2 Surface Preparation, item D for description.
3. Coating (Aliphatic-Polyurethane System)

Minimum Coverage	Manufacturer
Primer 5.0 mils DFT	Tnemec N69-Color High-Build Epoxoline II Primer Carboline 890 Epoxy Devoe Devran 224 HS Sherwin-Williams MacroPoxy 646 PW
Finish Coat 4.0 mils DFT	Tnemec 750-Color Endura-Shield Carboline 134 HS Polyurethane Devoe Devthane 359 DTM Sherwin-Williams Hi-Solids Polyurethane

D. Ferrous Metals, Immersed or Subject to Abrasive Conditions

1. General: All ferrous surfaces below ground level, submerged, or subject to abrasive conditions shall be painted in accordance with the following provisions. This includes but is not limited to: Ladders, grates, checkered plates, handrails, access covers, exterior of submerged valves, piping, brackets, structural steel, sluice gates, roller gates, drains, etc. (Surfaces that are questionable as to if they are subject to submerged or abrasive conditions will be considered as subject to those conditions).
2. Surface Preparation: SSPC SP-10 Near White Metal Blast Cleaning. Reference Part 3.2 Surface Preparation, item D for description.
3. Coating (Epoxy-Polyamide System)

Minimum Coverage	Manufacturer
Primer 5.0 mils DFT	Tnemec N140-1255 Pota-Pox Plus Primer Devoe Bar-Rust 233H Sherwin-Williams MacroPoxy 646 PW
Finish Coat 5.0 mils DFT	Tnemec N140-11WH Pota-Pox Plus Finish Devoe Bar-Rust 233H Sherwin-Williams MacroPoxy 646 PW

E. Non-Ferrous Metal Interior:

1. General: All nonferrous surfaces where painting is required shall be painted in accordance with the following provisions. This includes but is not limited to: pipe supports, underside of roof decks and man doors and frames.
2. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning. Reference Part 3.2 Surface Preparation, item D for description.
3. Coating (Epoxy-Polyamide System)

Minimum Coverage	Manufacturer
Primer 4.0 mils DFT	Tnemec N69-color High-Build Epoxoline II Devoe Devran 205 Sherwin-Williams MacroPoxy 646 PW
Finish Coat 5.0 mils DFT	Tnemec N69-High-Build Epoxoline II Devoe Devran 224HS Sherwin-Williams MacroPoxy 646 PW
Finish Coat (For Exterior Installation) 3.0 mils DFT in addition of Primer and Finish Coat described above	Tnemec Series 750 Endura-Shield Devoe Devthane 359 Sherwin-Williams Hi-Solids Polyurethane

F. Aluminum, Stainless Steel, Galvanized Steel, Copper, or Brass: Unless specifically called for in the Drawings, only clean these surfaces. Do not paint.

G. All Aluminum in Contact with Dissimilar Materials:

1. Surface Preparation: Remove all foreign matter and apply seal as required by coating Manufacturer.
2. Coating (Epoxy-Polyamide)

Minimum Coverage	Manufacturer
Primer (not required)	
Finish Coat 2 coats at 4.0 mils DFT each	Tnemec 66 Hi Build Epoxoline Carboline 890 Epoxy Devoe Devran 224 HS

H. Interior Concrete:

1. Surface Preparation: Remove all grease, oils and grime by washing with an emulsifying alkaline water based cleaner. All surface contaminants including existing coatings shall be removed prior to application of new coating. Brush blast or acid-etch concrete prior to coating. Surface preparation shall be as per Manufacturer's recommendations.
2. First coat: Tnemec Series 151 Elasto-grip applied at 200-400 SF per gallon, or Glidden Professional Decraflex 300 Elastomeric System at 12 dry mils.
3. Second Coat: Tnemec Series 156 Enviro-crete applied at 8 dry mils, or Glidden Professional 300 Elastomeric System at 12 dry mils.

4. Third Coat: Tnemec Series 157 Enviro-crete applied at 9 dry mils, or Glidden Professional 300 Elastomeric System at 12 dry mils.
- I. Exterior Concrete - Exposed
1. Surface Preparation: Remove all grease, oils and grime by washing with an emulsifying alkaline water based cleaner. All surface contaminants including existing coatings shall be removed prior to application of new coating. Brush blast or acid-etch concrete prior to coating. Surface preparation shall be as per Manufacturer's recommendations.
 2. First coat: Tnemec Series 151 Elasto-grip applied at 200-400 SF per gallon, or Glidden Professional 300 Elastomeric System at 12 dry mils.
 3. Second coat: Tnemec Series 156 Enviro-crete applied at 8 dry mils, or Glidden Professional 300 Elastomeric System at 12 dry mils.
 4. Third Coat: Tnemec Series 157 Enviro-crete applied at 9 dry mils, or Glidden Professional 300 Elastomeric System at 12 dry mils.
- J. Interior Concrete Block Masonry - Exposed
1. Surface Preparation: Remove all oil, grease, and other contaminants. Allow mortar to cure for 14 days. Surface preparation shall be per manufacturer's recommendations.
 2. First coat: Tnemec Series 130 Envirofill cementious block filler applied at 65-75 square feet per gallon, or Devoe Bloxfill 4000 applied at 50-75 SF per gallon.
 3. Second coat: Tnemec Series 287 Enviro-Pox applied at 5-6 mils DFT, or Devoe Tru-Glaze 4406 applied at 3-5 mils DFT.
 4. Third coat: Tnemec Series 297 Enviro-Glaze applied at 5-6 mils DFT, or Devoe Tru-Glaze 4406 applied at 3-5 mils DFT.
- K. Exterior Concrete Block Masonry - Exposed
1. Surface Preparation: Remove all oil, grease, and other contaminants. Allow mortar to cure for 14 days. Surface preparation shall be per manufacturer's recommendations.
 2. First coat: Tnemec Series 130 Enviro-fill applied at 85-115 SF per gallon, or Devoe Bloxfill 4000 applied at 50-75 SF per gallon
 3. Second coat: Tnemec Series 180 Tneme-crete applied at 8-10 dry mils
 4. Third coat: Tnemec Series 181 Tneme-crete applied at 8-10 mils DFT
- L. Submerged or intermittently submerged Concrete, Interior and Exterior, except for potable water service, and where special protective coatings are required:
1. Surface Preparation: Remove all scale, dirt, oil, grease, and all other foreign matter by washing with approved cleaning solvent. Remove any existing coating prior to application of new coating. Brush blast or acid-etch concrete prior to coating. All active cracks shall be treated as an expansion joint as detailed in ARC procedural guide and addressed by the certified coating applicator.
 2. Products and Manufacturer:

a. Chesterton

- 1) Primer: ARC 797 – 7 to 10 mils DFT (dry film thickness)
- 2) Finish Coat: ARC 791 – 250 mils DFT; apply at Manufacturer's recommended rate required to achieve total DFT

3. No substitutions will be allowed for coatings under this paragraph

M. PVC Pipe Interior

1. Surface Preparation: As recommended by Manufacturer
2. Coating (Epoxy-Polyamide)

Minimum Coverage

Manufacturer

Primer (not required)

Finish Coat 5.0 mils DFT

Tnemec N69-color HiBuild Epoxoline II

Devco Devran 224HS

Sherwin-Williams MacroPoxy 646 PW

N. PVC Pipe Exterior

1. Surface Preparation: As recommended by Manufacturer
2. Coating (Hybrid-Polyurethane System)

Minimum Coverage

Manufacturer

Primer 4.0-6.0 mils DFT

Tnemec N69-color High-Build Epoxoline II

Devco Devran 224 HS

Sherwin-Williams MacroPoxy 646 PW

Finish Coat 3.0-4.0 mils

Tnemec 750 Endura-Shield

DFT

Devco Devthane 379 UVA

Sherwin-Williams Hi-Solids Polyurethane

PART 3 – EXECUTION

3.1 WORK CONDITIONS

- A. Coating or painting shall be applied per all Manufacturer's recommendations.
- B. Surface: If surfaces to be painted cannot be put in proper condition for painting by customary cleaning and sanding operations, notify the Construction Manager in writing or assume the responsibility for and rectify any unsatisfactory finish resulting from application to an unsatisfactory surface. Do not proceed with surface preparation or

coating application until adverse conditions are corrected to provide an acceptable surface. The paint supplier shall inspect and certify all surfaces prior to coating application. Do not apply paint to a wet or damp surface.

- C. Equipment: The Contractor's coating and painting equipment shall be designed for application of the materials specified and shall be maintained in good working order comparable to that described in printed instructions of the coating Manufacturer. Clean equipment thoroughly before and after use with the appropriate cleaning solution indicated by the coating Manufacturer. All gages and controls on spray equipment shall be in proper working order at all times and the gages must be operational and readable.
- D. Warnings: Display caution signs in necessary areas advising of spray painting and warning against open flames.
- E. Barriers: Provide barriers or shelters on windy days to protect equipment and treatment facilities.

3.2 SURFACE PREPARATION

- A. Surface preparation standards are as described in this specification. The Steel Structures Painting Council (SSPC) Surface Preparation Specification is used for steel and as a guide for concrete.
- B. Solvent Cleaning: Remove oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods which involve a solvent or cleaning action, in accordance with Steel Structures Painting Council (SSPC) Surface Protection Specifications SP-1. Care must be taken to not allow solvent chemicals to enter treatment processes.
- C. Grinding: Remove weld splatter and rough edges and grind rough welds so that all surfaces are in proper condition, in the opinion of the Owner's Representative, to receive the specified coating.
- D. Abrasive Grit Cleaning:
 - 1. Use a source that provides compressed air, free of detrimental amounts of water and oil. The compressor shall, as a minimum, be capable of delivering a pressure at the blast nozzle of at least 90 psig; the blast nozzle shall be of the venturi type.
 - 2. Use a grit of 16/40 mesh. Keep grit clean, dry and free of clay particles and other extraneous matter.
 - 3. Blast only those areas that can be primed the same day. Areas which are not painted the same day must be reblasted again on the day the prime coat is applied. Remove grit from surface by brush or industrial vacuum.
 - 4. All immersed iron and steel surfaces shall be blasted to "near-white" metal in accordance with Steel Structures Painting Council Surface (SSPC) Preparation Specification SP-10, Near White Blast Cleaning. The blast cleaning shall produce an anchor pattern of 2-1/2 to 3 mils.
 - 5. All non-immersed iron and steel surfaces shall be commercial blast cleaned in accordance with SSPC SP-6. The blast cleaning shall produce an anchor pattern of 1-1/2 to 2 mils.

6. Concrete surfaces to be blasted should be prepared by using a brush-off blast cleaning unless otherwise specified. This blast shall lightly abrade the surface without entirely removing the surface or exposing the underlying aggregate.
- E. Power Tool Cleaning: Subject to review by the Engineer or Owner's Representative, any above metalwork in which SP-6 or SP-10 blasting cannot be accomplished shall be cleaned in accordance with SSPC SP-3, Power Tool Cleaning, removing loose mill scale, loose rust, loose paint and other foreign matter. Pumps, motors and similar equipment to be painted should be prepared per SSPC-SP3.
- F. Unknown or Noncompatible Materials: Items coated with an unknown paint system, or a primer or system which is not compatible with the specified system, shall be blast cleaned and recoated with the specified coating system at the job site. When blasting is not feasible, the Contractor shall notify the Owner's Representative and request permission to apply a barrier coat over the unknown or noncompatible material. The proposed barrier coat must be recommended in writing by the paint system manufacturer and is subject to review by the Owner's Representative. Following application of the barrier coat, if permitted, the specified coating system shall be applied. Minimum dry film thickness shall be increased an amount equal to the barrier coat and unknown or noncompatible coats.

3.3 PROTECTION

- A. Protect surfaces and installations requiring no painting or finishing by use of drop cloths, masking or other approved precautionary measures. Repair or replace property and work of other trades damaged, marred or stained by painting and finishing operations.
- B. Prior to surface preparation and painting operations, remove, mask or otherwise protect hardware, hardware accessories, machined surfaces, plates, light fixtures and similar items not to be painted but which are in contact with painted surfaces.
- C. Protect spaces used for mixing or storage of paint materials from damage or staining. Leave space in clean, neat condition.

3.4 MIXING AND THINNING

- A. Mix coatings in strict accordance with Manufacturer's directions. Do not thin coatings unless specifically authorized and recommended by the coating manufacturer.
- B. At the time of application, coating must show no signs of hard settling, excessive skinning, livering, or other deterioration.

3.5 COATING APPLICATION

- A. Manufacturer's Representative: The coating Manufacturer will be responsible, through an authorized representative, to provide technical assistance to the paint contractor as needed.
- B. Workmen: Employ workmen skilled in coating concrete surfaces.
- C. Materials:

1. Coating materials, abrasive grit, and equipment used in painting and blasting are subject to inspection at any time by the Engineer and Owner's Representative.
2. Remove blasting grit and dust from the surface to be painted before paint application is begun.
3. Dust, dirt, oil, grease, or any foreign matter that will affect the adhesion or durability of the finish must be removed prior to application of the coating.

D. Coating Methods:

1. Finished surfaces must be free from runs, drips, ridges, waves, laps, brush marks and variations in color, texture and finish.
2. Double lap all welds. Apply prime coat by brush to all weld areas; then apply prime coat to entire surface, including weld areas, by spray, roller or method selected.
3. Coat areas with a uniform film, free of sags, runs, or brush marks.
4. When coating is being applied to any other closed areas, provide adequate ventilation.
5. Comply with recommendations of the paint Manufacturer regarding drying time for each coat, technique of spray application, ventilation, paint thinning, and safety precautions. The Contractor must fully inform all members of his field crew of these recommendations.
6. Where inspection shows that the specified thickness is not developed, apply additional coats in accordance with the Manufacturer's surface preparation and cure schedule requirements to produce the required film thickness.
7. Repair and recoat improper applications as recommended by the Manufacturer or as required by the Construction Manager or the Owner's Representative.
8. Allow sufficient time between successive coatings to permit proper drying.

- E. Cleaning: Upon completion of the work, remove all staging and scaffolding. Dispose of all used grit, containers and rubbish in a suitable manner. Remove overspray, paint spots, oil or stains on adjacent surfaces. Leave the entire job clean and acceptable.

3.6 INSPECTION AND TESTING

A. Inspection and Testing:

1. The Contractor shall provide OSHA-approved staging, scaffolding and lighting as required to permit proper inspection as outlined in these specifications.
2. Contractor shall be responsible for and shall bear all the costs to perform the quality control tests for the coating.
3. Give sufficient notice in advance of coating applications so that the Construction Manager, Engineer and Owner's Representative can perform the following inspections:
 - a. Examination and approval of surface preparation prior to any coating
 - b. Examination and approval of each coat prior to application of the next coat
 - c. Inspection of the completed coating for runs, overspray, roughness, and any evidence of improper application

- d. Direction or observation of testing
- 4. Should any coating system fail to pass a test, the Contractor shall make necessary changes approved by the Construction Manager and Owner's Representative for the corrective measures. The coating system will then be retested.
- 5. The following tests will be conducted:
 - a. Dry film thickness will be tested after each coat of coating has been applied, and after final coat of the exterior system has been. A test will be made for every 25 square feet of surface and at locations designated by the inspector.
 - b. All submerged paint systems will be tested for holidays after the final coat has been applied.
 - c. Warranty Inspection: Warranty inspection shall be conducted during the eleventh month following completion of all coating and painting work. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Engineer and Owner's Representative.

END OF SECTION

SECTION 26 05 43**UNDERGROUND SYSTEM****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding all labor, tools, materials, equipment, and incidentals to furnish and install a complete underground system of raceways, manholes and handholes as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) International:
 - 1. ASTM A615/A615M-06a – Standard Specification for Deformed and Plain Carbon-Steel Bars for concrete Reinforcement
 - 2. ASTM A48 – Standard Specification for Gray Iron Castings
- B. American Association of State Highway and Transportation Officials
 - 1. AASHTO M306-04 – Standard Specification for Drainage, Sewer, Utility and Related Castings
- C. Occupational Safety and Health Administration (OSHA)
 - 1. OSHA – Standard No. 1926.956(c)(1)
- D. Underwriters Laboratories

1.4 QUALITY ASSURANCE

- A. The manufacturer of these materials shall have produced similar electrical materials and equipment for a minimum period of five years. When requested by the Owner/Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- B. The precast manholes shall be manufactured in a NPCA (National Precast Concrete Association) Certified Plant.

1.5 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01 33 00 – Submittal Procedures for the following:
 - 1. Manholes, handholes and associated hardware
 - 2. Plastic duct spacers

1.6 DELIVERY, STORAGE AND HANDLING

- A. Prior to jobsite delivery, the Contractor shall have successfully completed all submittal requirements, and present to the Owner/Engineer upon delivery of the equipment, an approved copy of all such submittals. Delivery of incomplete constructed equipment, onsite factory work, or failed factory tests will not be permitted.
- B. Materials shall be handled and stored in accordance with manufacturer's instructions.
- C. Materials shall not be stored exposed to sunlight. Such materials shall be completely covered.
- D. Materials showing signs of previous or jobsite exposure will be rejected.

1.7 WARRANTY

- A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship for one year from date of final acceptance of the equipment. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment, or materials shall be performed by the Contractor at no expense to the Owner.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Underwriters Laboratories
 - 1. All equipment components and completed assemblies specified in this Section of the Specifications shall bear the appropriate label of Underwriters Laboratories.
- B. Raceway System
 - 1. Raceway system shall be Schedule 80 PVC Rigid Nonmetallic Conduit (RNC), designed for use aboveground and underground as described in the NEC, resistant to sunlight. The conduits and fittings shall be manufactured to NEMA TC-2, Federal Specification WC1094A and UL 651 specifications. Minimum raceway size shall be 2 inch. Fittings shall be manufactured to NEMA TC-3, Federal Specification WC1094A and UL 514B. Conduit shall have a UL Label. Conduit shall be Carlon, Kraloy, or approved equal.
 - 2. PVC coated rigid aluminum conduit shall have a minimum 0.040-inch thick, polyvinyl chloride coating permanently bonded to rigid aluminum conduit and an internal chemically cured urethane or enamel coating. The ends of all couplings, fittings, etc. shall have a minimum of one pipe diameter in length of PVC overlap. PVC coated conduit and fittings shall be as manufactured by Perma-Cote, Robroy Industries, Calbond or Ocal. Any field bends shall be made using equipment designed to prevent damage to the PVC coating.
 - 3. All underground raceways of the underground system, terminating in manholes or handholes shall use terminators of the same size and type as the raceway

4. Blank Duct Plugs shall be sized for the duct installed on, and shall be TYCO Type JM-BLA-XXDXXXCR, with rubber gasket, or approved equal.
5. Duct spacers shall be as manufactured by Carlon or equal.
6. Where raceways terminate into existing and new manholes, handholes or structures, the duct bank steel shall be anchored into the manhole, handhole or structure with a Hilti HIT 150 MAX epoxy anchoring system. The termination of the duct bank steel shall utilize a minimum 24-inch length of reinforcing bar anchored not less than four inches into the manhole, handhole or structure wall, and lapped into each reinforcing bar in the duct bank.
7. Concrete encasement for raceways and duct banks shall be normal weight concrete weighing not more than 145 pounds per cubic foot with compressive strength, a minimum of 3000 pounds per square inch, or greater if required by other Divisions of the Specifications, at 28 days, Concrete shall have crushed aggregate with a maximum size of 3/4-inch, a slump of four to six inches and flow freely without the use of vibrators. Install red dye of 40 pounds per 10 cubic yards. of concrete, installed in the truck at the concrete plant.
8. Reinforcing steel shall comply with ASTM A615 Grade 60 and of a size and installation as shown on the Drawings.

C. Manholes and Handholes

1. General
 - a. Manholes and handholes shall be of the precast concrete type, designed for a Class HS20 highway load with sizes as shown on the Drawings, and as manufactured by Oldcastle Precast, Mansfield, TX, or approved equal.
2. Construction
 - a. Concrete for manholes and handholes shall have a 28-day compressive strength of 5000 PSI. Cement shall be Type 1 or III. Reinforcing steel shall be Grade 60 with minimum yield strength of 60,000 PSI. Design loadings shall be H-20-44 w/impact.
 - b. The top of all manholes shall be field removable and have stainless steel lifting eyes.
 - c. Duct bank entries into the manhole or handhole shall be centered on the entering wall, and shall contain the appropriate number and size of duct terminators to match the corresponding duct bank.
 - d. Each manhole and handhole shall have a minimum size of 1 inches by 12 inches by 2 inches deep concrete sump in the middle of the floor of the manhole or handhole, or as shown on the Drawings.
3. Manhole Covers

- a. Unless otherwise shown on the Drawings, manhole and handhole covers shall be heavy duty 36-inch machined gray iron, and AASHTO M306-04/ ASTM A48 CL35B Minimum, 40,000-pound proof load value (Class H20 X 2.5) “True Traffic” load covers, complete with frame, and “Electric” or “Communication” raised lettering recessed flush, as required, on the cover. Covers shall be V-1600-5, with drop handles as manufactured by East Jordan Iron Works, Ardmore, OK
- b. All castings shall be made in the USA, cast with the foundry’s name, part number, “Made in USA”, and production date (example: mm/dd/yyyy). Castings without proper markings will be rejected. Manufacturer shall certify that all castings conform to the ASTM and AASHTO Designations as specified herein. All casting shall be true to pattern in form and dimension, free from pouring faults, sponginess, cracks, blow holes and other defects in positions affecting strength and value for the service intended. Angles shall be filleted, and arises shall be sharp and true.

4. Access Hatch

- a. Where access hatches are shown on the Drawings, hatches shall be heavy duty aluminum, for HS20 load rating, sized as shown on the Drawings. Hatches shall be CHS Series as manufactured by East Jordan Iron Works, Ardmore, OK.
- b. Material shall be 6061-T6 aluminum for bars, angle and extrusions. 1/4-inch diamond plate shall be 5066 aluminum.
- c. Unit shall have a heavy duty pneumatic-spring, for ease of operation when opening cover. Cover shall be counter-balanced so that one person can easily open the hatch door.
- d. Frame shall be of extruded aluminum with a continuous 1-1/4 inch anchor flange. A dovetail groove shall be extruded into the seat of the frame with a 1/8” silicone gasket.
- e. Hinges shall be of heavy-duty design, the material shall be grade 316 stainless steel, with a 3/8-inch grade 316 stainless steel pin. Hinge shall be bolted to the channel frame and diamond plate with grade 316 stainless steel bolts and nylon lock nuts. Aluminum shall be supplied with mill finish. Exterior of frame which comes in contact with concrete shall have one coat black primer.
- f. Each hatch shall be supplied with a stainless steel slam lock, with the keyway protected by a threaded aluminum plug. The plug shall be flush with the top of the 1/4-inch diamond plate. The slam lock shall be fastened with grade 316 stainless steel bolts and washers.
- g. Each hatch shall be equipped with a stainless steel lift handle. Lift handles shall be flush with top of 1/4-inch diamond plate.

- h. Each hatch shall be supplied with a 1-1/2-inch threaded drain coupler on underside of channel frame for pipe connection.

5. Hardware

- a. Cable racks shall be of the heavy duty non-metallic type with arm lengths of 8 inches, 14 inches, and 20 inches, each supporting a load of not less than 250 pounds at the outer end. Racks shall be molded in one piece of U.L. listed glass reinforced nylon, Catalog CR36N with RA08N, RA14N and RA20N arms as manufactured by Underground Devices Inc. Northbrook, IL. Cable racks shall be secured to the manhole and walls by drilled, Hilti HIT-HY 150 MAX epoxy anchoring system, with Hilti 316 stainless steel bolts. Arms for racks shall be vertically spaced not greater than 24 inches on centers.
- b. Pulling irons shall be of copolymer polypropylene coated 1/2-inch diameter cable, with a rated pulling strength of 7500 pounds and a polyethylene pulling iron pocket, all recessed in the manhole wall opposite each duct entry. Pulling irons for handholes shall have the pulling iron located in the floor of the handhole near the center of the handhole opposite the duct entry. Pulling irons shall be as manufactured by M.A. Industries, Inc. Peachtree, GA. or Bowco Industries, Portland OR.
- c. Manhole and handhole ladders shall be constructed of fiberglass reinforced plastic, safety yellow, 18-inch rung width with 12-inch rung spacing, Safrail as manufactured by Strongwell Corp., Bristol, VA. Furnish a total of two ladders, each of a length four feet greater than the deepest manhole in the underground system.

D. Polyethylene Warning Tape

- 1. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
 - a. Brady Detectable Identoline
 - b. Approved Equal
- 2. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.
- 3. Warning tape shall be metal detectable polyester with subsurface graphics, black letters on red tape. The tape shall meet the OSHA 1926.956(c)(1), two-inch minimum width, for location tracing.

PART 3 – EXECUTION

3.1 GENERAL

- A. The Contractor shall field verify the routing of all underground duct banks before placement. He shall modify the routing as necessary to avoid underground utilities or above ground objects. Modification or rerouting for the convenience of the Contractor, or to reduce the length of duct run as designed, will not be permitted. The Contractor shall provide any alternate routing of the duct banks to the Owner/Engineer and, after approval, shall proceed with the installation.
- B. All changes of direction, less than 20 degrees, shall be made using a hotbox, strictly in conformance with the conduit manufacturer's instructions. Changes of direction greater than 20 degrees shall be accomplished using long radius bends of PVC coated rigid aluminum conduit.
- C. The Contractor shall saw cut and repair existing pavements above new and modified existing duct banks. The Contractor shall provide the alternate routing of the duct banks to the Owner/Engineer and after approval shall proceed with the installation.
- D. Install raceways to drain away from buildings. Raceways between manholes or handholes shall drain toward the manholes or handholes. Raceway slopes shall not be less than 3 inches per 100 feet.
- E. Reinforce raceway banks as shown on the Drawings.
- F. A #4/0 stranded bare tinned copper ground conductor shall be installed along the top of the rebar cage, as shown on the Drawings, for the full length of each duct run between manholes and handholes, and bonded to a ground rod in the vicinity of each manhole and handhole.
- G. Lay raceway lines in trenches on compacted earth as specified herein.
- H. Use plastic spacers located not more than four feet apart to hold raceways in place. Spacers shall provide not less than two-inch clearance between raceways.
- I. The minimum cover for raceway banks shall be 24 inches unless otherwise permitted by the Owner/Engineer.
- J. Raceway terminations at all manholes, existing and new, shall be with terminator for PVC conduit.
- K. Blank duct plugs shall be used to seal the ends of all unused ducts in the duct system. Plugs shall be installed at all locations where the ducts enter and leave the manholes or handholes, and all entrances and exits to the underground system.
- L. Where raceways enter or exit the Underground System, and the raceways rise to a higher elevation upon entering or leaving the System, such raceways shall be tightly sealed at the higher elevation, both before and after the installation of cables, such that there shall be no entry of water or moisture to the Underground System at any time. Raceways shall be sealed with 3M 1000NS Watertight Sealant, or approved equal.
- M. No wire shall be pulled until the duct system has been completed in every detail.

- N. Swab all raceways clean before installing cable.
- O. Train cables in manholes and handholes and support and restrain them on cable racks. All cables passing manhole duct entrances in the manhole or handhole shall pass above all duct entrances. No cable shall pass in front of or below duct bank entrances.
- P. Polyethylene Warning Tape shall be installed in the trench above each raceway or duct bank and located at the elevations shown on the Drawings.
- Q. The Contractor shall tag all underground conduits at all locations, exiting and entering from underground, including manholes and handholes.
- R. The minimum raceway size shall be 2-inch unless otherwise shown on the plans.

3.2 TRENCH EXCAVATION

- A. The excavation shall extend to the width and depth as shown on the Drawings, or as specified, and shall provide suitable room for installing manholes, handholes, ducts and appurtenances.
- B. Furnish and place all sheeting, bracing and supports.
- C. Excavation shall include material of every description and of whatever substance encountered, regardless of the methods or equipment required to remove the material. Pavement shall be cut with a saw, wheel or pneumatic chisel along straight lines before excavating.
- D. The Contractor shall strip and stockpile topsoil from grassed areas crossed by trenches. At the Contractor's option, topsoil may be otherwise disposed of and replaced, when required, with approved topsoil of equal quality.
- E. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected, as provided for in the Contract Documents.
- F. Materials shall be excavated to the depth indicated on the Drawings and in widths sufficient for installing manholes and laying the ducts. Coordinate the trench width the Details shown on the Drawings. The bottom of the excavations shall be firm and dry in all respects acceptable to the Owner/Engineer. Trench width shall be a practical minimum, but not less than 6 inches greater on each side, than the total duct section arrangement, including reinforcing steel.
- G. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of sub grade soils. The trench may be excavated by machinery to, or just below, the designated sub grade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Sub grade soils which become soft, loose or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods, shall be removed and replaced by gravel fill, of aggregate as specified herein, as required by the Owner/Engineer at the Contractor's expense.

3.3 EXCAVATION BELOW GRADE AND REFILL

- A. Regardless of the nature of unstable material encountered, or the groundwater conditions, trench and excavation drainage shall be complete and effective.

- B. If deemed necessary by the Owner/Engineer, or as shown on the Drawings, the Contractor shall be required to deposit pea gravel for duct bedding or gravel refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatsoever. All excavation shall be made in open trenches. Gravel used for this purpose, shall be aggregate, as specified that is no larger than one-half the minimum clear spacing between electrical ducts, and a maximum coarse aggregate size of 3/4-inch.

3.4 BACKFILLING

- A. Remove from the excavation all materials which the Owner/Engineer may deem unsuitable for backfilling.
- B. Backfilling shall not commence until, not less than 48 hours after placing of any concrete embedment, have lapsed.
- C. Where the duct banks are laid in the yard, the remainder of the trench, after concrete encasement, shall be filled with common fill material, void of rock or other non-porous material, in layers not to exceed eight inches in loose measure and compacted to 90% standard Proctor density at optimum moisture content of +/- 4%. The backfill shall be mounded six inches above the existing grade or as directed by the Owner/Engineer. Where a grass, loam or gravel surface exists prior to excavations in the yard, it shall be removed, conserved and replaced to the full original depth as part of the work under the duct items. In some areas, it may be necessary to remove excess material during the cleanup process, so that the ground may be restored to its original level and condition.
- D. Where the duct banks are laid in paved areas or designated future paved areas, existing or designated future structures, or other existing or future utilities, the remainder of the trench above the encasement, shall be backfilled with select common fill or select fill material in layers not to exceed eight inches loose measure and compacted at optimum moisture content (+/- 3%) to 95% standard Proctor density.
- E. Compaction shall be by use of hand or pneumatic tamping with tools weighing at least 20 pounds. The material being spread and compacted shall be placed in layers not over eight inches loose thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.
- F. Bituminous paving shall not be placed in backfill.
- G. Water jetting will not be accepted as a means of consolidating or compacting backfill.
- H. All road surfaces shall be broom finished and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.

3.5 RESTORING TRENCH AND ADJACENT SURFACES

- A. In paved areas, the edge of the existing pavement to be removed shall be cut along straight lines, and the pavement replaced with the same type and quality of the existing paving.

- B. In sections where the duct bank passes through grassed areas, the Contractor shall, at his own expense, remove and replace the sod, or shall loam and reseed the surface to the satisfaction of the Owner/Engineer.

3.6 CLEANING

- A. Remove all rubbish and debris from inside and around the underground system. Remove dirt, dust, or concrete spatter from the interior and exterior of manholes, handholes and structures, using brushes, vacuum cleaner, or clean, lint free rags. Do not use compressed air.

END OF SECTION

SECTION 31 00 00**EARTHWORK****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required to perform all operations in connection with the clearing, grubbing and stripping of topsoil; excavation and grading for all structures; excavation and placement and compaction of suitable material for the construction of the required embankments; trenching, embedment, concrete encasement, and backfilling required to install pipes and conduit; dewatering and other drainage work as necessary for construction; place and compact backfill around completed structures; all fill required for completion of the work; vapor barrier membranes under slabs on grade; and dispose of unsuitable, waste, and surplus excavated materials, complete and in place, as shown on the Drawings and as specified herein.
- B. Requirements regarding the services of a licensed Professional Engineer registered in the State of Texas to prepare temporary excavation support system designs and submittals.
- C. Requirements regarding to furnish and install temporary excavation support and safety systems, including sheeting, shoring and bracing, to ensure the safety of personnel and protect adjacent structures, piping, etc., and meet appropriate requirements established in the Occupational Safety and Health Administration (OSHA) Safety and Health Regulations, Part 1926, Subpart P - Excavations, Trenching and Shoring, State of Texas, and other applicable regulations. Where conflict between OSHA, State of Texas, and other applicable regulations exists, the most stringent requirements shall apply.
- D. Requirements regarding excavation that includes the removal of all earth, rock, and materials of any nature, including water, to the extent necessary to install the pipes, conduit, and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.
- E. Requirements regarding backfill that includes the refilling and consolidation of the fill in trenches and excavations up to the existing ground surface or finished grade as shown on the Drawings. The backfill from the trench bottom to above the top of the pipes and conduit when laid to the grade including the bedding layer sustaining the pipeline, as shown on the Drawings is termed "embedment". Backfill above the embedment is termed "final backfill".
- F. Requirements regarding dewatering shall include installing, maintaining, operating, and removing pump systems, culverts, channels, and other necessary devices for removal of standing water, surface drainage, and seepage from excavation or other work.
- G. Requirements regarding waste material disposal consisting of trees, stumps, logs, brush, roots, grass, vegetation, humus, rubbish, large rocks exceeding a dimension of six inches (6") in any direction, demolished equipment not retained by the Owner, and other objectionable matter from operations such as clearing and grubbing, demolition, excavation, and grading.

1.2 RELATED WORK

- A. Division 01 – General Requirements
- B. Section 01 33 00 – Submittal Procedures
- C. Section 03 30 00 – Cast-In-Place Concrete
- D. Section 31 23 33 - Trenching, Backfilling, Embedment and Encasement
- E. Section 31 23 33.14 - Trench Shielding
- F. Section 31 10 00 - Waste Material Disposal

1.3 REFERENCES

- A. ASTM International
 - 1. ASTM C33 - Standard Specification for Concrete Aggregates
 - 2. ASTM C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
 - 3. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - 4. ASTM C150 - Standard Specification for Portland Cement
 - 5. ASTM D75 – Standard Practice for Sampling Aggregates
 - 6. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
 - 7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)
 - 8. ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
 - 9. ASTM D4253 - Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
 - 10. ASTM D4254 – Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
 - 11. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
- B. America Water Works Association
 - 1. AWWA - M9
- C. Where reference is made to one of the preceding standards, the revision in effect at the time of bid opening shall apply.

1.4 QUALITY ASSURANCE

- A. All field testing and inspection services will be provided by the Contractor's independent testing laboratory. The cost of such work, unless specifically stated

otherwise, will be paid by the Contractor. Testing methods shall comply with the latest applicable ASTM Standards.

- B. Materials shall be tested and observed as described in the following paragraphs. Cooperate by allowing free access to the work for selection of materials and observation.
 - 1. At all structures, prior to placement of bedding material, concrete working mats, crushed stone base, or concrete fill, the Owner's geotechnical engineer shall observe the prepared subgrade to confirm its suitability for supporting the work to be placed thereon. Such observation shall include visual review, and in-place soil density tests as required.
 - 2. Before and during placement of fill and backfill, the soils testing laboratory shall provide at least one density and moisture content test for each 232 m² (2,500 ft²) of surface area for each compacted lift of fill.
- C. Test pits for the purpose of locating underground utilities or structures in advance of the construction excavated by the Contractor shall be backfilled immediately after the desired information has been obtained and shall be performed in a manner consistent with trench backfill requirements. The backfilled surface shall be restored and maintained in a manner consistent with the original conditions.

1.5 SUBMITTALS

- A. Submit the following in accordance with the requirements in Division 01- General Requirements and Section 01 33 00 – Submittal Procedures:
 - 1. Submit testing laboratory reports, as specified or required, to show compliance with specifications for material from off-site locations. The specified tests shall be performed by a certified independent testing laboratory retained and paid by the Contractor.
 - 2. Submit details of excavation plans designed and prepared by a licensed Professional Engineer, who is registered in the State of Texas and has experience in soils engineering, for all structure excavation. The plans shall include details of any proposed shoring systems, systems to protect existing facilities, slope stability monitoring, and the Contractor's means and methods for controlling groundwater. The plans shall be submitted to the Owner and the Engineer for record purposes prior to proceeding with any excavation work.
 - 3. Submit details of temporary excavation support system plans for all trench excavations, where an existing structure or utility falls within a 2 horizontal to 1 vertical (2:1) slope from the bottom of the excavation, or where considerations dictate a plan. The plans shall be developed by the Contractor's licensed Professional Engineer, who is registered in the State of Texas and has experience in trench safety analysis. The plans shall be submitted to the Owner and Engineer for record purposes prior to proceeding with any excavation work.

1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.7 CONTRACTOR'S RESPONSIBILITY

- A. The Contractor shall be responsible for design and implementation of adequate support, safety, dewatering, and drainage systems and for all loss or damage resulting from partial or complete failure of protective measures.
- B. The Contractor shall prepare and maintain a trench excavation safety plan prepared by a licensed Professional Engineer registered in the State of Texas. Design, furnish, and install trench safety system to protect the adjoining existing structures that are shown on the drawings. Contractor will be solely responsible for the design and construction of safety System.
- C. A signed, dated, and sealed copy of the trench safety plan shall be maintained at the project site for the Contractor's use during construction. In addition, a signed, dated, and sealed copy of the trench safety plan shall be maintained at the project site in the Contractor's records. The Contractor shall not deviate from the trench safety plan without written authorization from the Engineer who prepared the trench safety plan. This written authorization shall be signed, dated, and sealed by the Engineer. Any changes in the trench safety plan after initiation of construction will not be cause for extension of time or change order. The Contractor accepts sole responsibility for compliance with all applicable safety requirements. The trench safety plan does not relieve Contractor from responsibility for any or all construction means, methods, techniques, and procedures. Furthermore, the Contractor shall indemnify the Owner and Engineer from any and all claims due to any property damage or bodily injury (including death) that arises from use or misuse of the trench safety plan, or from Contractor's negligence in performance of the contract work.
- D. The Contractor shall be responsible for dewatering of seepage and leakage past any existing valve, wall, or gate.
- E. The Contractor shall protect the existing utilities during excavation work including that of test pits. The Contractor shall be fully responsible for any and all damages, which might be occasioned by the Contractor's failure to protect the existing utilities.
- F. Unless otherwise specified, the Contractor is responsible for removal and disposal of waste material in accordance with applicable regulations.
- G. Any submittals required for trench safety plan, dewatering and drainage plans, and similar temporary facilities, will be for references purposes only and maintained for record purposes in the Owner's and Engineer's files. Submittal of these items will not relieve the Contractor of any responsibility for the adequacy of support, safety, dewatering, and drainage systems.

1.8 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for designing, installation, and operation of excavation support, safety, dewatering and drainage control systems; and handling or disposing waste materials. All these costs of work shall be included in the lump sum contract bid prices for the entire project.

1.9 PROTECTION OF FACILITIES

- A. Before the start of earthwork operations, adequately protect utilities, trees, shrubs, and other permanent objects. Repair costs resulting from damage to permanent facilities due to negligence or lack of adequate protection will be charged to the Contractor.
- B. Provide surface drainage during the period of construction to protect the work and to avoid nuisance to adjoining property.
- C. The Contractor shall conduct his operations in such fashion that trucks and other vehicles do not create a dirt nuisance in the streets. The truck beds shall be sufficiently tight, and shall be loaded in such a manner that objectionable materials will not be spilled onto the streets. Any dirt, mud, or other materials that are spilled onto the streets or deposited onto the streets by the tires of vehicles shall be promptly cleared away by the Contractor.

1.10 INSPECTION OF EXCAVATIONS

- A. Do not place reinforcing steel or concrete in the excavation prior to inspection unless the Owner's and/or Engineer's Representative has given approval to proceed without inspection.

1.11 DEFINITIONS

- A. Common Fill: Refer to backfill placed outside the compacted select fill zone.
- B. Compaction (or Relative Compaction): Refer to in-place dry density of soil expressed as a percentage of the maximum dry density of the same material.
- C. Embankment: Refer to fill surrounding structures, which is placed during mass earthwork operations.
- D. In-the Dry: No freestanding water or seepage entering the excavation. Soil conditions such that the in-place moisture content of the soil is sufficiently dry for fill placement on firm material as approved by the Engineer.
- E. Maximum Dry Density (or Density): Refer to the maximum density defined by ASTM D698, unless otherwise specified. Determination of the density of backfill in-place shall be in accordance with the requirements of ASTM D6938. Density test intervals are defined in paragraph 3.7 of this Specification.
- F. Optimum Moisture Content: The moisture density relationship appropriate to the specified level of compaction. It is determined by laboratory tests in accordance with the procedures specified in ASTM D698.
- G. Select Fill: Refer to compacted fill placed under slabs or placed as backfill immediately outside the exterior of structure walls.
- H. Structure: Refer to all buildings, wet wells, manholes, and below grade vaults. Stormwater structures and duct banks are not considered structures in these Specifications.

- I. Trench: Refer to any excavation whose bottom width is less than twice the total depth of the excavation or whose depth is greater than five feet (5') for any structures and/or underground pipes and duct banks.

PART 2 – PRODUCTS

2.1 CRUSHED ROCK

- A. Crushed rock shall consist of sound and durable particles free from injurious amounts of salt, alkali, vegetable matter, or other material either free or as adherent coating. Its quality shall be reasonably uniform throughout.
- B. Gradation shall meet the following requirements for percentage by weight when tested in accordance with ASTM C136:

1. Standard Crushed Rock

Passing 38.1 mm (1-1/2") sieve	100%
Passing 25.4 mm (1") sieve	95-100%
Passing 12.7 mm (1/2") sieve	25-60%
Passing No. 4 sieve	0-10%
Passing No. 8 sieve	0-5%

2. Fine Crushed Rock

Passing 12.7 mm (1/2") sieve	100%
Passing 9.53 mm (3/8") sieve	95-100%
Passing No. 4 sieve	40-65%
Passing No. 8 sieve	0-10%

3. Coarse Crushed Rock

Passing 38.1 mm (1-1/2") sieve	100%
Retained on 19.1 mm (3/4") sieve	100%

2.2 GRAVEL

- A. Gravel shall consist of uncrushed stones and shall not have by weight more than one percent organic matter, clays, or loam and not more than five percent by weight of any, one or combination of slate, shale, schist, or soft particles of sandstone.
- B. Gradation shall meet the following requirements for percentage by weight when tested in accordance with ASTM C136:

Passing 38.1 mm (1-1/2") sieve	100%

Retained on 19.1 mm (3/4") sieve 95%

2.3 SAND FOR EMBEDMENT

- A. Sand shall consist of clean, hard, durable, uncoated grains, free from lumps, and organic material.
- B. Gradation shall meet the following requirements for percentage by weight when tested in accordance with ASTM C136:

Passing No. 4 sieve	80-100%
Passing No. 8 sieve	65-100%
Passing No. 16 sieve	40-80%
Passing No. 50 sieve	7-40%
Passing No. 100 sieve	2-20%
Passing No. 200 sieve	0-10%

2.4 GRANULAR MATERIAL

- A. Granular material shall be free flowing, such as sand or hydraulically graded crushed stone fines, or mixed sand and gravel. Material shall have no more than 10 percent fines and shall be free from lumps, stones over two inches in diameter, and organic matter.

2.5 MATERIAL FOR EMBEDMENT OF WRAPPED OR COATED PIPES

- A. This embedment material is applicable to steel, wrapped cast iron or ductile iron pipe and all plastic pipes. Embedment material shall be fine crushed rock. The material shall be free from binder, lumps, organic material, clay, silt, or other undesirable material.

2.6 SELECT MATERIAL

- A. Structure: Where select material is shown or specified, use an approved material, free of organic matter and foreign substances, obtained from an approved off-site source. The material shall be gravel, fine rock cuttings, sand, or loam free from excessive clay. Rock cuttings shall have no dimension greater than (2"). The material shall have a plasticity index (PI) between 4 and 12 and a maximum liquid limit of less than 35 as determined by ASTM D4318. The material shall retain a minimum of 50 percent on the No. 200 sieve. Prior to bringing any of the proposed material to the site, submit, for review by the Engineer, an analysis of the proposed material, including a moisture-density relationship curve prepared in accordance with ASTM D698 by a certified independent testing laboratory employed and paid by the Contractor.
- B. Trench:
 - 1. Backfill material to a depth of twelve inches (12") above the top of the pipe or conduit shall be embedment or encasement materials as specified in Paragraphs 2.4, 2.5 or 2.6, or as indicated on the Drawings or as specified elsewhere.

2. Unless otherwise specified or required elsewhere, the remaining backfill shall be material from the trench excavation, except the top six inches (6") shall be the topsoil which has been placed separately.
 3. Unless otherwise indicated on drawings, no material of a perishable, spongy or otherwise unsuitable nature, or expressively large rock (largest dimension greater than four inches (4")), shall be used in backfill.
- C. Material for Basin Embankments: All material used in the construction of the embankment surrounding the structures and any other embankment fill areas shall be comprised of on-site lean-to fat clays free of organic material and debris.

2.7 CONCRETE FOR EMBEDMENT AND ENCASEMENT

- A. Concrete for embedment and encasement shall be Class "B" concrete with a minimum compressive strength of 3,000 psi at 28 days as specified in Section 03 30 00. Dry mix will not be permitted. The concrete cushion portion of the embedment or encasement shall be mixed to give a slump of not more than one inch (1"). Concrete for the sides and top, if specified, shall be mixed to obtain a slump of not less than one inch (1") nor more than four inches (4"), and shall be placed after the concrete used for cushion portion of the embedment or encasement sets up.

2.8 CONCRETE BACKFILL

- A. Concrete backfill shall conform to Class "C" (2,000 psi) concrete.

2.9 CONCRETE FOR THRUST BLOCKING

- A. Concrete for thrust block shall be Class "B" concrete with a minimum compressive strength of 3,000 psi at 28 days as specified in Section 03 30 00.

2.10 VAPOR BARRIER MEMBRANE

- A. Polyethylene sheeting shall not be less than 6-mil nominal thickness.

2.11 FILTER MATERIAL

- A. Where indicated on the Drawings or required in the work, use a mixture of coarse aggregate or fine aggregate for filter material. Proportion the mixture with two parts coarse aggregate to one part fine aggregate by volume.
- B. Coarse aggregate shall consist of gravel, crushed gravel or crushed stone and shall have a gradation limit of three-quarter inch (3/4") to No. 4 complying with ASTM C33 (Type 7).
- C. Fine aggregate shall consist of natural sand and shall comply with the requirements of ASTM C33 for fine aggregate.

2.12 STOCKPILED TOPSOIL FOR FINISH GRADING

- A. Natural friable soil of region, free from lumps, clay, toxic substances, roots, debris, vegetation, stones over one inch (1") in maximum dimension, and containing no salt or alkali.

2.13 MATERIALS AND EQUIPMENT FOR DEWATERING AND DRAINAGE

- A. Select materials and equipment as appropriate for the intended use.

PART 3 – EXECUTION

3.1 PREPARATION

A. Clearing and Grubbing

1. Cut, grub, remove, and dispose of trees, stumps, brush, shrubs, roots and other objectionable material from areas needed to construct structures, roads, pipelines, and any other areas to be stripped. Remove tree stumps to a depth of four feet (4') below grade.
2. Protect trees or groups of trees, designated by the Owner to remain, from damage by construction operations by erecting suitable barriers, or by other approved means. Conduct clearing operations in a manner to prevent falling trees from damaging trees designated to remain.
3. Protect areas outside the easements or limits of clearing from damage. No equipment or materials shall be stored in these areas.
4. No stumps, trees, limbs, or brush shall be buried on the site.

- B. Stripping: Strip topsoil and grass a minimum of six inches (6") over all areas to be excavated or filled. Avoid mixing topsoil with subsoil. Topsoil consisting of friable material free of vegetation, clay lumps, large stones, trash, toxic substances or other extraneous material shall be stockpiled in areas at the site for use in finish grading. Dispose of remaining topsoil.

C. Test Pits:

1. Perform exploratory excavation work (test pits) to verify the location of underground utilities and structures and to check for unknown utilities and structures, prior to commencing excavation work.
2. Backfill test pits as soon as the desired information has been obtained. Backfilled surface shall be stabilized in accordance with approved erosion and sedimentation control plans.

3.2 EXCAVATION SUPPORT SYSTEMS

- A. Protection of the excavation against caving or settling of the banks shall be the sole responsibility of the Contractor. The Contractor shall protect the sides of the excavation by sheeting and bracing as may be necessary. No actions or instructions by the Engineer shall be regarded as the responsibility for security of the trench or the surrounding areas. Furnish, put in place, and maintain sheeting and bracing required to support the sides of the excavation and prevent loss of ground which could damage or delay the work or endanger workers, adjacent structures or vehicular traffic. If the Engineer is of the opinion that at any points sufficient or proper supports have not been provided, he may order additional supports put in, and compliance with such order shall not relieve or release the Contractor from the responsibility for the sufficiency of such supports.
- B. Sheeting, Shoring and Bracing:

1. Provide sheeting, shoring, and bracing of excavations at locations shown on the Drawings and where required to properly and safely complete the work. Construct sheeting, shoring, and bracing to prevent the excavation from extending beyond specified or indicated limits, to protect adjacent structures or improvements and to protect workmen and the public. The design of sheeting, shoring, and bracing shall be the responsibility of the Contractor.
 2. Care shall be taken to prevent voids outside the sheeting. If voids are formed, they shall immediately be filled and compacted.
 3. After completion of the structure, all sheeting, shoring, and bracing shall be removed unless approval has been granted by the Engineer, in writing, to leave any or all of it in place. The sheeting, shoring, and bracing shall be removed as excavations are backfilled in a manner that will prevent injurious caving of the excavation or damage to the structure.
 4. Voids left or caused by removal of sheeting shall immediately be filled with suitable material and compacted.
- C. When movable trench bracing such as trench boxes, movable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding, embedment and the backfill.
1. When installing rigid pipe, any portion of the box extending below diameter shall be raised above this point prior to moving the box ahead to install the next pipe. This is to prevent the separation of installed pipe joints due to movement of the box.
 2. When installing flexible pipe, trench boxes, movable sheeting, shoring, or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, movable sheeting, shoring, or plates are moved, sand shall be placed to fill any voids created and the sand and backfill shall be recomacted to provide uniform side support for the pipe.
- D. Sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction or other existing structures, utilities, or property. Voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as may be directed.
- E. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so, shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
- F. Any sheeting driven below mid-diameter of any pipe shall remain in place from the driven elevation to at least one foot above the top of the pipe.

3.3 DEWATERING AND DRAINAGE SYSTEMS

A. Dewatering:

1. Furnish, install, operate, and maintain all necessary pumping for dewatering the various parts of the work and for maintaining free of water the parts of the work as required for construction operations. Also, as required for inspections and safety.
 2. Continue dewatering in all required areas, until the area has been completed and accepted by the Owner.
 3. Temporary dewatering and drainage systems shall be in place and operational prior to beginning excavation work. Maintain excavation dewatered while work is in progress.
 4. Provide sufficient pumping equipment, in good working order, available at all times to remove any water that accumulates in the excavations.
 5. In all cases, accumulated water in the trench shall be removed before laying pipe, placing concrete or backfilling.
- B. Specific Requirements: Groundwater levels may exist above the required excavation level at all locations. Such a condition can result in an unstable excavation and inadequate foundation. Therefore, the Contractor must take whatever means are necessary to control groundwater inflow and protect the foundation material.
- C. Repair of Damage: Assume full responsibility for all loss and damage due to flood, rising water, or seepage in any part of the work. Repair any damage to partially completed work from these or other causes by failure or lack of adequate dewatering or drainage facilities.

3.4 EXCAVATION SAFETY SYSTEMS

- A. Trench excavation safety system shall be constructed, installed, and maintained in accordance with the details shown in the safety plan designed and prepared by the Contractor's licensed Professional Engineer registered in the State of Texas to prevent death or injury to personnel or damage to structures in or near these trench excavations. All vehicles and materials excavated from trench shall be located/stockpiled no closer to the edge of trench than the vertical depth of the trench.
- B. The Contractor shall provide competent supervisory personnel at each trench while work is in progress to ensure the Contractor's trench safety methods, procedures, equipment, and materials meet the requirements of OSHA standards and the trench excavation plan. Supervisory personnel shall be knowledgeable in soil mechanics and have attended a trench safety program.
- C. The safety system shall be maintained in the condition as specified by the Contractor's Trench Safety Engineer. The Contractor shall take all necessary precautions to ensure the safety systems are not damaged during their use. If at any time during its use a safety system is damaged, personnel shall be immediately removed from the trench or excavation area and the safety system repaired. The Contractor shall take all necessary precautions to ensure no loads, except those included in the safety system design, are imposed upon the excavation.
- D. The Contractor shall make daily inspection of trench safety system to ensure that the system meets OSHA requirements and the requirements of the trench safety plan. Daily inspection is to be made by qualified personnel. If evidence of possible cave-ins or slides is apparent, all work in the trench shall cease until necessary precautions have been

taken to safeguard personnel entering trench. The Contractor shall maintain permanent record of daily inspections. The Contractor's Trench Safety Engineer shall make periodic (at least once per week) site visits. Within two (2) days after each visit, the Contractor's Trench Safety Engineer shall make a written report to the Owner's Representative certifying that the trench excavation plan and safety construction practices are being followed. The Contractor's Trench Safety Engineer shall immediately report any unsafe construction practices to the Owner's and/or Engineer's Representative.

- E. Bed and backfill pipe to a point at least one foot above top of pipe prior to removal of any portion of trench safety system. Bedding and backfill to be in accordance with other applicable specification items. Backfilling and removal of trench supports shall progress together from bottom of trench upward. Remove no braces or trench supports until all personnel have evacuated the trench. Backfill trench to within five feet of natural ground prior to removal of entire trench safety system.

3.5 EXCAVATION

A. General:

1. Excavation work shall be unclassified and includes removal of all types of materials encountered without exception. Make excavations to lines and grades indicated on the Drawings. Complete excavations within the tolerances specified.
2. Excavations for structures shall be suitably wide for construction of the structures, including excavation supports, dewatering and drainage systems, and working clearances.
3. Excavation shall be performed in-the-dry, and shall be accomplished by methods which preserve the undisturbed state of subgrade soils. Drainage and dewatering systems shall be in place and operational prior to beginning excavation work. In no case shall the earth be plowed, scraped, or excavated by any means that would disturb the finished subgrade. Hand excavation of the final three inches (3") to six inches (6") inches may be required to obtain a satisfactory, undisturbed subgrade. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory for support of structures as a result of inadequate excavation, dewatering, or other construction methods shall be removed and replaced with lean concrete fill at no additional cost to the Owner.
4. Subgrade Preparation: Excavate materials as required to place a four-inch (4") concrete fill seal slab where indicated on the Drawings.
5. When excavations have reached the required subgrade, including any allowances for working mats or base materials, but before the placement of working mats, base materials or embankment materials, notify the soils testing laboratory to verify the suitability of the existing subgrade soils for the anticipated foundation and structural loadings. If the existing subgrade soils are determined to be unsuitable, direction will be provided by the Engineer regarding removal and replacement with suitable materials. If Contractor believes that such direction would increase Contractor's cost and would, thereby, entitle the Contractor to a change in contract cost, the Contractor shall notify the Owner's and/or Engineer's Representative in accordance with the applicable article(s) in the General Conditions pertaining to changes in the work.

6. Over-excavation beyond the limits and depths required by the Contract Documents shall be replaced by lean concrete or other material acceptable to the Engineer. Such replacement shall be at no additional cost to the Owner.

B. Structures:

1. Wherever practicable, cut all footing excavations to neat lines with a tolerance of minus one inch (-1") to 0 inch (0"), and place concrete to bear against earth sides. Where beams are shown to be monolithic with slabs on ground, shape soil to the profile shown. Excavate a sufficient distance from walls, shafts, or similar elements of structures to allow for placing and removing forms and for inspection.
2. Excavate to the elevations shown on the drawings forming a level undisturbed surface free of mud or other soft material. When the bottom of the excavation, at the elevation shown, is not within the foundation bearing material shown on the drawings or is unsuitable for foundation bearing, notify the Engineer. Remove all pockets of soft or otherwise unstable soils and replace with concrete or with suitable well-compacted soil as directed by the Engineer.
3. Protect all open excavations from rainfall or excessive drying so as to maintain the foundation subgrade in a satisfactory, undisturbed condition. Keep excavations reasonably free of water at all times and completely free of water during placement of concrete. Soils below foundation, which become soft, loose or otherwise unsatisfactory for dewatering or other construction methods shall be removed and replaced with satisfactory material.
4. For footings, founded on rock, hard shale or similar material, remove all material. Clean and cut to a firm surface either level, stepped or serrated as shown on the drawings. Clean out seams and fill with concrete at the time footing concrete is placed.

C. Trench:

1. Trenches shall be excavated to the lines and grades shown on the drawings with the centerlines of the trenches on the centerlines of the pipes and conduit. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible verification in pipe wall thickness.
2. The sides of all trenches shall be vertical to a point twelve inches (12") above the top of the pipes and conduits. Unless otherwise indicated on the drawings, the trench width shall be equal to the sum of the outside diameter of the pipe plus two feet (2'), within a tolerance of plus three inches (+3"). The trench width will be measured at an elevation in the trench which is twelve inches (12") above the top of the pipe when laid to grade.
3. Where the normal trench width below the top of the pipe is exceeded for any reason, the Contractor shall, unless the Engineer determines that the pipe being used is strong enough for the actual trench width, furnish an adequate support for the pipe. This may be accomplished by furnishing a stronger pipe or a concrete cradle, next higher class embedment or encasement, cap or envelope as determined by the Engineer.
4. The trenches shall be excavated to the required depth allowing for the placement of pipes and conduit bedding to the thickness shown on the drawings. The trench bottom shall form a continuous and uniform bearing and support for the pipe at

every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

5. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. The trench may be excavated by machinery to, or just below the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory as a result of inadequate excavation, dewatering, or other construction methods shall be removed and replaced with coarse crushed rock.
6. Should the bottom of the trench become an unstable foundation for the pipes or conduit and/or the trench be inadvertently excavated to a greater depth than necessary through the failure of the Contractor to adequately perform, the Contractor shall remove the unstable material and fill the trench to the proper subgrade with coarse crushed rock. No extra compensation will be allowed for this material or work.
7. Should the undisturbed material encountered at the grade depth constitute, in the opinion of the Owner's and/or Engineer's Representative, an unstable foundation for the pipe or conduit, the Contractor shall be required to remove such unstable material and fill the trench to the proper subgrade with coarse crushed rock or other material approved by the Engineer.
8. Bell (Joint) Holes: At the location of each joint, dig dell (joint) holes of ample dimensions in the bottom of the trench and at the sides where necessary to permit easy visual inspection of the entire joint.
9. Minimum pipe burial to the top outside surface of the pipe barrel shall be three feet (3') unless otherwise noted.

D. Embankments:

1. After clearing and grubbing and before placing any fill proof roll the foundation with a loaded tandem-axle dump truck weighing at least 25 tons to locate any soft or unstable zones. Any unstable soils should be over excavated and replaced with an approved low volume changes soil as approved.
2. Prior to any filling operations samples of the proposed borrow and on-site materials proposed for use in the embankments should be obtained for laboratory moisture-density testing. The tests will provide a basis for evaluation of field compaction by in-place density tests during fill operations to evaluate that proper levels of compaction, including dry unit weight and moisture content, are being obtained.

3.6 SLABS ON GROUND

A. Slabs at Grade:

1. Subgrade. Scarify to a depth of six inches (6") below the cleared depth. Adjust moisture content within a range of optimum to optimum + 4 percentage points and recompact within a range of 95 to 100 percent maximum density as determined by ASTM D698. The recompacted subgrade shall be proof rolled with a pneumatic tire roller in order to detect any soft areas. Soft or wet areas will require removal and replacement with select material of at least (12") compacted thickness (2 lifts).

Depressions from stump removal shall be cleaned of all organic matter and filled with select material.

2. Fill. Upon completion of subgrade preparation, place select material in uniform layers of loose material, six inches (6") in depth, within the moisture and density range specified in 1. above. Previous lifts and/or subgrade should be protected from moisture loss.
 3. Final Grade. Conform to lines and grades shown on the drawings.
- B. Slabs Below Grade: Excavate to (12") above final sub-grade. In order to preserve the in-situ moisture of the subgrade, do not excavate the final (12") until prior to the floor slab construction or seal slab where specified. If the soil at the time of final exposure and concrete placement is not within zero to four percent above optimum moisture content as determined by the Engineer's testing laboratory, the top (6") shall be recompact at the proper moisture level. Soft and wet areas not achieving compaction will require removal and replacement with select material of at least (12") compacted thickness (2 lifts).
- C. Compaction:
1. The subgrade and fill material shall be compacted to a minimum of 95 percent and maximum of 100 percent of maximum density at 0 to 4% above optimum moisture as determined by ASTM D698. The methods used to secure the specified compaction and moisture content shall be the Contractor's responsibility. Wet soils shall be worked by plowing, disking, or scarifying and air drying as required to reduce the moisture content to optimum levels.
 2. The compacting equipment and method of compaction shall be such that uniform density will be obtained over the entire area and depth of material being compacted. All fill materials deposited in place by scrapers, dump trucks, drag lines or similar equipment shall be thoroughly broken up before being spread into uniform layers.
 3. Moisten layers between lifts to achieve bonding.
 4. Field density tests shall be performed at a rate of 1 test per each 500 cubic yards (500 cy) of material placed with a minimum of three tests per lift.
- D. Vapor Barrier Membrane:
1. As soon as practical after final grading, while the base material is still at its optimum moisture content, install a vapor barrier membrane over the prepared surface at all locations. Provide membrane in the widest practical seamless widths.
 2. Lay the membrane material continuous with the joints lapped (6") in the direction of the concrete placement. Carefully fit the membrane tight around all penetrations.
 3. Before placing concrete, patch all holes and tears in membrane with patches cemented in place with adhesive. Seal around penetrations for conduit, piping, etc., with cold mastic.
- E. Mud slabs (lean concrete seal slabs) shall be placed after final grading or within 4 hours of the removal of the last (12") of an excavation, while the base material is at its optimum moisture content, at locations indicated in Paragraph 3.6B of this Specification.

3.7 EMBANKMENTS

- A. After performing the proof roll on the subgrade scarify the exposed subgrade to a depth of 8 inches. Adjust the scarified soil to a workable moisture content that is above its optimum value to not more than 4 percent above optimum, as determined by test method ASTM D698. Compact the soil to at least 95 percent of its maximum dry density.
- B. Compaction:
 - 1. Place loose fill in 9 inches or less thickness. The subgrade and fill material shall be compacted to a minimum of 95 percent and maximum of 100 percent of maximum density at 0 to 4% above optimum moisture as determined by ASTM D698. The methods used to secure the specified compaction and moisture content shall be the Contractor's responsibility. Wet soils shall be worked by plowing, disking, or scarifying and air drying as required to reduce the moisture content to optimum levels.
 - 2. The compacting equipment and method of compaction shall be such that uniform density will be obtained over the entire area and depth of material being compacted. All fill materials deposited in place by scrapers, dump trucks, drag lines or similar equipment shall be thoroughly broken up before being spread into uniform layers.
 - 3. Moisten layers between lifts to achieve bonding.
 - 4. Field density tests shall be performed at a rate of 1 test per each 500 cubic yards (500 cy) of material placed with a minimum of three tests per lift.

3.8 CONCRETE THRUST BLOCKING

- A. The Contractor shall use an approved concrete block or cradle where required.
- B. Concrete thrust blocks shall be provided at changes in pipe diameter (reducers), or direction (e.g., tees, bends, elbows, and crosses), plugs and valves on buried piping having unrestrained joints. Thrust blocking shall be placed against undisturbed trench walls and the pipe in such a manner that the blocking will prevent the pipe from moving when subjected to required test pressure.
- C. Concrete thrust blocking shall be in place at least five days prior to testing the pipeline or conduit.
- D. The minimum bearing areas for thrust blocks for each pipe is based on pipe size and bend and internal fluid test pressure on the pipe. The Contractor shall note on all record drawings the quantities, dimensions, and locations of the blocks.

3.9 FINAL BACKFILL PROCEDURES

- A. Backfill at Structure:
 - 1. Complete backfill to the surface of natural ground or to the lines and grades shown on the drawings. Use select material except where special materials are shown on the drawings or specified for all structural excavation. Deposit backfill in uniform layers and compact each layer as specified.

2. Place backfill as promptly as practicable after completion of each structure or portion of a structure. The bottom 1/4 of wall height may be backfilled when the walls attain 75 percent of the specified 28-day compressive strength. The remaining wall height may be backfilled when the specified 28-day compressive strength is attained. Remove concrete forms before starting to backfill and remove shoring and bracing as the work progresses. Take care to prevent any wedging action of backfill against the structure. Step-cut the slopes at 0.91 m (3') intervals bounding the excavation as required to prevent wedging.
- B. Compacting Backfill: Place material in uniform layers of prescribed maximum thickness and wet or dry the material to 0 to 4 percent above optimum moisture content. Compact with power-driven hand tampers to the prescribed density.
1. Regular and Select Material. Place in (6") maximum layers, loose measure. Compact to at least 95 percent of maximum soil density as determined by ASTM D698.
 2. Sand and Filter Material. Place in (6") maximum layers, loose measure. Compact to not less than 70 percent of maximum soil density as determined by ASTM 4253 and 4254.
 3. On-Site Soil for Use as Backfill: On-site soil that is used as backfill shall be compacted to between 92 and 97 percent of the maximum dry density as determined by the Standard Proctor test, ASTM D698. In conjunction with the compacting operations, this fill material shall be brought to between two percent below and three percent above the optimum moisture content (-2 to +3).
- C. Restoring Trench Surface:
1. Maintain the trench surface as the work progresses. If settlement takes place, immediately deposit additional fill to restore the level of the ground.
 2. The surface of any driveway or any other area which is disturbed by the trench excavation and which is not a part of the paved street shall be restored to a condition at least equal to that existing before work began.
 3. In sections where the pipe or conduit passes through grassed areas, the Contractor shall regrade and replace grass and reseed disturbed areas as directed by the Owner.
- D. Protection: Guard rails, curbing, signs, lighting, and fencing etc., in the vicinity of the Contractor's operations shall be adequately protected, and if necessary, removed and restored after backfilling. Curbing, fencing, or guard rails which are damaged during construction shall be replaced with material fully equal to that existing prior to construction.

3.10 EXCAVATED MATERIALS

- A. Excavated material to be used for backfilling and finish grading shall be placed adjacent to the work, without excessive surcharge on the trench bank and separate from stockpiled topsoil and grass. Material shall not obstruct free access to valves and hydrants and not obstruct the operation of other contractors working at the site. Obstructing traffic with excavated material will not be allowed.

- B. Excess material and material which is unsuitable for backfilling shall be removed from the site by the Contractor.
- C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided by the Contractor at no additional cost to the Owner.

3.11 DISPOSAL OF EXCESS MATERIAL

- A. Tree trunks, limbs, roots, stumps, brush, foliage, other vegetation, and objectionable material shall be disposed of in accordance with applicable regulations.
- B. Off-Site Disposal Area: Waste material which must be removed from the work site shall be disposed of in accordance with applicable regulations and laws, and in a manner as not to damage the Owner or other persons.
- C. On-Site Temporary Stockpile Area: Material may be temporarily stockpiled at a designated area approved by Owner. Grade and slope stockpile for drainage with a maximum 4:1 slope (horizontal to vertical).
- D. No burning is permitted.
- E. Equipment Fluids: The Contractor's equipment fluids shall be collected during servicing and removed from the site and disposed off-site and in accordance with environmental regulations. Flammable or toxic waste shall be contained and not allowed to be spilled on the ground. Used filters, batteries, machine parts, tires, and other waste material shall also be removed from the site and disposed off-site in accordance with environmental regulations.

3.12 GRADING

- A. Finish Grading:
 - 1. Rough grade compacted fill allowing for a maximum amount of natural settlement and compact. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc., in excess of three inches in size. Remove fill material which has been contaminated with petroleum products.
 - 2. Compact areas which are to receive paving or stabilizing base to sub-grade elevation, and to at least 95 percent and not more than 98 percent maximum dry density. Moisture shall be between optimum and 4 percent above optimum.
 - 3. Bring compacted fill to required levels, profiles, and contours. Make changes in grade gradually. Blend slopes into level areas.
 - 4. Slope grade away from structures minimum (6") in (6') unless otherwise indicated on the drawings.
 - 5. Where fill to required subgrade elevation is less than (6"), scarify to a depth of (6") and compact.
 - 6. Cultivate subgrade to a depth of (6") where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subgrades.

B. Placing Topsoil:

1. Place topsoil where area to be seeded or sodded.
2. Place in minimum ± 4 " depth up to finished grade elevations.
3. Use topsoil in relatively dry state.
4. Import topsoil if necessary.
5. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles, and contours of sub-grades.
6. Remove stone, roots, grass, weeds, debris, and other foreign material while spreading.

C. Protection:

1. Protect newly graded areas from traffic and erosion; keep free of trash and rubbish.
2. Repair settled, eroded, or rutted areas, using additional topsoil upon final acceptance of the facilities.

END OF SECTION

SECTION 31 10 00**WASTE MATERIAL DISPOSAL****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirement regarding Off-Site Waste Material Disposal: waste material disposal consists of trees, stumps, logs, brush, roots, grass, vegetation, humus, rubbish, large rocks exceeding a dimension of 6 inches in any direction, demolished equipment not retained by Owner and other objectionable matter from operations such as clearing and grubbing, demolition, excavation, and grading. Unless otherwise specified, the Contractor is responsible for removal and disposal of waste material in accordance with applicable regulations.

1.2 RELATED WORK

- A. Division 01 – General Requirements
- B. Section 02 41 00 – Demolition, Cutting, and Patching
- C. Section 31 00 00 - Earthwork
- D. Section 31 11 00 – Clearing and Grubbing
- E. Section 31 23 33 – Trenching, Backfilling, Embedment and Encasement

1.3 REFERENCES

- A. ASTM International
 - 1. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³)

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS (NOT USED)****1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)****1.7 SYSTEM DESCRIPTION/DESIGN REQUIREMENTS (NOT USED)****1.8 MAINTENANCE/SPARE PARTS (NOT USED)****1.9 WARRANTY/EXTENDED WARRANTY (NOT USED)****PART 2 – PRODUCTS****2.1 SPECIFIC PRODUCTS**

- A. Specific products are not required. Use equipment and materials necessary to properly complete disposal of waste materials.

PART 3 – EXECUTION

3.1 OFF-SITE DISPOSAL AREA

- A. Waste material, which must be removed from the work site, shall be disposed of in accordance with applicable regulations and in a manner as not to damage the Owner or other persons.

3.2 TEMPORARY STOCKPILE AREA

- A. The excavated material may be temporarily stockpiled at a designated area approved by Owner and outside the 100-year floodplain. Grade and stockpile with a maximum 4:1 slope (horizontal to vertical). If no space is available, then Contractor is responsible for hauling the stockpile material offsite.

3.3 FILL PLACEMENT AREA

- A. Excess excavated material fill shall be disposed of on-site unless otherwise indicated on plans. Excess excavated material suitable for fill, if requested by Owner, shall be placed at the site designated by the Owner. The Contractor shall place, if requested by Owner, the material in 8" maximum layers and compact to at least 95% maximum dry density as determined by ASTM D698. The moisture content shall be between 0 to 4% above optimum moisture.

3.4 BURNING

- A. No burning is permitted.

3.5 EQUIPMENT FLUIDS

- A. Contractor's equipment fluids shall be collected during servicing and removed from the site and disposed off-site and in accordance with environmental regulations. Flammable or toxic waste shall be contained and not allowed to be spilled on the ground. Used filters, batteries, machine parts, tires and other waste material shall also be removed from the site and disposed off-site in accordance with environmental regulations.

3.6 BASIN CLEANING

- A. Prior to work on any existing structures, Contractor shall remove grit material, debris, dirt, trash, and related items and dispose of it in accordance with applicable regulations. Contractor shall protect all existing equipment and utilities during cleaning. Contractor shall repair or replace items damaged during the cleaning at no additional cost to the Owner.

END OF SECTION

SECTION 31 11 00**CLEARING AND GRUBBING****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding site clearing activities including trees and vegetation removal and root grubbing, tree protection, topsoil stripping and stockpiling, capping and removing utilities, temporary erosion and sedimentation control measures, and removing minor above- and below-grade site improvements.
- B. Requirements regarding detailed tree protection and trimming, tree and root pruning, or tree relocation; grading, excavating, backfilling for earthwork and trenching; building and selective demolition; or landscaping.

1.2 RELATED WORK

- A. Section 00 72 00 – General Conditions
- B. Division 01 – General Requirements
- C. Section 02 41 00 - Demolition, Cutting and Patching
- D. Section 31 00 00 - Earthwork

1.3 REFERENCES

- A. Environmental Protection Agency
 - 1. EPA 832/R-92-005

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS**

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record Documents, according to Section 01 70 00, "Execution and Closeout Requirements," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)**1.7 DEFINITIONS**

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface

- C. Grubbing: Removal of vegetation and other organic matter, including stumps, buried logs, and roots greater than two-inch caliber to a depth as specified in the following paragraphs
- D. Scalping: Removal of sod without removing more than upper 3-inches of topsoil
- E. Stripping: Removal of topsoil remaining after applicable stripping is completed
- F. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials
- G. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated
- H. Project Limits: Areas, as shown or specified, within which work is to be performed.

1.8 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.9 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.

- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Storm Water Pollution Prevention Plan (SWP#):
 - 1. CONTRACTOR shall obtain a permit to discharge storm water from the construction site from Texas Commission on Environmental Quality (TCEQ) in accordance with TPDES General Permit No. TXR150000 (Permit).
 - 2. The CONTRACTOR shall comply with all requirements of the Permit, including the development of a Storm Water Pollution Prevention Plan (SWP3), filing of the Notice of Intent (NOI) and Notice of Termination (NOT), record maintenance, and posting of the Permit.
 - 3. Costs associated with obtaining and compliance with the Permit is the CONTRACTOR'S responsibility.
 - 4. Submit the draft SWP3 and other pertinent TCEQ submittals to the ENGINEER for review two weeks prior to submitting to TCEQ.
- B. Temporary Erosion and Sedimentation Control:
 - 1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to a sediment and erosion control plan, specific to the site, which complies with the requirements of TCEQ, or EPA 832/R-92-005, or requirements of authorities having jurisdiction, whichever is more stringent.
 - 2. The CONTRACTOR shall have the sole responsibility for the means, methods, techniques, sequences, and procedures for furnishing, installing and maintaining the erosion and sedimentation control system.
 - 3. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection as indicated in the drawings before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree protection zones, unless otherwise indicated.

- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Backfill with soil as soon as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Engineer.
 - 1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by ENGINEER.

3.4 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Existing Utilities: If applicable, do not interrupt utilities serving facilities occupied by OWNER or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify ENGINEER not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without ENGINEER'S written permission.
- C. Excavate for and remove underground utilities as indicated to be removed.

3.5 LIMITS OF CLEARING

- A. As follows, but not to extend beyond Project limits shown on the Drawings.
 - 1. Excavation Excluding Trenches: 5 feet beyond top of cutslopes
 - 2. Trench Excavation: 4 feet from trench centerline, regardless of actual trench width
 - 3. Fill:
 - a. Clearing and Grubbing: 5 feet beyond toe of permanent fill
 - b. Stripping: 2 feet beyond toe of permanent fill
 - 4. Roadways: Clearing and grubbing 20 feet from roadway centerline
 - 5. Overhead Utilities: Clearing and grubbing entire width of easements and rights-of-way
 - 6. Other Areas: As shown on drawings

- B. Remove rubbish, trash and junk from entire area within Project limits.

3.6 BLASTING

- A. No blasting will be allowed on this project.

3.7 BURNING

- A. Unless otherwise indicated, burning will only be allowed when the CONTRACTOR provides the OWNER with copies of written authorization from all appropriate and responsible regulatory agencies indicating that burning is acceptable. Said regulatory agencies may include, but not be limited to, State, City, County or local officials, fire marshals/chiefs, etc.

3.8 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 4. Use only hand methods for grubbing within tree protection zone.
 5. Chip removed tree branches and dispose of off-site.
- B. As required, fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.9 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 1. Limit height of topsoil stockpiles to approximately six feet.
 2. Do not stockpile topsoil within tree protection zones.
 3. Dispose of excess topsoil as specified for waste material disposal.

3.10 SITE DEMOLITION

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Neatly saw-cut length of existing pavement at line to remain at line of demotion before removing existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.11 DISPOSAL

- A. Clearing and Grubbing Debris:
 - 1. Burning is not permitted.
 - 2. Dispose of debris offsite.
 - a. Woody debris may be chipped. Chips may be sold to Contractor's benefit or used for landscaping onsite as mulch or uniformly mixed with topsoil, provided the resulting mix will be fertile and not support combustion. Maximum dimensions of chipped material used onsite shall be 1/4 inch by 2 inches. Dispose of chips that are unsalable or unsuitable for landscaping or other uses with unchipped debris.
 - b. Debris, tree trunks, roots, stumps and objectionable material shall be disposed offsite to locations that are approved by federal, state and local authorities, and that will not be visible from Project site.
 - c. Disposal of materials in streams shall not be permitted. No material shall be piled in streams and channels or in areas where it might be washed away by floods.
- B. Stockpile topsoil in sufficient quantity to meet Project needs. Stockpile excess stripping material in an onsite location approved by the Engineer. All excess topsoil at the end of the project shall be disposed of offsite at the expense of the Contractor.

END OF SECTION

SECTION 31 22 19**FINISH GRADING****PART 1 - GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding all labor materials, equipment, and incidental necessary to perform grading required to complete the work shown on the Drawings and specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 31 00 00 - Earthwork
- C. Section 31 11 00 - Clearing and Grubbing
- D. Section 31 23 33 – Trenching, Backfilling, Embedment and Encasement
- E. Section 32 92 19 – Seeding and Sodding

1.3 REFERENCES

- A. ASTM International
 - 1. ASTM D698- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lb/ft3)

1.4 QUALITY ASSURANCE

- A. Topsoil Material and Source: Inspected and approved by Owner's Representative prior to transporting.

1.5 SUBMITTALS (Not Used)**1.6 DELIVERY, STORAGE, AND HANDLING (Not Used)****1.7 SYSTEM DESCRIPTION/DESIGN REQUIREMENTS (Not Used)****1.8 MAINTENANCE/SPARE PARTS (Not Used)****1.9 WARRANTY/EXTENDED WARRANTY (Not Used)****PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Topsoil: Stockpile on-site material, supplemented by approved off-site material as required.
 - 1. Provide topsoil in accordance with Section 32 92 19 – Seeding and Sodding.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Finish Grading:

1. Rough grade compacted fill allowing for a maximum amount of natural settlement and compact. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc., in excess of three inches in size. Remove fill material which has been contaminated with petroleum products.
2. Compact areas which are to receive paving or stabilizing base to subgrade elevation, and to at least 95 percent and not more than 98 percent maximum dry density. Moisture shall be between optimum and 4 percent above optimum.
3. Bring compacted fills to required levels, profiles and contours. Make changes in the grade gradually. Blend slopes into level areas.
4. Slope grades away from structures minimum 6 inches in 6 feet unless otherwise indicated on Drawings.
5. Where fill to required subgrade elevation is less than 6 inches, scarify to a depth of 6 inches and compact.
6. Cultivate subgrade to a depth of 6 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subgrades.

B. Placing Topsoil:

1. Place in minimum four inches depth up to finished grade elevations.
2. Use topsoil in relatively dry state. Place during dry weather.
3. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of subgrades. Rake until surfaces are smooth.
4. Remove stone, roots, grass, weeds, debris and other foreign material while spreading.
5. Manually spread topsoil around trees, plants, and building to prevent damage which may be caused by grading equipment.
6. Lightly compact, 90% minimum of maximum dry density as defined by ASTM D698, (Standard Proctor) zero to 4% above optimum moisture, topsoil after placing.

3.2 MAINTENANCE

- A. Protect newly graded areas from traffic and erosion; keep free of trash and rubbish.
- B. Repair settled, eroded or rutted areas, using additional topsoil upon final acceptance of the facilities.

END OF SECTION

SECTION 31 23 19**DEWATERING AND DRAINAGE****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding all labor, materials, equipment, power and incidentals, and for performing all operations necessary to dewater, drain and maintain excavations and other work as necessary for construction as shown in the Drawings and as specified herein. Included are installing, maintaining, operating, and removing pump systems, culverts, channels and other approved devices for removal of standing water, surface drainage and seepage from excavation or other work. No separate payment will be made for drainage control and pumping. Some shutdowns will not be absolute. The Contractor will be responsible for dewatering of seepage and leakage past any existing valve, wall, or gate.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 31 23 33.14: Trench Shielding

1.3 REFERENCES (NOT USED)**1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS**

- A. Submit a groundwater control plan, developed and sealed by a licensed professional engineer in the State of Texas in accordance with Section 01 33 00 – Submittal Procedures that outlines the Contractor's means and methods for controlling groundwater including the location of all proposed groundwater monitoring wells for verification prior to beginning excavation for trench and excavation safety system submitted under Section 31 22 33.14 – Trench Shielding. Adequacy and implementation of the plan is the sole responsibility of the Contractor. The groundwater control plan will be maintained in the Owner's and Engineer's files for reference purposes only. No review will be made nor is any responsibility for the plan assumed by the Owner, or Engineer.

1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)**1.7 CONTRACTOR'S RESPONSIBILITY**

- A. Assume sole responsibility for dewatering systems and for all loss or damage resulting from partial or complete failure or protective measures.
- B. Contractor shall be responsible for design of dewatering and drainage system.

1.8 QUALITY CONTROL

- A. Contractor shall retain a professional engineer to evaluate groundwater conditions and design appropriate dewatering systems for trench and excavation safety system submitted under Section 31 23 33.14 – Trench Shielding. The Contractor shall install an adequate number of groundwater monitoring wells to demonstrate that dewatering has occurred to adequate depths below all excavations prior to beginning excavation as verified by the Owner.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Select equipment and material as appropriate for the intended use.

PART 3 – EXECUTION

3.1 DEWATERING

- A. Furnish, install, operate and maintain all necessary pumping for dewatering the various parts of the work and for maintaining free of water the parts of the work as required for construction operations, inspections and safety.
- B. Continue dewatering in all required areas, until the area has been completed and accepted by the Owner.

3.2 SPECIFIC REQUIREMENTS

- A. Soil borings indicate groundwater levels at or above the required excavation level for all utility excavations. The Contractor must take all necessary means to control groundwater inflow and protect the foundation soils below structures and utilities. This will require installation of deep wells, sump pumps, and possibly well points.

3.3 REPAIR OF DAMAGE

- A. Contractor shall assume full responsibility for all loss and damage due to inadequate dewatering prior to excavation or as a result of flood, rising water or seepage in any part of the work. Repair any damage to partially completed work from these or other causes by failure or lack of adequate dewatering or drainage facilities.

END OF SECTION

SECTION 31 23 33**TRENCHING, BACKFILLING, EMBEDMENT AND ENCASEMENT****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding all labor, equipment and materials, and performing all operations in connection with the excavation, trenching, backfill, embedment and concrete encasement required to install pipelines, complete and in place, as shown on the Drawings and as specified herein.
- B. Requirements regarding the removal of any trees, stumps, brush, debris, or other obstacles that may obstruct the line of work, and the excavation, and removal of all earth, rock or other materials to the extent necessary to install the pipe and appurtenances in conformance with the lines and grades shown on the Drawings, or as specified.
- C. Backfill that include the refilling and consolidation of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing.
- D. Embedment shall be as indicated on the plans.
- E. Where construction enters the limits of City, State or County rights-of-way, the requirements of these agencies shall be met.

1.2 RELATED WORK

- A. Section 26 05 43 - Underground System
- B. Section 31 00 00 – Earthwork
- C. Section 31 23 33.14 - Trench Shielding
- D. Section 31 10 00 - Waste Material Disposal
- E. Division 40 - Process Interconnections

1.3 REFERENCES**A. ASTM INTERNATIONAL**

- 1. ASTM D75 – Standard Practice for Sampling Aggregates
- 2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³)
- 3. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- 4. ASTM D4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.4 QUALITY ASSURANCE

- A. Density: All references to "Maximum dry density" shall mean the maximum dry density defined by the "Maximum Density- Optimum Moisture Test," ASTM D698, unless otherwise specified. Determination of the density of backfill in-place shall be in accordance with the requirements of ASTM D2922, "Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)." The Owner will provide for initial density testing of in-place backfill; however, the Contractor shall pay for all additional density testing of backfills found not to be within the minimum requirements of the Specifications.
- B. Sources and Evaluation Testing: Materials to be used for embedment and granular material to be used for select backfill shall be obtained in accordance with a sampling plan and ASTM D75, Sampling Aggregates. Testing of materials to certify conformance with the specification requirements shall be performed by an independent testing laboratory paid by the Contractor. Contractor's testing agency shall perform tests upon change of source and at sufficient intervals to certify conformance of all select material furnished for use on this project.
- C. Trench Width Dimension: The sides of all trenches shall be cut as nearly vertical as possible. If the maximum width is exceeded at any point, the Contractor shall provide adequate support for the pipe as specified in Paragraph 3.1B Item 3 of this Section.

1.5 SUBMITTALS (NOT USED)

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

PART 2 – PRODUCTS

2.1 PIPE EMBEDMENT

- A. Embedment for all underground piping shall be as indicated on the plans.

2.2 SELECT FILL MATERIAL

- A. Where select material is shown or specified, use an approved material, free of organic matter and foreign substances, obtained from an approved off-site source. The material shall have a plasticity index between four and twelve and a maximum liquid limit of less than 35 as determined by ASTM D4318. The materials shall retain a minimum of 50 percent on the No. 200 sieve. Prior to bringing any of the proposed material to the site, submit, for review by the Engineer, an analysis of the proposed material, including a moisture-density relationship curve prepared in accordance with ASTM D698 by a certified independent testing laboratory employed and paid by the Contractor.

2.3 FINAL BACKFILL

- A. From 12 inches above the top of the pipe or conduit, the trench or excavation shall be backfilled with select material or excavated material free from rocks with any dimension greater than four inches unless otherwise specified or required elsewhere. The top 6 inches shall be the topsoil which has been placed separately.

- B. Unless otherwise indicated on the drawings, no material of a perishable, spongy, or otherwise unsuitable nature, or excessively large rock (largest dimension greater than 4 inches), shall be used in backfilling.

2.4 FLOWABLE FILL

- A. Flowable material shall be a controlled density material consisting of cement and/or fly ash, sand and water meeting the following requirements:
 - 1. High strength fast fix flowable fill: High strength fast fix flowable fill shall consist of an appropriate amount of cement (with other additives as necessary) mixed wet with mortar sand to flow and fill all voids in the excavation. This fill shall develop a minimum compressive strength of 2,160 pounds per square foot (15 psi) one hour after placement, and a 28-day compressive strength within the range of 300 psi to 500 psi. The material shall be such that it can be capped in 1 ½ to 2 hours.
 - 2. Low strength fast fix flowable fill: Low strength fast fix flowable fill shall consist of an appropriate amount of cement (with other additives as necessary) mixed with mortar sand to flow and fill all voids in the excavation. This fill shall develop a minimum compressive strength of 1,120 pounds per square foot (7.8 psi) one hour after placement, and a 28-day compressive strength within the range of 25 psi to 100 psi. The material shall be such that it can be capped in 1 ½ to 2 hours.
- B. Any materials used shall be primarily granular, with a plasticity index less than 12 and with 100% passing a 3/4" sieve.
- C. Flowable Fill Base shall be a flowable fill meeting the requirements of high strength fast fix flowable fill.

PART 3 – EXECUTION

3.1 GENERAL

- A. Topsoil: Topsoil and grass shall be stripped a minimum of six inches over the trench excavation site and stockpiled separately for replacement over the finished grading areas.
- B. Excavation:
 - 1. Excavation work shall be unclassified and includes removal of all types of materials encountered without exception. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible verification in pipe wall thickness.
 - 2. The sides of all trenches shall be vertical to a point one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the trench width shall be as shown on the drawings within a tolerance of +3 inches. Trench width will be measured at an elevation in the trench which is 12 inches above the top of the pipe when laid to grade.
 - 3. Where the normal trench width below the top of the pipe is exceeded for any reason, the Contractor shall furnish an adequate support for the pipe. This may be

accomplished by furnishing a stronger pipe or a concrete cradle, next higher-class embedment or encasement, cap or envelope as approved.

4. The trenches shall be excavated to the required depth allowing for the placement of pipe bedding to the thickness shown on the Drawings. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.
5. Should the bottom of the trench become an unstable foundation for the pipe through the failure of the Contractor to adequately perform, the Contractor shall remove the unstable material and fill the trench to the proper subgrade with crushed rock. No extra compensation will be allowed for this material or work.
6. Should the undisturbed material encountered at the grade depth constitute, in the opinion of the Owner's Representative, an unstable foundation for the pipe, the Contractor shall be required to remove such unstable material and fill the trench to the proper subgrade with crushed rock.
7. Bell (Joint) Holes: At the location of each joint, dig bell (joint) holes of ample dimensions in the bottom of the trench and at the sides where necessary to permit easy visual inspection of the entire joint.
8. Minimum pipe burial to the top outside surface of the pipe barrel shall be 3 feet unless otherwise noted.
9. The excavation, installation and backfilling for the piping should be done in an expedient manner so that deep clay soils are not exposed to significant drying. Otherwise, larger swell potential should be anticipated. If the excavations are going to be open for 48 hours or more, a minimum of 12 inches of low PI select fill could be placed and compacted beneath the specified bedding material in order to maintain the moisture of the deeper clay soils. If this is done, the select fill should be placed within 48 hours after excavation. The select fill should have PI of 4 to 12 and should be compacted in maximum six-inch lifts at -2% to +2% of optimum to 98% ASTM D698.

3.2 TRENCH SAFETY SYSTEMS

- A. Refer to Specification Section 31 23 33.14 - Trench Shielding for requirements.

3.3 DEWATERING EXCAVATIONS

- A. There shall be sufficient pumping equipment, in good working order, available at all times to remove any water that accumulates in excavations. Where the pipeline crosses natural drainage channels, the Work shall be conducted in such a manner that unnecessary damage or delays in the execution of the Work will be prevented. Provision shall be made for the satisfactory disposal of surface water pumped to prevent damage to public or private property.
- B. Dewatering will be required for the proposed pipelines.
- C. In all cases, accumulated water in the trench shall be removed before laying pipe, placing concrete or backfilling.

3.4 EXCAVATED MATERIALS

- A. Excavated material shall be placed adjacent to the work area and used for backfilling as required. Topsoil shall be placed separately in a careful manner and replaced in its original position. Excess excavated materials shall be disposed of offsite as per Section 31 10 00 unless specifically indicated otherwise in the Contract Documents.

3.5 EMBEDMENT

- A. Provide pipe bedding material under all pipe for the full width of the trench. Minimum depth of bedding material below the pipe barrel shall be as shown on the Drawings or as specified.
- B. Minimum depth of pipe bedding material under the pipe bell shall not be less than 3 inches under normal trench conditions and not less than 6 inches in rock excavation areas. Minimum depth of pipe bedding material below the pipe shall be as shown on the drawings.
- C. Placement:
 - 1. Place the pipe bedding or foundation stabilization material for the full width of the trench in layers not exceeding 6 inches deep and compact each layer, until the material does not yield or move to the grade established for the pipe bedding. Where the distance to stable ground is excessive (more than two (2) feet), the Owner reserves the right to order as an extra, in writing, such other types of foundation or pipe supports as he shall deem necessary.
 - 2. Particular attention must be given to the area of the pipe zone from the flow line to the springline of the pipe to ensure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone.

3.6 BACKFILL

- A. All backfill for underground piping shall be as indicated on the plans and in accordance with the recommendations of the Geotechnical investigation report.

3.7 CONCRETE EMBEDMENT AND ENCASEMENT

- A. After pipe joints are completed, the voids at the joints in the embedments shall be brought to proper grade. Where concrete is placed over or along the pipe, it shall be placed in such manner as not to injure the joints or displace the pipe.
- B. While placing concrete embedment and until the concrete sets up, each pipe shall be properly braced and held to grade so as to prevent any possible shifting or floating of the pipe.
- C. Backfilling shall be done in a careful manner and no less than 24 hours after concrete embedment, cradle, thrust block, or encasement has been placed.

3.8 FINAL BACKFILL PLACEMENT

- A. Method of Compaction: Compaction shall be performed by mechanical means. Jetting and flooding are not allowed.

3.9 CONCRETE THRUST BLOCKING

- A. Thrust blocking of concrete shall be provided at changes in pipe diameter (reducers), or direction (e.g., tees, bends, elbows, and crosses), and plugs and valves on buried piping having unrestrained joints. Thrust blocking shall be placed against undisturbed trench walls and the pipe in such a manner that the blocking will prevent the pipe from moving when subjected to required test pressure.
- B. Concrete thrust blocking shall be in place at least five days prior to testing the pipeline/conduit.

3.10 FIELD TESTING

- A. Testing shall be in accordance with the recommendations in the geotechnical investigation report.

END OF SECTION

SECTION 31 23 33.14**TRENCH SHIELDING****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding equipment, materials and labor for a trench and excavation safety system meeting appropriate requirements established in the Occupational Safety and Health Administration (OSHA) Safety and Health Regulations, Part 1926, Subpart P - Excavations, Trenching and Shoring, and other applicable regulations and State of Texas Trench Safety regulations.

1.2 RELATED WORK

- A. Division 01 – General Requirements
- B. Section 01 33 00 – Submittal Procedures
- C. Section 01 45 00 – Quality Control
- D. Section 03 30 00 – Cast-in-Place Concrete
- E. Section 26 05 43 – Underground System
- F. Section 31 23 19 – Dewatering and Drainage
- G. Section 31 23 33 – Trenching, Backfilling, Embedment and Encasement
- H. Section 40 05 19 – Ductile Iron Pipe and Fittings
- I. Section 40 05 31.13 – PVC Pressure Pipe
- J. Section 40 23 00 – Plant Piping, General

1.3 REFERENCES

- A. Occupational Safety and Health Administration (OSHA)
 - 1. Part 1926, Subpart P - Excavations, Trenching and Shoring, and other applicable regulations.

1.4 QUALITY ASSURANCE

- A. Engineers responsible for design of trench safety systems, structural excavation plans, and existing utility and structure protection systems shall be Professional Engineers licensed in the State of Texas. Such engineers must also demonstrate experience in soil mechanics, structural engineering and design of trench safety systems with a minimum 5 years of experience on similar sized projects. Such engineers shall also submit to the Owner certification of professional liability insurance coverage of at least \$1,000,000.00. Such coverage must not exclude structural design or trench safety design.

1.5 SUBMITTALS

- A. Submit the following in accordance with the requirements of the General Conditions and Division 01 – General Requirements and Section 01 33 00 – Submittal Procedures:
- B. The Contractor shall retain the services of a Professional Engineer, licensed in the State of Texas and having experience in soils engineering, to design and prepare the trench and excavation plans for all trench and excavations. The plans shall include shoring systems, systems to protect existing utilities, slope stability monitoring and dewatering.
- C. Submit a plan for all excavations of a depth 5 feet or greater, with a bottom width less than twice the total depth of the excavation, where an existing structure or utility falls within a 2 horizontal to 1 vertical (2:1) slope from the bottom of the excavation, or where conditions dictate, a plan be developed based on the trench and excavation safety engineers' analysis.
- D. Submit details of any proposed dewatering system including groundwater monitoring wells, slope stability and/or shoring systems to the Owner prior to proceeding with any excavation.
- E. The Contractor should recognize that failure to dewater excavations prior to excavation to adequate levels below required excavation depths will result in a bearing capacity failure at the base of the excavation. If this occurs, the cost of repair of any excavation base failure will be charged to the Contractor. The Contractor must install an adequate number of groundwater monitoring wells in order to verify that adequate dewatering has occurred prior to beginning excavation.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 SYSTEM DESCRIPTION/DESIGN REQUIREMENTS

- A. Trench and Excavation Plan: After award, the Contractor shall have a trench and excavation plan prepared. This excavation plan must illustrate proposed trench safety and excavation requirements specifically designed for this project and must be designed, signed, dated and sealed by a Professional Engineer licensed in the State of Texas with professional experience in soil mechanics and design of trench safety systems. The Contractor is responsible for obtaining additional soil borings and soil analysis as required for design. The trench and excavation plan is to be designed in conformance with OSHA standards and other applicable regulations.
- B. A signed, dated and sealed copy of the trench and excavation plan shall be maintained at the project site for the Contractor's use during construction. In addition, a signed, dated and sealed copy of the trench and excavation plan shall be maintained at the project site in the contractor's records. No work in trenches or excavations in excess of five feet deep is to be performed until this plan is prepared and implemented. The Contractor shall not deviate from the trench and excavation plan without written authorization from the engineer who prepared the trench and excavation plan. This written authorization shall be signed, dated and sealed by the engineer. Any changes in the trench and excavation plan after initiation of construction will not be cause for extension of time or change order. Contractor accepts sole responsibility for compliance with all applicable safety requirements. The trench and excavation plan does not relieve Contractor from responsibility for any or all construction means, methods, techniques

and procedures. Furthermore, the Contractor shall indemnify the Owner and Consulting Engineer from any and all claims due to any property damage or bodily injury (including death) that arises from use or misuse of the trench safety and excavation plan, or from Contractor's negligence in performance of the contract work.

1.8 MAINTENANCE/SPARE PARTS (NOT USED)

1.9 WARRANTY/EXTENDED WARRANTY (NOT USED)

1.10 PROTECTION OF FACILITIES

- A. Before the start of earthwork operations, adequately protect utilities, structures, trees, shrubs and other permanent objects. Costs resulting from damage to permanent facilities due to negligence or lack of adequate protection will be charged to the Contractor. Excavations near existing structures or utilities must be instrumented to verify no impact to existing facilities.
- B. Provide surface drainage during the period of construction to protect the work and to avoid nuisance to adjoining property.
- C. The Contractor shall conduct his operations in such fashion that trucks and other vehicles do not create a dirt nuisance in the streets. The truck beds shall be sufficiently tight and shall be loaded in such a manner that objectionable materials will not be spilled onto the streets. Any dirt, mud, or other materials that are spilled onto the streets or deposited onto the streets by the tires of vehicles shall be promptly cleared away by the Contractor.

1.11 DEFINITION

- A. For the purposes of this project, a trench excavation is any excavation whose bottom width is less than twice the total depth of the excavation.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL

- A. Trench safety system shall be constructed, installed and maintained in accordance with the details shown in the design prepared by the Contractor's licensed Professional Engineer to prevent death or injury to personnel or damage to structures or utilities in or near these trench excavations. Unless otherwise specified elsewhere, materials excavated from trench to be stored no closer to the edge of trench than one-half the depth of the trench.

3.2 SUPERVISION

- A. Contractor shall provide competent supervisory personnel at each trench while work is in progress to ensure Contractor's trench safety methods, procedures, equipment and materials meet the requirements of OSHA standards and the trench and excavation plan.

3.3 MAINTENANCE OF SAFETY SYSTEM

- A. The safety system shall be maintained in the condition as specified by the Contractor's Trench Safety Engineer. The Contractor shall take all necessary precautions to ensure the safety systems are not damaged during their use. If at any time during its use a safety system is damaged, personnel shall be immediately removed from the trench or excavation area and the safety system repaired. The Contractor shall take all necessary precautions to ensure no loads, except those included in the safety system design, are imposed upon the excavation.

3.4 INSPECTION

- A. Contractor shall make daily inspection of trench safety and excavation system to ensure that the system meets OSHA requirements and the requirements of the trench safety plan. Daily inspection is to be made by qualified personnel. If evidence of possible cave-ins, slides or other conditions of concern is apparent, all work in the trench shall cease until necessary precautions have been taken to safeguard personnel entering trench and protect adjacent structures and utilities. Contractor shall maintain permanent record of daily inspections. The Contractor's Trench Safety Engineer shall make periodic site visits (at the start of each new excavation and at least once per week for all open excavations). Within two (2) days after each visit, the Contractor's Trench Safety Engineer shall make a written report to the Owner certifying that the trench and excavation plan and safety construction practices are being followed. The Contractor's Trench Safety Engineer shall immediately report any unsafe construction practices to the Owner and Contractor.

3.5 REMOVAL

- A. Bed and backfill pipe to a point at least one foot above top of pipe prior to removal of any portion of trench safety system. Bedding and backfilling of the trench shall be performed in accordance with other applicable specification items. Backfilling and removal of trench supports shall progress together from bottom of trench upward. Remove no braces or trench supports until all personnel have evacuated the trench. Backfill trench to within five feet of natural ground prior to removal of entire trench safety system.

END OF SECTION

SECTION 31 25 00**EROSION AND SEDIMENT CONTROLS****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Implementation of the project’s Storm Water Pollution Prevention Plan (SWPPP) and installation, maintenance and removal of erosion and sediment control devices.

1.2 RELATED WORK

- A. Division 00 – Procurement and Contracting Requirements
- B. Division 01 – General Requirements
- C. Section 01 33 00 – Submittal Procedures
- D. Division 31 - Earthwork

1.3 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM D3786 - Standard Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method
 - 2. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
 - 3. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile
 - 4. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- B. Texas Commission on Environmental Quality (TCEQ)
 - 1. TPDES General Permit No. TXR150000
- C. TxDOT Departmental Material Specifications (DMS)
 - 1. DMS-6230 “Temporary Sediment Control Fence Fabric”
- D. TxDOT Publications
 - 1. “Stormwater Management Program,” TxDOT, 2018

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS**

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures.

- B. Storm Water Pollution Prevention Plan (SWPPP), approved by the jurisdiction where the project is located prior to submittal to Owner.
- C. TCEQ Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under the TPDES General Permit
- D. Construction Site Notice
- E. TCEQ Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under the TPDES General Permit
- F. Notice of Change (if applicable)

1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)

PART 2 – PRODUCTS

2.1 OWNER-SUPPLIED PRODUCTS (NOT USED)

2.2 PRODUCT TYPES AND MATERIALS

A. Rock Filter Dams

1. Aggregate

- a. Furnish aggregate with hardness, durability, cleanliness and resistance to crumbling, flaking and eroding acceptable to the Engineer.
- b. Provide the following:
 - 1) Types 1, 2 and 4 Rock Filter Dams
 - a) Use 3-to-6-inch aggregate
 - 2) Type 3 Rock Filter Dams
 - a) Use 4-to-8-inch aggregate

2. Wire

- a. Provide minimum 20-gauge galvanized wire for the steel wire mesh and tie wires for Types 2 and 3 rock filter dams
- b. Type 4 dams require:
 - 1) Double-twisted, hexagonal weave with a nominal mesh opening of 2½ inches x 3 ¼ inches
 - 2) Minimum 0.0866-inch steel wire for netting
 - 3) Minimum 0.1063-inch steel wire for selvages and corners
 - 4) Minimum 0.0866-inch for binding or tie wire

B. Geotextile Fabric

- 1. Place the aggregate over geotextile fabric meeting the following criteria:
 - a. Tensile Strength of 250 pounds per ASTM D4632
 - b. Puncture Strength of 135 pounds per ASTM D4833

- c. Mullen Burst Rate of 420 psi per ASTM D3786
 - d. Apparent Opening Size of No. 20 (max) per ASTM D4751
- C. Sandbag Material
 - 1. Furnish sandbags meeting Section 2.2 except that any gradation of aggregate may be used to fill the sandbags.
- D. Stabilized Construction Entrances
 - 1. Provide materials that meet the details shown on the Drawings and this Section.
 - a. Provide crushed aggregate for long and short-term construction exits.
 - b. Furnish aggregates that are clean, hard, durable and free from adherent coatings such as salt, alkali, dirt, clay, loam, shale, soft or flaky materials and organic and injurious matter.
 - c. Use 3-to-5-inch coarse aggregate with a minimum thickness of 12 inches.
 - d. The aggregate shall be placed over a geotextile fabric meeting the following criteria:
 - 1) Tensile Strength of 300 pounds per ASTM D4632
 - 2) Puncture Strength of 120 pounds per ASTM D4833
 - 3) Mullen Burst Rate of 600 psi per ASTM D3786
 - 4) Apparent Opening Size of No. 40 (max) per ASTM D4751
- E. Embankment for Erosion Control
 - 1. Provide rock, loam, clay, topsoil, or other earth materials that will form a stable embankment to meet the intended use.
- F. Sandbags
 - 1. Provide sandbag material of polypropylene, polyethylene or polyamide woven fabric with a minimum unit weight of 4 ounces per square yard, a Mullen burst strength exceeding 300 psi, and an ultraviolet stability exceeding 70 percent.
 - 2. Use natural coarse sand or manufactured sand meeting the gradation given in Table 1 to fill sandbags.
 - 3. Filled sandbags must be 24 to 30 inches long, 16 to 18 inches wide, and 6 to 8 inches thick.

Table 1
Sand Gradation

Sieve #	Maximum Retained (% by Weight)
4	3 percent
100	80 percent
200	95 percent

- G. Temporary Sediment Control Fence
 - 1. Provide a net-reinforced fence using woven geo-textile fabric.

2. Logos visible to the traveling public will not be allowed.
 - a. Fabric
 - 1) Provide fabric materials in accordance with DMS-6230, "Temporary Sediment Control Fence Fabric."
 - b. Posts
 - 1) Provide essentially straight wood or steel posts with a minimum length of 48 inches, unless otherwise shown on the Drawings.
 - 2) Soft wood posts must be at least 3 inches in diameter or nominal 2 x 4 inch.
 - 3) Hardwood posts must have a minimum cross-section of 1-1/2 x 1-1/2 inch.
 - 4) T- or L-shaped steel posts must have a minimum weight of 1.3 pounds per foot.
 - c. Net Reinforcement
 - 1) Provide net reinforcement of at least 12-1/2 gauge galvanized welded wire mesh, with a maximum opening size of 2 x 4 inch, at least 24 inches wide, unless otherwise shown on the Drawings.
 - d. Staples
 - 1) Provide staples with a crown at least 3/4 inch wide and legs 1/2 inch long.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Storm Water Pollution Prevention Plan

1. Develop and implement the project's Storm Water Pollution Prevention Plan (SWPPP) in accordance with the TPDES Construction General Permit TXR150000 requirements. Prevent water pollution from storm water runoff by using and maintaining appropriate structural and nonstructural BMPs to reduce pollutants discharges to the MS4 from the construction site.

B. Control Measures

1. Implement control measures in the area to be disturbed before beginning construction, or as directed. Limit the disturbance to the area shown on the Drawings or as directed.
2. Control site waste such as discarded building materials, concrete truck washout water, chemicals, litter and sanitary waste at the construction site.
3. If, in the opinion of the Engineer, the Contractor cannot control soil erosion and sedimentation resulting from construction operations, the Engineer will limit the disturbed area to that which the Contractor is able to control. Minimize disturbance to vegetation.

4. Immediately correct ineffective control measures. Implement additional controls as directed. Remove excavated material within the time requirements specified in the applicable storm water permit.
 5. Upon acceptance of vegetative cover by the Owner, remove and dispose of all temporary control measures, temporary embankments, bridges, matting, falsework, piling, debris, or other obstructions placed during construction that are not a part of the finished work, or as directed.
- C. Do not locate disposal areas, stockpiles, or haul roads in any wetland, water body, or streambed.
- D. Do not install temporary construction crossings in or across any water body without the prior approval of the appropriate resource agency and the Engineer.
- E. Provide protected storage area for paints, chemicals, solvents, and fertilizers at an approved location. Keep paints, chemicals, solvents, and fertilizers off bare ground and provide shelter for stored chemicals.
- F. Installation and Maintenance
1. Perform work in accordance with the TPDES Construction General Permit TXR150000.
 2. When approved, sediments may be disposed of within embankments, or in areas where the material will not contribute to further siltation.
 3. Dispose of removed material in accordance with federal, state, and local regulations.
 4. Remove devices upon approval or when directed.
 - a. Upon removal, finish-grade and dress the area.
 - b. Stabilize disturbed areas in accordance with the permit, and as shown on the Drawings or directed.
 5. The Contractor retains ownership of stockpiled material and must remove it from the project when new installations or replacements are no longer required.
- G. Rock Filter Dams for Erosion Control
1. Remove trees, brush, stumps and other objectionable material that may interfere with the construction of rock filter dams.
 2. Place sandbags as a foundation when required or at the Contractor's option.
 3. For Types 1, 2, 3, and 5, place the aggregate to the lines, height, and slopes specified, without undue voids.
 4. For Types 2 and 3, place the aggregate on the mesh and then fold the mesh at the upstream side over the aggregate and secure it to itself on the downstream side with wire ties, or hog rings, or as directed.
 5. Place rock filter dams perpendicular to the flow of the stream or channel unless otherwise directed.
 6. Construct filter dams according to the following criteria, unless otherwise shown on the Drawings:

- a. Type 1 (Non-reinforced)
 - 1) Height - At least 18 inches measured vertically from existing ground to top of filter dam
 - 2) Top Width - At least 2 feet
 - 3) Slopes - At most 2:1
- b. Type 2 (Reinforced)
 - 1) Height - At least 18 inches measured vertically from existing ground to top of filter dam
 - 2) Top Width - At least 2 feet
 - 3) Slopes - At most 2:1
- c. Type 3 (Reinforced)
 - 1) Height - At least 36 inches measured vertically from existing ground to top of filter dam
 - 2) Top Width - At least 2 feet
 - 3) Slopes - At most 2:1
- d. Type 4 (Sack Gabions)
 - 1) Unfold sack gabions and smooth out kinks and bends.
 - 2) For vertical filling, connect the sides by lacing in a single loop–double loop pattern on 4- to 5-inches spacing. At 1 end, pull the end lacing rod until tight, wrap around the end, and twist 4 times. At the filling end, fill with stone, pull the rod tight, cut the wire with approximately 6 inches remaining, and twist wires 4 times.
 - 3) For horizontal filling, place sack flat in a filling trough, fill with stone, and connect sides and secure ends as described above.
 - 4) Lift and place without damaging the gabion.
 - 5) Shape sack gabions to existing contours.
- e. Type 5
 - 1) Provide rock filter dams as shown on the Drawings.

H. Construction Entrances

- 1. When tracking conditions exist, prevent traffic from crossing or exiting the construction site or moving directly onto a public roadway, alley, sidewalk, parking area, or other right of way areas other than at the location of construction entrances.
- 2. Place the exit over a foundation course, if necessary.
 - a. Grade the foundation course or compacted subgrade to direct runoff from the construction exits to a sediment trap as shown on the Drawings or as directed.
- 3. At drive approaches, make sure the construction entrance is the full width of the drive and meets the length shown on the Drawings.

- a. The width shall be at least 14 feet for 1-way and 24 feet for 2-way traffic for all other points of ingress or egress or as directed by the Engineer.

I. Earthwork for Erosion Control

- 1. Perform excavation and embankment operations to minimize erosion and to remove collected sediments from other erosion control devices.
 - a. Excavation and Embankment for Erosion Control Measures
 - 1) Place earth dikes, swales or combinations of both along the low crown of daily lift placement, or as directed, to prevent runoff spillover.
 - 2) Place swales and dikes at other locations as shown on the Drawings or as directed to prevent runoff spillover or to divert runoff.
 - 3) Construct cuts with the low end blocked with undisturbed earth to prevent erosion of hillsides.
 - 4) Construct sediment traps at drainage structures in conjunction with other erosion control measures as shown on the Drawings or as directed.
 - 5) Where required, create a sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures for drainage locations that serve an area with 10 or more disturbed acres at 1 time, not including offsite areas.
 - b. Excavation of Sediment and Debris
 - 1) Remove sediment and debris when accumulation affects the performance of the devices, after a rain, and when directed.

J. Sandbags for Erosion Control

- 1. Construct a berm or dam of sandbags that will intercept sediment-laden storm water runoff from disturbed areas, create a retention pond, detain sediment and release water in sheet flow.
- 2. Fill each bag with sand so that at least the top 6 inches of the bag is unfilled to allow for proper tying of the open end.
- 3. Place the sandbags with their tied ends in the same direction.
- 4. Offset subsequent rows of sandbags 1/2 the length of the preceding row.
- 5. Place a single layer of sandbags downstream as a secondary debris trap.
- 6. Place additional sandbags as necessary or as directed for supplementary support to berms or dams of sandbags or earth.

K. Temporary Sediment-Control Fence

- 1. Provide temporary sediment-control fence near the downstream perimeter of a disturbed area to intercept sediment from sheet flow.
- 2. Incorporate the fence into erosion-control measures used to control sediment in areas of higher flow. Install the fence as shown on the Drawings, as specified in this Section, or as directed.
 - a. Post Installation

- 1) Embed posts at least 18 inches deep, or adequately anchor, if in rock, with a spacing of 6 to 8 feet and install on a slight angle toward the run-off source.
- b. Fabric Anchoring
 - 1) Dig trenches along the uphill side of the fence to anchor 6 to 8 inches of fabric.
 - 2) Provide a minimum trench cross-section of 6 x 6 inches.
 - 3) Place the fabric against the side of the trench and align approximately 2 inches of fabric along the bottom in the upstream direction.
 - 4) Backfill the trench, then hand-tamp.
- c. Fabric and Net Reinforcement Attachment
 - 1) Unless otherwise shown under the Drawings, attach the reinforcement to wooden posts with staples, or to steel posts with T-clips, in at least 4 places equally spaced.
 - 2) Sewn vertical pockets may be used to attach reinforcement to end posts.
 - 3) Fasten the fabric to the top strand of reinforcement by hog rings or cord every 15 inches or less.
- d. Fabric and Net Splices
 - 1) Locate splices at a fence post with a minimum lap of 6 inches attached in at least 6 places equally spaced, unless otherwise shown under the Drawings.
 - a) Do not locate splices in concentrated flow areas.
 - 2) Requirements for installation of used temporary sediment-control fence include the following:
 - a) Fabric with minimal or no visible signs of biodegradation (weak fibers)
 - b) Fabric without excessive patching (more than 1 patch every 15 to 20 feet)
 - c) Posts without bends
 - d) Backing without holes

- 3.2 REPAIR/RESTORATION (NOT USED)
- 3.3 RE-INSTALLATION (NOT USED)
- 3.4 FIELD [OR] SITE QUALITY CONTROL (NOT USED)
- 3.5 SYSTEM STARTUP (NOT USED)
- 3.6 ADJUSTING (NOT USED)
- 3.7 CLEANING

- A. Waste Management

- 1. Remove sediment, debris and litter as needed.

- 3.8 CLOSEOUT ACTIVITIES

- A. Erosion control measures remain in place and are maintained until all soil disturbing activities at the project site have been completed.
 - B. Establish a uniform vegetative cover with a density of 70 percent on all unpaved areas, on areas not covered by permanent structures, or in areas where permanent erosion control measures (i.e. riprap, gabions, or geotextiles) have been employed.

- 3.9 PROTECTION (NOT USED)

- 3.10 MAINTENANCE

- A. Install and maintain the integrity of temporary erosion and sedimentation control devices to accumulate silt and debris until earthwork construction and permanent erosion control features are in place or the disturbed area has been adequately stabilized as determined by the Engineer.
 - B. If a device ceases to function as intended, repair or replace the device or portions thereof as necessary.
 - C. Perform inspections of the construction site as prescribed in the Construction General Permit TXR150000.
 - D. Records of inspections and modifications based on the results of inspections must be maintained and available in accordance with the permit.

- 3.11 ATTACHMENTS (NOT USED)

END OF SECTION

SECTION 31 50 00**TRENCH AND EXCAVATION SAFETY SYSTEMS****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required to install trench and excavation safety systems meeting appropriate requirements established in the Occupational Safety and Health Administration (OSHA) Safety and Health Regulations, Part 1926, Subpart P - Excavations, Trenching and Shoring, and other applicable regulations, complete and in place, as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Specifications:
 - 1. Division 01 - General Requirements
 - 2. Section 01 33 00 – Submittal Procedures
 - 3. Section 01 45 00 – Quality Control

1.3 REFERENCES

- A. Occupational Safety and Health Administration (OSHA)
 - 1. OSHA Safety and Health Regulations, Part 1926, Subpart P - Excavations, Trenching and Shoring

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS**

- A. Submit the following in accordance with the requirements of the General Conditions, Division 01 - General Requirements, and Section 01 33 00 – Submittal Procedures and include the following:
 - 1. The Contractor shall retain the services of a Professional Engineer, licensed in the State of Texas and having experience in soils engineering, to design and prepare the trench and excavation plans for all trench and excavations. The plans shall include shoring systems, systems to protect existing utilities, slope stability monitoring and dewatering.
 - 2. Submit a plan for all excavations of a depth 5 feet or greater, with a bottom width less than twice the total depth of the excavation, where an existing structure or utility falls within a 2 horizontal to 1 vertical (2:1) slope from the bottom of the excavation, or where conditions dictate a plan be developed based on the trench and excavation safety engineers analysis.
 - 3. Submit details of any proposed dewatering system including groundwater monitoring wells, slope stability and/or shoring systems to the Owner prior to proceeding with any excavation.

- B. The Contractor should recognize that failure to dewater excavations prior to excavation to adequate levels below required excavation depths will result in a bearing capacity failure at the base of the excavation. If this occurs, the cost of repair of any excavation base failure will be charged to the Contractor. The Contractor must install an adequate number of groundwater monitoring wells in order to verify that adequate dewatering has occurred prior to beginning excavation.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 PROTECTION OF FACILITIES

- A. Before the start of earthwork operations, adequately protect utilities, structures, trees, shrubs, and other permanent objects. Costs resulting from damage to permanent facilities due to negligence or lack of adequate protection will be charged to the Contractor. Excavations near existing structures or utilities must be instrumented to verify no impact to existing facilities.
- B. Provide surface drainage during the period of construction to protect the work and to avoid nuisance to adjoining property.
- C. The Contractor shall conduct his operations in such fashion that trucks and other vehicles do not create a dirt nuisance in the streets. The truck beds shall be sufficiently tight and shall be loaded in such a manner that objectionable materials will not be spilled onto the streets. Any dirt, mud, or other materials that are spilled onto the streets or deposited onto the streets by the tires of vehicles shall be promptly cleared away by the Contractor.

1.8 QUALITY CONTROL

- A. Engineers responsible for the preparation of the Trench and Excavation Plan shall meet the qualifications requirements of Section 01 45 00 - Quality Control.

1.9 TRENCH AND EXCAVATION PLAN

- A. Trench and Excavation Plan: After award, the Contractor shall have a trench and excavation plan prepared. This excavation plan must illustrate proposed trench safety and excavation requirements specifically designed for this project and must be designed, signed, dated and sealed by a Professional Engineer licensed in the State of Texas with professional experience in soil mechanics and design of trench safety systems. The Contractor is responsible for obtaining additional soil borings and soil analysis as required for design. The trench and excavation plan is to be designed in conformance with OSHA standards and other applicable regulations.
- B. A signed, dated, and sealed copy of the trench and excavation plan shall be maintained at the project site for the Contractor's use during construction. In addition, a signed, dated, and sealed copy of the trench and excavation plan shall be maintained at the project site in the Contractor's records. No work in trenches or excavations in excess of five feet deep is to be performed until this plan is prepared and implemented. The Contractor shall not deviate from the trench and excavation plan without written authorization from the engineer who prepared the trench and excavation plan. This written authorization shall be signed, dated, and sealed by the engineer. Any changes in the trench and excavation plan after initiation of construction will not be cause for

extension of time or change order. Contractor accepts sole responsibility for compliance with all applicable safety requirements. The trench and excavation plan does not relieve Contractor from responsibility for any or all construction means, methods, techniques, and procedures. Furthermore the Contractor shall indemnify the Owner and Engineer from any and all claims due to any property damage or bodily injury (including death) that arises from use or misuse of the trench safety and excavation plan, or from Contractor's negligence in performance of the contract work.

1.10 DEFINITION

- A. For the purposes of this project, a trench excavation is any excavation whose bottom width is less than twice the total depth of the excavation.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL

- A. Trench safety system shall be constructed, installed and maintained in accordance with the details shown in the design prepared by the Contractor's licensed Professional Engineer to prevent death or injury to personnel or damage to structures or utilities in or near these trench excavations. Unless otherwise specified elsewhere, materials excavated from trench to be stored no closer to the edge of trench than one-half the depth of the trench.

3.2 SUPERVISION

- A. Contractor shall provide competent supervisory personnel at each trench while work is in progress to ensure Contractor's trench safety methods, procedures, equipment, and materials meet the requirements of OSHA standards and the trench and excavation plan.

3.3 MAINTENANCE OF SAFETY SYSTEM

- A. The safety system shall be maintained in the condition as specified by the Contractor's Trench Safety Engineer. The Contractor shall take all necessary precautions to ensure the safety systems are not damaged during their use. If at any time during its use a safety system is damaged, personnel shall be immediately removed from the trench or excavation area and the safety system repaired. The Contractor shall take all necessary precautions to ensure no loads, except those included in the safety system design, are imposed upon the excavation.

3.4 INSPECTION

- A. Contractor shall make daily inspection of trench safety and excavation system to ensure that the system meets OSHA requirements and the requirements of the Trench and Excavation Plan. Daily inspection is to be made by qualified personnel. If evidence of possible cave-ins, slides or other conditions of concern is apparent, all work in the trench shall cease until necessary precautions have been taken to safeguard personnel entering trench and protect adjacent structures and utilities. Contractor shall maintain permanent record of daily inspections. The Contractor's Trench Safety Engineer shall make periodic site visits (at the start of each new excavation and at least once per week for all

open excavations). Within two (2) days after each visit, the Contractor's Trench Safety Engineer shall make a written report to the Owner certifying that the trench and excavation plan and safety construction practices are being followed. The Contractor's Trench Safety Engineer shall immediately report any unsafe construction practices to the Owner and Contractor.

3.5 REMOVAL

- A. Bed and backfill pipe to a point at least one foot above top of pipe prior to removal of any portion of trench safety system. Bedding and backfill to be in accordance with other applicable specification items. Backfilling and removal of trench supports shall progress together from bottom of trench upward. Remove no braces or trench supports until all personnel have evacuated the trench. Backfill trench to within five feet of natural ground prior to removal of entire trench safety system.

END OF SECTION

SECTION 32 13 13**CONCRETE PAVING AND SIDEWALKS****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements regarding all labor, materials, equipment and incidentals necessary to construct exterior concrete paving and sidewalks, complete and in place, as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 02 30 00 - Subsurface Investigation
- C. Section 03 15 00 - Concrete Accessories
- D. Section 03 30 00 - Cast-in-Place Concrete

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) International:
 - 1. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
 - 2. ASTM A615/615M – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 3. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 - 4. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - 5. ASTM C33 – Standard Specification for Concrete Aggregates
 - 6. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 7. ASTM C94 – Standard Specification for Ready-Mixed Concrete
 - 8. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete
 - 9. ASTM C150 – Standard Specification for Portland Cement
 - 10. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete
 - 11. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
 - 12. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete
 - 13. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

14. ASTM C618 – Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
15. ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars
16. ASTM C1059 – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
17. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
18. ASTM C1077 – Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
19. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
20. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
21. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

B. American Concrete Institute (ACI)

1. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
2. ACI 301 - Specifications for Concrete Construction
3. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete
4. ACI 305R – Guide to Hot Weather Concreting
5. ACI 306.1 – Standard Specification for Cold Weather Concreting
6. ACI 309R – Guide for Consolidation of Concrete

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Plant Certification Program.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 to conduct the testing indicated.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same Manufacturer's plant and each aggregate from one source.

- E. ACI Publications: Comply with ACI301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

1.5 SUBMITTALS

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures.
- B. Product Data: For each type of manufactured material and product indicated.
- C. Design Mixes: Submit concrete mix design in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- D. Material Certificates: Signed by Manufacturers certifying that each of the following materials complies with requirements:
 - 1. Cementitious materials and aggregates
 - 2. Steel reinforcement and reinforcement accessories
 - 3. Admixtures
 - 4. Curing compounds
 - 5. Bonding agent or adhesive
 - 6. Joint fillers
- E. Submit a plan showing the location of pavement joints.

1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.7 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.8 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 – PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Use flexible or curved forms for curves of a radius 100 feet (30.5 m) or less.

- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Fabric: ASTM A185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcement Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- C. Plain Steel Wire: ASTM A1064, as drawn.
- D. Joint Dowel Bars: Plain steel bars, ASTM A615/A615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.
- E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

- A. General: Use the same brand and type of cementitious material from the same Manufacturer throughout the Project.
- B. Portland Cement: ASTM C150, Type I or II.
 - 1. Fly Ash: ASTM C618, Class F or C.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
 - 3. Fly ash can be substituted for pavement and sidewalk concrete. The maximum cement reduction by weight shall not exceed 15%. The fly ash replacement shall be 1.0 pounds per pound of cement reduction.
- C. Aggregate: ASTM C33, uniformly graded, from a single source, with coarse aggregate as follows:
 - 1. Class: 4S.
 - 2. Maximum Aggregate Size: 1-inch (25 mm) nominal.
 - 3. Do not use fine or coarse aggregates containing substances that cause spalling.
- D. Water: ASTM C94.

2.4 ADMIXTURES

- A. General: Admixtures certified by Manufacturer to contain no more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.
- B. Air-Entraining Admixture: ASTM C260.

2.5 CURING MATERIALS

- A. Water: Potable.
- B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- C. White Waterborne Membrane-Forming Curing Compound: ASTM C309, Type 2, Class B.
- D. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Evaporation Retarder:
 - a. Eucobar; Euclid Chemical Co.
 - b. E-Con; L&M Construction Chemicals, Inc.
 - c. SikaFilm; Sika Corporation.
 - 2. White Waterborne Membrane-Forming Curing Compound:
 - a. L&M Cure R-2; L&M Construction Chemicals, Inc.
 - b. 1200-White; W. R. Meadows, Inc.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.7 CONCRETE MIXES

- A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
- B. Proportion mixes to provide concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4,000 psi for pavement and 3,000 psi for sidewalks.
 - 2. Slump Limit: 4 inches (100 mm).
- C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.
- D. Add air-entraining admixture at Manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.

PART 3 – EXECUTION

3.1 SUBGRADE PREPARATION

- A. Scarify subgrade to a depth of 6" below the cleared depth. Adjust moisture content within 0 to 4 percent above optimum moisture content. Compact subgrade within a range of 95 to 100 percent maximum dry density as determined by ASTM D698.
- B. Where P.I. of subgrade materials is 15 or greater, subgrade shall be lime stabilized with hydrated lime at a minimum rate of 6% by weight.
- C. Apply emulsified asphalt SS-1 at 0.25 gallon per square yard if the subgrade is treated with lime.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.4 JOINTS

- A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 3. Provide tie bars at sides of pavement strips where indicated.
 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 20 feet (6.1 m), unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler less than 1/2-inch (12 mm) or more than 1-inch (25 mm) below finished surface if joint sealant is indicated.
 4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
- D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness. Grooved Joints form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces. Radius: 1/4-inch (6 mm). Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch (3 mm) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces. Radius: 1/4-inch (6 mm).

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

- C. Moisten subgrade or subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery, at Project site, or during placement.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.
- I. Cold-Weather Placement: Cold-Weather concreting shall be in accordance with Section 03 30 00-Cast-in-Place Concrete.
- J. Hot-Weather Placement: Hot-Weather concreting shall be in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3.6 CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture. Medium-to-Fine-Textured Broom Finish, draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.

- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to Manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of Curing Compound where compound is applied uniformly in continuous operation by power spray or roller according to Manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/4-inch (6 mm).
 - 2. Thickness: Plus 3/8-inch (9 mm), minus 1/4-inch (6 mm).
 - 3. Surface: Gap below 10 foot (3 m) long, unleveled straightedge not to exceed 1/4-inch (6 mm).
 - 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1-inch (25 mm).
 - 5. Vertical Alignment of Tie Bars and Dowels: 1/4-inch (6 mm).
 - 6. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4-inch per 12 inches (6 mm per 300 mm).
 - 7. Joint Spacing: 3 inches (75 mm).
 - 8. Contraction Joint Depth: Plus 1/4-inch (6 mm), no minus.
 - 9. Joint Width: Plus 1/8-inch (3 mm), no minus.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner or Owner's Designated Agent will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- B. Testing Services: Testing shall be performed according to the following requirements:
 - 1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C172, except modified for slump to comply with ASTM C94.
 - 2. Slump: ASTM C143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

3. Air Content: ASTM C231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
 4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 5. Compression Test Specimens: ASTM C31/C31M; and as specified in Section 03 30 00.
 6. Compressive-Strength Tests: As specified in Section 03 30 00.
- C. Test results shall be reported in writing to engineer, concrete Manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 - D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as the sole basis for approval or rejection.
 - E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed.

3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
- B. Drill test cores where directed by Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 92 19

SEEDING AND SODDING

PART 1 – GENERAL

1.1 SECTION INCLUDES:

- A. Hydromulch seeding will consist of providing all materials, labor and superintendence to install hydromulch seeding complete and in place for all disturbed areas to include but not limited to final grading, topsoil, seedbed preparation, fertilizer, hydromulch with seed to match existing grass, and temporary watering and maintenance until growth standards are met.
- B. Erosion control mats shall be furnished and installed on all slopes 6:1 and greater.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures

1.3 REFERENCES (NOT USED)

1.4 QUALITY ASSURANCE (NOT USED)

1.5 SUBMITTALS

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures.
- B. Shop Drawing: Product labels/data sheets.
- C. Quality Control Submittals:
 - 1. Seed: Certification of seed analysis, germination rate, and inoculation:
 - a. Certify that each lot of seed has been tested by a testing laboratory certified in seed testing, within six (6) months of date of delivery. Include with certification:
 - 1) Name and address of laboratory
 - 2) Date of test
 - 3) Lot number for each seed specified
 - 4) Test results: name, percentages of purity and of germination, and weed content for each kind of seed furnished
 - b. Mixtures: Proportions of each kind of seed
 - 2. Seed Inoculant Certification: Bacteria were prepared specifically for legume species to be inoculated.
- D. Temporary irrigation plan

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

PART 2 – PRODUCTS

2.1 SEED

- A. Permanent Seeding: Seed shall match variety at the site.
- B. Temporary Seeding: If seeding occurs outside of planting season listed below, temporary cold weather seeding will be required.
- C. Fertilizer: A pelleted or granulated fertilizer will be used and applied uniformly at a rate of 50 pounds of Nitrogen per acre (i.e. A 40-pound bag of 20-10-10 fertilizer. Total Nitrogen = pounds in bag $\times$ N/(N+P+K) = 40 pounds $\times$ 20/(20+10+10) = 20 pounds).

2.2 EROSION CONTROL MAT

- A. S75 Turf Reinforcement Mat manufactured by North American Green, Inc.

PART 3 – EXECUTION

3.1 WATERING & FINISHING

- A. After the designated areas have been completed to the lines, grades, and cross-sections shown on the plans and as provided for in other items of this contract, seeding of the type specified shall be performed in accordance with the requirements hereinafter described.
- B. Watering: Seeding areas shall be watered lightly but frequently, at least twice daily, for at least fourteen consecutive days after seeding in a manner so as to prevent washing of the slopes of dislodgment of the seed and to prevent top of soil from drying out. When grass is about 1-inch tall, decrease frequency and increase depth of watering. Water shall be applied to the cultivated areas until a minimum depth of six- inches (6”) is thoroughly moistened. The Contractor shall be responsible for the watering operation until grass has reached a height suitable for mowing or as accepted by the Owner. All materials and labor to provide temporary irrigation shall be the responsibility of the Contractor.
- C. Finishing: When applicable, the shoulders, slopes and ditches shall be smoothed after seed bed preparation has been completed and shaped to conform to the cross-section previously provided and existing at the time planting operations were begun. The Contractor shall immediately repair any seeded areas damaged by erosion. The Contractor in repairing any seeded areas damaged by erosion shall reseed areas which failed to germinate and within the next consecutive specified planting date-range.

3.2 HYDRO-MULCH SEEDING

- A. Seed or seed mixture, in the quantity of 1,500 lbs of hydro-mulch per acre and 1-2 lbs of hulled common Bermuda grass per 1,000 square feet, shall be uniformly distributed over the areas shown on the plans or where directed. Seed and fertilizer are to be applied to that area to be seeded within 30 minutes after all components are placed in the equipment. After hydro-mulching is completed, the planted area shall be watered

sufficiently to assure uniform moisture from the surface to a minimum of six inches (150 mm) in depth.

3.3 EROSION CONTROL MATS

- A. Install erosion control mats on slopes 5:1 or greater in accordance with manufacturer's recommendations.

3.4 GROWTH STANDARDS

- A. Seeding shall provide a dense, virile growth at the end of 60 days after planting. Dense growth shall be defined as 95% coverage of each square yard planted with those areas covered with growth providing 100% coverage. No bald spots larger than 6-inch (6") square will be allowed.

3.5 PLANTING SEASON

- A. The growing season for this project is March 15 to October 15. If the final phase of the project is completed outside of the normal growing season, the growth standard period shall begin on March 15 of the following year. If the full growth standard period cannot be completed prior to October 15, then the remaining number of days for determining growth standards shall commence on March 15 of the following year with the minimum of 30 days being required from March 15. Growth standards will not be evaluated prior to April 15.

END OF SECTION

SECTION 33 01 30.16**TELEVISION INSPECTION OF SEWER PIPELINES****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements and procedures for Closed Circuit Television (CCTV) Inspection of sanitary sewer or storm sewer mains.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 33 01 30.41 – Cleaning of Sewer Mains and Manholes
- C. Section 33 01 30.51 – Bypass Pumping of Existing Sewer Systems

1.3 REFERENCES (NOT USED)**1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS**

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures
- B. All submittals shall be approved by the Engineer or the Authority prior to delivery.
- C. Pre-CCTV submittals for sanitary sewer lines 24 inches and larger, if required
 - 1. Project schedule
 - 2. Listing of cleaning equipment and procedures
 - 3. Listing of flow diversion procedures
 - 4. Catalog of manufacturers' data sheets for television equipment
 - 5. Listing of backup and standby equipment
 - 6. Listing of safety precautions and traffic control measures
 - 7. Certification that staff to be used for the Work are properly trained in confined space entry and hazardous atmospheres
 - 8. Training and inspection plan, seven (7) days prior to manual inspection
 - 9. Confined space entry procedures and required permits
 - 10. Log of cable footage counter calibration checks
 - 11. Listing of actual measured flow depth and times
 - 12. Project-specific Safety Plan.
- D. Post-CCTV submittals
 - 1. 2 copies of CCTV video results on DVD

2. 2 hard copies of Inspection Report

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 PRICE AND PAYMENT PROCEDURES

A. Pre-CCTV Inspection

1. Measurement

- a. Measurement for this Item will be by the linear foot of line televised for CCTV Inspection performed prior to any line modification or replacement determined from the distance recorded on the video tape log.

2. Payment

- a. 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 per linear foot for "Pre-CCTV Inspection".

- 1) Contractor will not be paid for unaccepted video.

3. The price bid shall include:

- a. Mobilization
- b. Cleaning
- c. Documentation

B. Post-CCTV Inspection

1. Measurement

- a. Measurement for this Item will be by the linear foot of line televised for CCTV Inspection performed following repair or installation determined from the distance recorded on the digital media log.

2. Payment

- a. 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 per linear foot for "Post-CCTV Inspection".

- 1) Contractor will not be paid for unaccepted video.

3. The price bid shall include:

- a. Mobilization
- b. Cleaning
- c. Documentation

PART 2 – PRODUCTS [NOT USED]

PART 3 – EXECUTION

3.1 PREPARATION

A. Sanitary Sewer Lines

1. Transport Platform
 - a. Self-propelled, mounted on skid, or mounted on float.
 - b. Sized for each pipe diameter in accordance with manufacturer's recommendations.
 - c. Cables: 1,000 feet long, minimum.
 - d. Equipped with tag line suitable for pulling camera backwards.
 - e. Equipped with winch, power winch, TV cable, powered rewind, or other devices used to move camera through pipe.
 - 1) When powered and controlled winches are used to pull television camera through line, provide telephones, radios, or other means of communication between the two (2) manholes to ensure communications exist between crewmembers.
 - f. Remote Reading Footage Counter:
 - 1) Accuracy: 0.20 foot over length of section being inspected
 - 2) Counter display
 - 3) Marking on cable will not be allowed
 - 4) Calibration: Perform each day prior to setup
 - g. Secure cable, chains, and other devices used with camera so as not to obstruct camera view or otherwise interfere with proper documentation of sewer conditions.
2. Temporary Bypass Pumping – Conform to Section 33 01 30.51
3. Cleaning – Conform to Section 33 01 30.41

3.2 INSPECTION (CCTV)

A. General

1. Begin inspection immediately after cleaning of the main.
2. Move camera through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the main's condition.
3. Do not move camera at a speed greater than 30 feet per minute.
4. Use manual winches, power winches, TV cable, and power rewinds that do not obstruct the camera view, allowing for proper evaluation.
5. During investigation stop camera at each defect along the main.
 - a. Record the nature, location and orientation of the defect or infiltration location as specified in the CCTV Manual.
6. Pan and tilt the camera to provide additional detail at:
 - a. Manholes
 - b. Service connections
 - c. Joints

- d. Visible pipe defects such as cracks, broken or deformed pipe, holes, offset joints, obstructions or debris
 - e. Infiltration/Inflow locations
 - f. Pipe material transitions
 - g. Other locations that do not appear to be typical for normal pipe conditions
 - 7. Provide accurate distance measurement.
 - a. The meter device is to be accurate to the nearest 1/10 foot.
 - 8. CCTV inspections are to be continuous.
 - a. Do not provide a single segment of main on more than 1 DVD.
- B. Pre-Installation Inspection for Sewer Mains to be rehabilitated
 - 1. Perform Pre-CCTV inspection immediately after cleaning of the main and before rehabilitation work.
 - 2. If, during inspection, the CCTV will not pass through the entire section of main due to blockage or pipe defect, set up so the inspection can be performed from the opposite manhole.
- C. Post-Installation Inspection
 - 1. Complete manhole installation before inspection begins.
 - 2. Prior to inserting the camera, flush and clean the main in accordance to Section 33 01 30.41.
- D. Documentation of CCTV Inspection
 - 1. Sanitary Sewer Lines
 - a. Follow the CCTV Manual for the inspection video, data logging and reporting.
 - 2. Storm Sewer Lines
 - a. Follow the CCTV Manual for the inspection video, data logging and reporting.

END OF SECTION

SECTION 33 01 30.41**CLEANING OF SEWERS AND MANHOLES****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Requirements and procedures for cleaning sewer lines and manholes for new or existing wastewater systems.

1.2 RELATED WORK

- A. Section 33 01 30.16 – Television Inspection of Sewer Pipelines

1.3 REFERENCES (NOT USED)**1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS (NOT USED)****1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)****PART 2 – PRODUCTS****2.1 PRODUCT TYPES**

- A. Use only the type of cleaning material which will not create hazards to health or property or affect treatment plant processes.

PART 3 – EXECUTION**3.1 CLEANING****A. General**

1. All materials, equipment, and personnel necessary to complete the cleaning of the sanitary sewer main and manholes must be present on the jobsite prior to isolating the sewer manhole or line segment and beginning the cleaning process.
2. Maintain clean work and surrounding premises within the work limits so as to comply with Federal, State, and local environmental and anti-pollution laws, ordinances, codes, and regulations when cleaning and disposing of waste materials, debris, and rubbish.
3. Keep the work and surrounding premises within work limits free of accumulations of dirt, dust, waste materials, debris, and rubbish.
4. Suitable containers for storage of waste materials, debris, and rubbish shall be provided until time of disposal.
 - a. It is the sole responsibility of the Contractor to secure a licensed legal dump site for the disposal of this material.

- b. Under no circumstances shall sewage or solids removed from the main or manhole be dumped onto streets or into ditches, catch basins, storm drains, or sanitary sewers.
- 5. The cleaning process shall remove all grease, sand, silts, solids, rags, debris, etc. from each sewer segment, including the manhole(s) and junction boxes.
- 6. Selection of cleaning equipment and the method for cleaning shall be based on the condition of the sanitary sewer mains at the time work commences and will be subject to approval by the Owner.
- 7. All cleaning equipment and devices shall be operated by experienced personnel.
- 8. Satisfactory precautions shall be taken to protect the sanitary sewer mains and manholes from damage that might be inflicted by the improper use of the cleaning process or equipment.
- 9. Any damages done to a sewer main and/or structure by the Contractor shall be repaired by the Contractor at no additional cost and to the satisfaction of the Owner.
- 10. Cleaning shall also include the manhole wall and junction box wall washing by high pressure water jet.
- 11. The Contractor may be required to demonstrate the performance capabilities of the cleaning equipment proposed for use on the project.
 - a. If the results obtained by the proposed sanitary sewer cleaning equipment are not satisfactory, the Contractor shall use different equipment and/or attachments, as required, to meet the requirements of the contract documents.
 - b. More than one type of equipment/attachments may be required at a location.
- 12. When hydraulic or high velocity cleaning equipment is used, a suitable sand trap, weir, dam, or suction shall be constructed in the downstream manhole in such a manner that all the solids and debris are trapped for removal.
- 13. Whenever hydraulically-propelled cleaning tools which depend upon water pressure to provide their cleaning force, or any tool which retard the flow of water in the sanitary sewer lines are used, precautions shall be taken to insure that the water pressure created does not cause any damage or flooding to public or private property being served by the manhole section involved.
- 14. Any damage of property, as a result of flooding, shall be the liability and responsibility of the Contractor.
- 15. The flow of wastewater present in the sanitary sewer main shall be utilized to provide necessary fluid for hydraulic cleaning devices whenever possible.
- 16. When additional quantities of water from fire hydrants are necessary to avoid delay in normal working procedures, the water shall be conserved and not used unnecessarily.
 - a. No fire hydrant shall be obstructed or used when there is a fire in the area.
 - b. It is the responsibility of the Contractor to obtain the fire hydrant, water meter and all related charges for the set-up, including the water usage bills from respective water purveyor agency.

- c. All expenses shall be considered incidental to the cleaning of the existing sanitary sewer mains.

B. Methods

1. Hydraulic Cleaning

- a. Hydraulic-propelled devices which require a head of water to operate must utilize a collapsible dam.
- b. The dam must be easily collapsible to prevent damage to the sewer main, property, etc.
- c. When using hydraulically-propelled devices, precautions shall be taken to ensure that the water pressure created does not cause damage or flood public or private property.
- d. Do not increase the hydraulic gradient of the sanitary sewers beyond the elevation that could cause overflow of sewage into area waterways or laterals.
- e. The flow of wastewater present in the sanitary sewer main shall be utilized to provide necessary fluid for hydraulic cleaning devices whenever possible.

2. High-Velocity Cleaning

- a. Cleaning equipment that uses a high velocity water jet for removing debris shall be capable of producing a minimum volume of 50 gpm, with a pressure of 1,500 psi, for the sanitary sewer line and 3,500 psi for the (manhole) structure at the pump.
 - 1) Any variations to this pumping rate must be approved, in advance, by the Owner.
 - 2) To prevent damage to older sewer mains and property, a pressure less than 1500 psi can be used.
 - 3) A working pressure gauge shall be used on the discharge of all high pressure water pumps.
 - 4) For sewers 18 inches and larger in diameter, in addition to conventional nozzles, use a nozzle which directs the cleaning force to the bottom of the pipe.
 - 5) Operate the equipment so that the pressurized nozzle continues to move at all times.
 - 6) The pressurized nozzle shall be turned off or reduced anytime the hose is on hold or delayed in order to prevent damage to the line.

3. Mechanical Cleaning

- a. Mechanical cleaning, in addition to normal cleaning when required, shall be with approved equipment and accessories driven by power winching devices.
- b. Submit the equipment manufacturer's operational manual and guidelines to the Owner, which shall be followed strictly unless modified by the Owner.

- c. All equipment and devices shall be operated by experienced operators so that they do not damage the pipe in the process of cleaning.
- d. Buckets, scrapers, scooters, porcupines, kites, heavy duty brushes, and other debris-removing equipment/accessories shall be used as appropriate and necessary in the field, in conjunction with the approved power machines.
- e. The use of cleaning devices such as rods, metal pigs, porcupines, root saws, snakes, scooters, sewer balls, kites, and other approved equipment, in conjunction with hand winching device, and/or gas, electric rod propelled devices, shall be considered normal cleaning equipment.

END OF SECTION

SECTION 33 01 30.51**BYPASS PUMPING OF EXISTING SEWER SYSTEMS****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. Furnish all materials, labor, equipment, power, maintenance, etc. to implement a temporary pumping system for the purpose of diverting the existing flow around the work area for the duration of the project.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM) International:
 - 1. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
 - 2. ASTM D3035 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
 - 3. ASTM F714 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
 - 4. ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
- B. Occupational Safety and Health Organization (OSHA)

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS**

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittals Procedures.
- B. All submittals shall be approved by the Owner prior to delivery.
- C. Submit a detailed plan and description outlining all provisions and precautions that will be taken with regard to the handling of sewer flows. Submit the plan to the Owner for approval a minimum of 7 days prior to commencing work. Include the following details:
 - 1. Schedule for installation and maintenance of the bypass pumping system
 - 2. Staging areas for pumps
 - 3. Pump sizes, capacity, number of each size, and power requirements
 - 4. Calculations for static lift, friction losses, and velocity
 - 5. Pump curves showing operating range and system head curves

6. Sewer plugging methods
7. Size, length, material, joint type, and method for installation of suction and discharge piping
8. Method of noise control for each pump and/or generator, if required
9. Standby power generator size and location
10. Suction and discharge piping plan
11. Emergency action plan identifying the measures taken in the event of a pump failure or sewer spill
12. Staffing plan for responding to alarm conditions identifying multiple contacts by name and phone numbers (office, mobile)
13. A contingency plan to implement in the event the replacement or rehabilitation has unexpected delays or problems
14. Schematic Map showing route of discharge, discharge locations, areas to be fenced, and where and how discharge piping will be hardened to allow traffic access.
15. Sewer plugging method and types of plugs

D. The Contractor shall employ the services of a vendor who can demonstrate to the Engineer that he specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five (5) references of projects of a similar size and complexity of this project performed by his firm within the past three years.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Schedule meeting with Owner to review sewer shutdown prior to replacing or rehabilitating any facilities.
2. Owner reserves the right to delay schedule due to weather conditions, or other unexpected emergency within the sewer system.
3. Review bypass pumping arrangement or layout in the field with Owner prior to beginning operations. Facilitate preliminary bypass pumping run with Owner staff present to affirm the operation is satisfactory to the Owner.
4. After replacement or rehabilitation of facilities, coordinate the reestablishment of sewer flow with Owner staff.
5. Provide onsite continuous monitoring during all bypass pumping operations using one of the following methods:
 - a. Personnel on site
 - b. Portable SCADA equipment

PART 2 – PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. Pumping

1. Provide equipment that will convey dry-weather flow conditions and 100 percent of wet weather peak flow conditions.
2. Provide fully automatic self-priming pumps. Foot-valves or vacuum pumps are not permitted for priming the system.
3. Pumps must be constructed to allow dry running for periods of time to account for the cyclical nature of sewer flow.
4. Provide 1 stand-by pump for each size to be maintained on site. Place backup pumps on line, isolated from the primary system by valve.
5. If multiple pumps are required to meet the flow requirements, provide the necessary fittings and connections to incorporate multiple discharges.
6. Noise levels of the pumping system must be “Hospital Grade,” or follow the requirements of local noise ordinances for gas wells, whichever is lower.

B. Piping

1. Discharge and Suction Pipes: Approved by Engineer.
 - a. Discharge piping: Determined according to flow calculations and system operating calculations.
 - b. Suction piping: Determined according to pump size, flow calculations, and manhole depth following manufacturer's specifications and recommendations.
2. Polyethylene Plastic Pipe:
 - a. High density solid wall and following ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-DR) based on Outside Diameter, ASTM D1248 and ASTM D3035
 - b. Homogenous throughout, free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.
3. High-Density Polyethylene (HDPE)
 - a. Homogenous throughout, free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.
 - 1) Defective areas of pipe: Cut out and joint fused as stated herein.
 - b. Assembled and joined at site using couplings, flanges or butt-fusion method to provide leak proof joint. Follow manufacturer's instructions and ASTM F2620.
 - 1) Threaded or solvent joints and connections are not permitted.

- c. Fusing: By personnel certified as fusion technicians by manufacturer of HDPE pipe and/or fusing equipment.
 - d. Butt-fused joint: True alignment and uniform roll-back beads resulting from use of proper temperature and pressure.
 - 1) Allow adequate cooling time before removal of pressure.
 - 2) Watertight and have tensile strength equal to that of pipe.
 - 3) Acceptance by Engineer before insertion.
 - 4. Flexible Hoses and Associated Couplings and Connectors.
 - a. Abrasion resistant.
 - b. Suitable for intended service.
 - c. Rated for external and internal loads anticipated, including test pressure.
 - 1) External loading design: Incorporate anticipated traffic loadings, including traffic impact loading.
 - d. When subject to traffic loading, compose system, such as traffic ramps or covers.
 - 1) Install system and maintain H-20 loading requirements while in use or as directed by the Engineer.
 - 5. Valves and Fittings: Determined according to flow calculations, pump sizes previously determined, and system operating pressures.
- C. Plugs or Stop Logs
- 1. Plugs
 - a. Select a plug that is made for the size and potential pressure head that will be experienced.
 - b. Provide an additional anchor, support or bracing to secure plug when back pressure is present.
 - c. Use accurately calibrated air pressure gauges for monitoring the inflation pressure.
 - d. Place inflation gauge at location outside of confined space area. Keep the inflation gauge and valve a safe distance from the plugs.
 - e. Never over inflate the plug beyond its pressure rating.
 - 2. Stop Logs
 - a. Use stop log devices designed for the manhole or sewer vault structure in use.
 - b. If applicable, obtain stop logs from Owner that may be used on specific structures.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Locate the bypass pipelines in area to minimize disturbance to existing utilities and obtain approval of those locations from the Owner.
- B. Make preparations to comply with OSHA requirements when working in the presence of sewer gases, oxygen-deficient atmospheres and confined spaces.
- C. Do not begin bypass preparation and operation until Owner approval of the submittals requested per this Specification.

3.2 INSTALLATION

- A. Install and operate pumping and piping equipment in accordance to the submittals provided per this Specification. Flow diversion materials and equipment must be in place and successfully operating for a period of four hours prior to starting any rehabilitation work requiring flow diversion.
- B. Sewer flow stoppage
 - 1. Plugging
 - a. Use confined space procedures and equipment during installation when necessary.
 - b. Thoroughly clean the pipe before insertion of the plug.
 - c. Insert the plug seal surface completely so it is fully supported by the pipe.
 - d. Position the plug where there are not sharp edges or protrusions that may damage the plug.
 - e. Use pressure gauges for measuring inflation pressures.
 - f. Minimize upstream pressure head before deflating and removing.
- C. Sewer flow control and monitoring
 - 1. Take sufficient precautions to ensure sewer flow operations do not cause flooding or damage to public or private property. The Contractor is responsible for any damage resulting from bypass pumping operations.
 - 2. Begin continual monitoring of the sewer system as soon as the sewer is plugged or blocked. Be prepared to immediately start bypass pumping if needed due to surcharge conditions.
 - 3. Sewer discharge may be into another sewer manhole or appropriate vehicle or container only. Do not discharge sewer into an open environment such as an open channel or earthen holding facility.
 - 4. Do not construct bypass facilities where vehicular traffic may travel over the piping.

- a. Provide details in the suction and discharge piping plan that accommodate both the bypass facilities and traffic without disrupting either service.

3.3 SITE QUALITY CONTROL

- A. Test: The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Owner will be given 24 hours' notice prior to testing.
- B. Inspection: Contractor shall inspect bypass pumping system every two hours to ensure that the system is working correctly.
- C. Maintenance Service: The Contractor shall ensure that the temporary pumping system is properly maintained and a responsible operator shall be on hand at all times when pumps are operating.
- D. Extra Materials:
 1. Spare parts for pumps and piping shall be kept on site as required.
 2. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

3.4 CLOSEOUT ACTIVITIES

- A. Once plugging or blocking is no longer necessary, remove in such a way that permits the sewer flow to slowly return to normal – preventing surge, surcharging and major downstream disturbance.

END OF SECTION

SECTION 33 04 40**DISINFECTION OF POTABLE WATER FACILITIES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required for the disinfection of potable water facilities, complete and in place, as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures

1.3 REFERENCES

- A. American Water Works Association (AWWA)
 - 1. AWWA B300 – Hypochlorites
 - 2. AWWA C651 – Disinfecting Water Mains

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS**

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures and shall include the following:
 - 1. A proposed plan and schedule for water conveyance, cleaning, disinfection and water disposal of disinfected water shall be submitted in writing prior to disinfection procedure and plan for disinfection of potable water facilities.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)**PART 2 – PRODUCTS****2.1 MATERIALS REQUIREMENTS**

- A. All equipment, chemicals for chlorination, temporary valves, bulkheads, or other water control equipment shall be selected and furnished by the Contractor.
- B. Chlorine for disinfection may be in the form of sodium hypochlorite solution or calcium hypochlorite granules.
- C. Sodium hypochlorite and calcium hypochlorite shall be in accordance with the requirements of AWWA B300.

PART 3 – EXECUTION

3.1 GENERAL

- A. Disinfection operations shall be scheduled by the Contractor as late as possible during the contract time period so as to assure the maximum degree of sterility of the facilities at the time the Work is accepted by the Owner.

3.2 PROCEDURES

A. Pipelines:

1. During installation, the interior of all pipes, fittings and other accessories shall be kept as free as possible from dirt and foreign matter at all times. If, in the opinion of the Owner's Representative, the pipe contains dirt or foreign matter that could not be removed during the flushing operation, the interior of the pipe shall be cleaned and swabbed with a bactericidal solution. When pipe laying is not in progress, the open ends of it shall be sealed with watertight plugs. If water has accumulated in the trench, the seal shall remain in place until the trench-water has been removed to such an extent that it will not enter the pipe.
2. After completion of hydrostatic pressure tests and prior to disinfection, the pipeline shall be flushed, as thoroughly as possible with the water pressure and outlets available. If feasible, flushing rate should develop a velocity in the pipeline of at least 2.5 fps. If a velocity of 2.5 fps cannot be achieved, the requirements of Paragraph 3.2.A.1 above shall be rigidly enforced. The minimum quantity of water used for flushing shall be in excess of the storage capacity of the pipeline, to insure that clean water has traversed the entire length of line.
3. After flushing has been completed to the point that apparent dirt and foreign matter have been removed from the pipeline, pipeline shall be disinfected in accordance with AWWA C651 as modified herein.
4. The pipeline shall be disinfected using the Continuous-Feed Method or Slug Method. Minimum chlorine concentration shall be 50 mg/l for Continuous-Feed Method and 100 mg/l for Slug Method.
5. Chlorinated water shall be retained in the pipeline for at least 24 hours for Continuous-Feed Method and 3 hours for Slug Method.
6. After applicable retention period, the heavily chlorinated water shall be flushed from the newly laid pipeline at its extremities until chlorine measurements show that the concentration in the water leaving the pipeline is no higher than that prevailing in the system or is acceptable for domestic use.

3.3 WATER SOURCE

- A. Unless otherwise indicated, water for disinfection will be furnished by the Owner; however, the Contractor shall make necessary provisions for conveying the water from the Owner designated source to the point of use.

3.4 BACTERIOLOGICAL SAMPLING AND TESTING

- A. After final flushing and before the pipeline and structures are placed in service, a sample or samples shall be collected from the end of the line or the structure and shall be tested

for bacteriological quality in accordance with the requirements of the State Department of Health or the appropriate regulatory agency having jurisdiction. For this purpose the pipe or the structure shall be refilled with the fresh potable water and left for a period of 24 hours before any sample is collected. Should the initial disinfection treatment fail to produce satisfactory bacteriological test results, the disinfection procedure shall be repeated until acceptable results are obtained.

- B. The Contractor will perform all sampling for bacteriological tests and will pay for all testing to be performed by Owner selected laboratory. All subsequent testing, should the initial test fail, shall be paid for by the Contractor.

3.5 CONNECTIONS TO EXISTING SYSTEMS

- A. Where connections are to be made to existing potable water and filtered water system, the interior surfaces of all pipe and fittings used in making the connections shall be swabbed or sprayed with a one percent hypochlorite solution before they are installed. Thorough flushing shall be started as soon as the connection is completed and shall be continued until discolored water is eliminated.

3.6 DISPOSAL OF CHLORINATED WATER

- A. Dispose chlorinated water in a manner that will protect the public and publicly used receiving waters from harmful or toxic concentrations of chlorine. Disposal shall be in accordance with Federal, State and local requirements.
- B. Do not allow flow into a waterway without neutralizing disinfectant residual.
- C. Refer to the appendix of AWWA C651 for acceptable neutralization chemicals.

END OF SECTION

SECTION 33 05 05.30**SANITARY SEWER ACCEPTANCE TESTING****PART 1 – GENERAL****1.1 SECTION INCLUDES:**

- A. This section consists of requirements for: vacuum, deflection, low pressure air and hydrostatic testing. Section also consist of requirements for field testing for sanitary sewer (wet wells, lift stations, junction boxes, manholes, gravity sewer, force mains, and vent systems and related piping)

1.2 RELATED WORK

- A. SECTION 01 33 00 – Submittal Procedures

1.3 REFERENCES

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

1. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
2. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
3. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
4. ASTM D3262 - Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe
5. ASTM D3753 - Standard Specification for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Manholes and Wetwells
6. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
7. ASTM F1417 - Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air
8. ASTM F3080 – Standard Practice for Laser Technologies for Measurement of Cross-Sectional Shape of Pipeline and Conduit by Non-Rotating Laser Projector, Infrared Measurement, and CCTV Camera System
9. ASTM F3095 – Standard Practice for Laser Technologies for Direct Measurement of Cross Sectional Shape of Pipeline and Conduit by Rotating Laser Diodes and CCTV Camera System

- B. American Water Works Association (AWWA):

1. C605-13 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings

- C. Texas Commission on Environmental Quality (TCEQ):

1. 30 TAC §217.57 - Testing Requirements for Installation of Gravity Collection System Pipes
 2. 30 TAC §217.58 - Testing Requirements for Manholes
 3. 30 TAC §217.68 - Force Main Testing
- D. PVC Pipe Association:
1. UNI-B-6 - "Recommended Practice for Low-Pressure-Air Testing of Installed Sewer Pipe"
- E. American Concrete Institute (ACI):
1. ACI 350.1 – Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures & Commentary
- 1.4 QUALITY ASSURANCE (NOT USED)
- 1.5 SUBMITTALS
- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures.
 - B. Prepare and submit a test plan for approval. Include testing procedures, methods, equipment, and tentative schedule.
 - C. Submit test results within 10 calendar days after completion.
- 1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

PART 2 – PRODUCTS

2.1 EQUIPMENT

- A. Deflection Testing Equipment
 1. Mandrel
 - a. Mandrels shall be fabricated to meet the sizing and design requirements described in 30 TAC §217.57, except that the maximum allowable deflection shall be 3.0%.
 - b. The mandrel shall be fitted with pulling rings at each end.
 - c. The mandrel shall be stamped or engraved on some segment other than a runner with the nominal pipe/culvert size and mandrel outside diameter.
 2. Laser Profiling
 - a. Laser profiling equipment shall meet the requirements of ASTM F3080 and ASTM F3095.
- B. Low Pressure Air Testing Equipment
 1. Provide the equipment with an air regulator valve or air safety valve set to an internal air pressure in the pipeline that cannot exceed 6 psig.

2. Provide pneumatic plugs that have a sealing length equal to or greater than the circumference of the pipe to be tested.
 3. Provide pneumatic plugs that resist internal test pressures without requiring external bracing or blocking. Test pneumatic plugs by placing plug in each end of length of pipe on ground. Pressurize plugs to 25 psig; then pressurize sealed pipe to 5 psig. Plugs are acceptable when they remain in place against test pressure without external aids.
 4. Provide an air compressor of adequate capacity for charging the system.
 5. Provide pressure gauges that have markings no greater than 1 psig increments.
- C. Infiltration Testing Equipment
1. Calibrated 90-degree V-notch weir.
 2. Pipe plugs.

PART 3 – EXECUTION

3.1 WET WELLS, STORAGE TANKS, LIFT STATIONS AND JUNCTION BOXES

A. Preparation

1. Perform leakage tests after required concrete strength is achieved, after all concrete has cured 28 days minimum, and prior to installing interior or exterior coatings."
2. Perform leakage tests prior to installing equipment or materials within the wet wells and lift stations.
3. Perform leakage tests prior to placing backfill.
4. Provide temporary plugs and blocking for the pipes entering and exiting the structure.
 - a. See Paragraph 3.1.C.3 for additional information.
5. Allow concrete structures to saturate before beginning hydrostatic testing.

B. Qualitative Test Application

1. Concurrent with the quantitative test below, perform a qualitative leakage test per the requirements of ACI 350.1, Section 2 – Hydrostatic Tightness Test for Open or Covered Containment Structures, Section 2.3.2.
2. During the 3-day test, the exterior surfaces of the containment structure shall be observed twice a day, preferably in the early morning and late afternoons. If any water or dampness is observed on the exterior surface (moisture can be picked up on a dry hand), the containment structure shall be considered to have failed the leakage test. Document the failed areas.
3. If the structure fails the leakage test, completely drain the structure and develop a repair plan for all leaks to be reviewed and accepted by the Engineer. Upon acceptance of the repair plan, repairs all leaks and repeat the test.
4. The qualitative test shall be repeated until the structure passes the test. All testing and repairs shall be conducted at no additional cost to the Owner.

C. Quantitative Test Application

1. Determine the evaporation allowance for loss of water.
 - a. Use a standard circular pan procedure established by the U.S. Weather Bureau to measure evaporation rate.
 - b. Calculate evaporation allowance by multiplying the evaporation rate in gallons per 24 hours per square foot of surface by the open surface area of the water in the basin.
2. Calculate the allowable leakage for the basin. Allowable leakage is calculated as 0.03 gallons per square foot of concrete area in contact with the water per 24 hours.
 - a. Fill the structure to the overflow level with water at a rate not to exceed 2 feet per hour.
 - b. Allow the basins to set for three (3) days.
 - c. Observe the perimeter of the basin and identify all leaks.
 - d. Repair basin walls and floors where leaks have been identified.
 - e. Mark the water level at the basin wall. Measure the fall in water level over a 24-hour period to the nearest 1/8" at least twice a day to determine the quantity of water lost. Provide a stilling well for measurement if required to allow accurate measurement.
 - f. Calculate the amount of water lost during this time period.
 - g. Compare the amount of water lost to the allowable loss.
3. If plugs on large diameter pipe cannot be completely sealed, the Contractor may request a variance to use infiltration testing to visually inspect for leaks. The Contractor shall submit the request for variance to the Engineer and Owner, who will then forward the request to the Texas Commission on Environmental Quality (TCEQ) for approval.

D. Field Quality Control

1. In the event that the basins fail to pass the test, drain the basin, repair the leaks, re-fill, and re-test the basin.
2. Repeat tests until the basin passes the test.
3. The Owner may request the Contractor to repeat the test at any time during the one (1) year warranty period if subsequent leaks are discovered.

3.2 MANHOLES

- A. Perform Vacuum Testing as described in Paragraph 3.6 or Hydrostatic Testing as described in Paragraph 3.7.

3.3 GRAVITY SEWERS

- A. Perform Deflection Testing as described in Paragraph 3.8.
- B. Perform Low Pressure Air Testing as described in Paragraph 3.9 or Infiltration/Exfiltration testing as described in Paragraph 3.10.

1. Testing Methods

- a. For pipes up to 33 inches in diameter, low pressure air testing must be used.
- b. For pipes greater than 33 inches in diameter, testing may be done either by using a Low Pressure Air Test or an Infiltration/Exfiltration Test. For a Low Pressure Air Test, the Contractor shall submit a request for variance to the Engineer and Owner, who will then forward the request to the Texas Commission on Environmental Quality (TCEQ) for approval.

- 3.4 FORCE MAINS

- A. Perform Deflection Testing as described in Paragraph 3.8.
- B. Perform Pressure and Leakage tests as described in AWWA C605 and 30 TAC §217.68.

- 3.5 VENT SYSTEMS AND RELATED PIPING

- A. Preparation
 1. Perform leakage tests both prior to and after placing backfill.
 2. Provide temporary plugs and blocking for the pipes.
- B. Application
 1. Fill piping with water to the level of the highest vent stack.
 2. Allow the water to sit for at least 30 minutes.
 3. There shall be no drop in water level.
- C. Field Quality Control
 1. In the event that the piping fails to pass the test, drain the piping, repair the leaks, re-fill, and re-test the piping.
 2. Repeat tests until the piping passes the test.

- 3.6 VACUUM TESTING (MANHOLES)

- A. Preparation
 1. Manholes must be tested prior to backfill, and after placing both backfill and manhole ring.
 2. Manholes must be tested independently of the connecting pipes.
 3. Thoroughly clean manholes with high-pressure water and remove any debris prior to testing.
- B. Application
 1. Perform vacuum tests on concrete manholes in accordance with ASTM C1244 and 30 TAC §217.58.
 2. Perform vacuum tests on fiberglass and PVC manholes in accordance with ASTM D3753 and 30 TAC §217.58.
- C. Field Quality Control

1. Should the manhole fail to pass the test, the Contractor may choose to re-test the manhole using either the vacuum or hydrostatic test method.
2. Should the manhole fail to pass a second test, the manhole shall be examined both internally and externally for damage. If the manhole is undamaged, it may be reinstalled and retested. If the manhole is damaged, the manhole shall be removed and replaced.

3.7 HYDROSTATIC TESTING (MANHOLES)

A. Preparation

1. Manholes must be tested prior to backfill, and after placing both backfill and manhole ring.
2. Manholes must be tested independently of the connecting pipes.
3. Thoroughly clean manholes with high-pressure water and remove any debris prior to testing.

B. Application

1. Perform hydrostatic tests on manholes in accordance with 30 TAC §217.58.

C. Field Quality Control

1. Should the manhole fail to pass the test, The Contractor may choose to re-test the manhole using either the vacuum or hydrostatic test method.
2. Should the manhole fail to pass a second test, the manhole shall be examined both internally and externally for damage. If the manhole is undamaged, it may be reinstalled and retested. If the manhole is damaged, the manhole shall be removed and replaced.

3.8 DEFLECTION TESTING (PIPE)

A. Preparation

1. Testing shall be performed only after the final backfill has been in place for at least 30 days.
2. For paved areas, permanent pavement is not required to be in place prior to Testing. Temporary pavement may be placed in lieu of permanent pavement.
3. Thoroughly clean the inside of the pipe and inspect for offset and obstructions prior to testing.

B. Application

1. Testing Methods

- a. For pipes up to 27 inches in diameter, deflection testing must be done using a Mandrel.
- b. For pipes greater than 27 inches in diameter, deflection testing may be done either by using a Mandrel or Multi Sensor Inspection. For Multi Sensor Inspection, the Contractor shall submit a request for variance to the Engineer

and Owner, who will then forward the request to the Texas Commission on Environmental Quality (TCEQ) for approval.

2. Mandrel

- a. Perform deflection tests on pipe in accordance with ASTM D3034, ASTM D3262, ASTM F679 and AWWA C605. The owner may choose not to require a deflection test for rigid and semi-rigid pipe.
- b. The mandrel shall be pulled through the pipe or culvert by hand with a rope or cable. Where applicable, pulleys may be incorporated into the system to change the direction of pull so that inspection personnel need not physically enter the pipe, culvert or manhole.
- c. The maximum allowable deflection of pipe measured as the reduction in vertical inside diameter is 3.0% unless specified otherwise.

3. Laser Profiling

- a. Perform deflection tests on pipe in accordance with ASTM F3080 and ASTM F3095. The Owner may choose not to require a deflection test for rigid and semi-rigid pipe.
- b. Provide test results in an electronic format that can be viewed on desktop Microsoft software (Word, Windows Media Player, etc.).
- c. The maximum allowable deflection of pipe measured as the reduction in vertical inside diameter is 3.0% unless specified otherwise.

C. Field Quality Control

1. Should the mandrel fail to pass through the pipe, or should laser profiling results show a failing number, the pipe shall be considered overdeflected.
2. The over-deflected pipe may be uncovered and examined for damage. If the pipe is undamaged, it may be recovered and retested. If the pipe is damaged, or if the pipe fails the second test, the pipe shall be removed and replaced.

3.9 LOW PRESSURE AIR TESTING (PIPE)

A. Preparation

1. Pipe backfill must be in place for a minimum of 30 days prior to testing.
2. Pipes must be tested independently of the connecting manholes and structures.
3. Thoroughly clean the inside of the pipe and inspect for offset and obstructions prior to testing.

B. Application

Perform air tests on gravity pipe in accordance with ASTM F1417, 30 TAC §217.57 and UNI-B-06.

1. For air tests on individual pipe joints for pipes 36" and larger, the maximum allowable time for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge is 10 seconds for all pipe sizes.
2. Pass air through a single control panel.

3. Check connections for leakage with a soap solution. If leaks are found, release the air pressure, repair the leak, and retest with soap solution until results are satisfactory, before resuming air test.

C. Field Quality Control

1. Should the pipe fail to pass the test, the Contractor shall make repairs and re-test the pipe until passing.

3.10 INFILTRATION/EXFILTRATION TESTING (PIPE)

A. Preparation

1. Pipe backfill must be in place for a minimum of 30 days prior to testing.
2. Pipes must be tested independently of the connecting manholes and structures.
3. Thoroughly clean the inside of the pipe and inspect for offset and obstructions prior to testing.

B. Perform Application

1. hydrostatic pressure and leakage tests using methods, and per performance requirements of 30 TAC §217.57.
2. Duration of pressure test shall be at least 24 hours.
3. The total exfiltration, as determined by hydrostatic head test, shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours at minimum test head of 2 feet above crown of pipe at upstream manhole or 2 feet above groundwater elevation, whichever is greater.
4. When pipes are installed more than 2 feet below groundwater level, use infiltration test in lieu of exfiltration test. Total infiltration shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours. Groundwater elevation must be at least 2 feet above crown of pipe at upstream manhole.

C. Field Quality Control

1. Should the pipe fail to pass the test, the Contractor shall make repairs and re-test the pipe until passing.

END OF SECTION

SECTION 33 05 31.11**SOLID WALL POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required for the installation of Solid Wall Polyvinyl Chloride (PVC) Gravity Sewer Pipe and associated appurtenances with gasketed push-on joints for gravity sewer services, completed and in place, as shown on the Drawings, and as specified herein.

1.2 RELATED WORK

- 1. Division 01 – General Requirements
- 2. Section 01 33 00 – Submittal Procedures
- 3. Section 01 66 00 – Product Storage and Handling Requirements
- 4. Section 33 05 05.30 – Sanitary Acceptance Testing

1.3 REFERENCES**A. ASTM International (ASTM)**

- 1. ASTM D1784 - Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) - Compounds
- 2. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
- 3. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- 4. ASTM D3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- 5. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- 6. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
- 7. ASTM F1336 - Standard Specification for PolyVinyl Chloride (PVC) Gasketed Sewer Fittings.

B. American Water Works Association (AWWA)

- 1. AWWA C605-13 - Underground Installation of Polyvinyl Chloride (PVC) And Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings
- 2. AWWA M23 - PVC Pipe – Design and Installation

1.4 QUALITY ASSURANCE (NOT USED)

1.5 SUBMITTALS

- A. General: Submittals shall be furnished in accordance with the requirements of Division 01 – General Requirements, Section 01 33 00 – Submittal Procedures, and as specified herein.
- B. Product Data
 - 1. Manufacturer
 - 2. Manufacturer Number (identifies factory, location, and date manufactured)
 - 3. Nominal Diameter
 - 4. Beam load
 - 5. Laying lengths and schedules
 - 6. ASTM designation
- C. Shop Drawings
 - 1. Pipe details
 - 2. Joint details, including maximum interior joint gap opening, in the deflected position and in straight alignment
 - 3. Miscellaneous items to be furnished and fabricated for the pipe
 - 4. Dimensions
 - 5. Tolerances
 - 6. Wall thickness
 - 7. Properties and strengths
 - 8. Gasket type and composition showing ability to withstand the chemicals and conditions within sanitary sewers
 - 9. Connections to all proposed structures including water stop
 - 10. Pipe calculations
 - a. Calculations signed and sealed by a Professional Engineer licensed in the State of Texas confirming the pipe will handle anticipated loading.
- D. Certificates
 - 1. Furnish an affidavit certifying that all PVC Pipe meets the provisions of this Section and has been tested and meets the requirements of ASTM F679 or ASTM D3034.
 - 2. Pipe fabricator shall provide a certification that all elastomeric gasket materials furnished under this section are suitable for use with domestic sewage.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery, Storage, and Handling shall be in accordance with Section 01 66 00 – Product Storage and Handling Requirements and AWWA M23 as well as the manufacturer's guidelines.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. PVC pipe and fittings shall be from a single manufacturer.
- B. The manufacturer shall provide evidence of 10 years of successful pipe fabrication, as well as 5 completed projects of similar diameter pipe within the past 5 years.

2.2 MANUFACTURED UNITS

A. Pipe

1. Pipe shall be rigid, unplasticized polyvinyl chloride (PVC) made of PVC plastic having a cell classification of 12454 or 12364 as described in ASTM D1784.
2. Provide pipe meeting or exceeding the following requirements:
 - a. 18-60 inches in diameter: ASTM F679, Solid Wall Pipe, PS 46 and PS 75 (up to 15 feet of cover) and PS 115 (greater than 15 feet of cover).
 - b. 4-15 inches in diameter: ASTM D3034, SDR - 26

B. Joints

1. Jointing systems shall consist of an elastomeric gasket joint meeting requirements of ASTM D3212.
 - a. Gaskets shall conform to ASTM F477, synthetic rubber. Natural rubber shall not be accepted.
 - b. Gaskets shall be supplied by the pipe manufacturer, but installed in the field.
 - c. Lubricant shall be as recommended by the manufacturer.

C. Fittings

1. Fittings shall meet the requirements of ASTM D3034 (4-Inch to 15-Inch) or ASTM F679 (18-Inch to 60-Inch). Molded and fabricated fittings shall meet the requirements of ASTM F1336.
2. Fittings shall be made of PVC compound having a cell classification of 12454 or 13343 in accordance with ASTM D1784.
3. Fabricated fittings shall have a wall thickness equal to or greater than the wall thickness of the pipes to which the fitting (or that part of the fitting) will be joined.
4. Molded and fabricated fittings shall have markings including:
 - a. Manufacturer's name or trademark
 - b. Nominal size
 - c. Material designation (e.g. "PVC")

d. ASTM Designation

D. Cleanouts

1. The cleanout wye shall be a combination wye and 1/8th bend as manufactured by Tyler Corporation or approved equal.
2. The cleanout frame and cover shall be Bass and Hayes Model 404 with bolt on lid or approved equal.

2.3 SOURCE QUALITY CONTROL

- A. The quality of all materials, the process of manufacture, and finished pipe shall be subject to the inspection and approval by the Owner. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements even though some sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the site.
- B. Pipe manufacturer shall perform an analysis checking for possible flotation for water depths above the top of pipe of 2, 4, 6, 8, 10 and 12 feet.
- C. Contractor shall require the manufacturer to mark the date of extrusion on the pipe. This shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.
- D. Identify each length of pipe clearly at intervals of 5 feet or less with the following:
 1. Manufacturer's name and trademark
 2. ASTM designation
 3. Nominal size of pipe
 4. Polymer cell classification
 5. Stiffness
 6. Insertion depth mark on the spigot end

PART 3 – EXECUTION

3.1 INSTALLATION

A. Pipe

1. Inspect pipe prior to installation. Damaged pipe shall not be installed. Field repair of damaged pipe shall not be allowed.
2. Install pipe and fittings in accordance with ASTM D2321 and AWWA C605-13, as recommended by the manufacturer and as specified in Division 33 – Utilities
3. Pipe shall not be laid in water.
4. Pipe shall not be laid in unsuitable weather or trench conditions.

5. Pipe shall be laid with bell ends facing the direction of laying except when making closures.
6. Pipe shall be laid with uniform bearing under the full barrel of the pipe.
7. Pipe shall be laid to line and grade as shown on the Drawings.

B. Embedment

1. Pipe shall be protected from lateral displacement.
2. Pipe embedment material shall be installed as shown in the drawings.
3. First lift of embedment shall not exceed 12 inches in depth and shall be hand tamped to provide proper compaction and pipe support.
4. Additional lifts of embedment shall not exceed 18 inches in depth and shall be roller compacted. Hand tamping on additional lifts shall not be allowed.

C. Gaskets

1. Install in conformance with the pipe manufacturer's recommendations

3.2 FIELD QUALITY CONTROL

A. Infiltration and Exfiltration:

1. Infiltration and Exfiltration testing shall be performed in accordance with Division 33 – Utilities.
2. Perform tests only during presence of the Owner or his authorized representative.
3. Locate and repair defective joints or pipes at no cost to Owner.

B. Deflection:

1. Test each section of pipe after backfill placement and compaction for deflection as specified in Section 33 05 05.30 – Sanitary Sewer Acceptance Testing.
2. Pipe with deflection exceeding 3.0% of the inside diameter shall have backfill removed and replaced to provide a deflection of less than 3.0%. Inspect pipe prior to replacement of backfill.

END OF SECTION

SECTION 33 05 31.16**POLYVINYL CHLORIDE PRESSURE PIPE FOR WATER****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required to install Polyvinyl Chloride (PVC) pressure pipe and associated appurtenances, complete and in place, as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 31 23 33 – Trenching, Backfilling, Embedment and Encasement
- C. Section 40 80 05 – Field Testing of Piping Systems

1.3 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI A21.11 – American National Standard Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 - 2. ANSI A21.53 – American National Standard for Ductile-Iron Compact Fittings for Water Service
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM A536 – Standard Specifications for Ductile Iron Castings
 - 2. ASTM D1784 – Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
 - 3. ASTM D2241 – Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
 - 4. ASTM D3139 – Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
- C. American Water Works Association (AWWA)
 - 1. AWWA C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 - 2. AWWA C153 – Ductile-Iron Compact Fittings
 - 3. AWWA C600 – Installation of Ductile-Iron Mains and Their Appurtenances
 - 4. AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings
 - 5. AWWA C651 – Disinfecting Water Mains
 - 6. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm)

1.4 QUALITY ASSURANCE

- A. All pipe and fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the material to be furnished.

1.5 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of Section 01 33 00 - Submittal Procedures, and shall include:
 - 1. Certified Test Reports from the Manufacturer's testing facility or an approved testing laboratory.
 - 2. Shop Drawing including the following information:
 - a. Manufacturer
 - b. Dimension Ratio
 - c. Joint types
 - d. Gaskets material
 - e. Means of restraint
 - f. Manufacturer's recommendation for maximum deflection joint angle and minimum longitudinal bending radius
 - g. Thrust restraint lengths and lay schedule as Shop Drawing. Lay schedule shall include the following
 - 1) Pipe class
 - 2) Joint type
 - 3) Fittings
 - 4) Stationing
 - 5) Transitions
 - 6) Joint deflection
- B. Submit proposed methods, equipment, materials, and sequence of operation for force main construction. Plan operations to minimize disruption of utilities to occupied facilities or adjacent property.
- C. Submit shop drawings showing design of new pipe, fittings, and joint restraint systems indicating alignment and grade, laying dimensions, fabrication, fittings flanges, and special details.
- D. Contractor to review and submit PVC pipe manufacturers recommended installation procedures.
- E. Calculations and limits of thrust restraint shall be based on AWWA M23, latest edition.
- F. Submit qualifications, proposed methods, equipment, materials, and sequence for acceptance testing of pipeline.
- G. Submit test reports as specified in Part 3 of this Section.

1.6 DELIVERY, STORAGE AND HANDLING

- A. PVC items deteriorate in sunlight and are slightly brittle, especially at lower temperatures, so care shall be taken in loading, transporting and unloading PVC items to prevent injury to the PVC items.
- B. Pipe and fittings shall be stored in a manner which will keep them at ambient outdoor temperatures and out of the sunlight. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature buildup or direct or indirect sunlight will not be permitted.
- C. Inspection of Material at Delivery Point:
 - 1. When delivered to the site, and prior to unloading, the CONTRACTOR shall inspect all pipe, valves, valve boxes and meters, and accessories for loss, damage or lack of specified identification and markings.
 - 2. Any defective or improper material shall be immediately marked and shall not be unloaded. Defective or improper material shall not be considered for payment as “material stored on or at the site”.
- D. Handling: In shipping, storing and installing pipe, valves and accessories shall be kept in a sound, undamaged condition. They shall, at all time, be handled with care and shall not be dropped, dumped or bumped against any other object. Any material(s) damaged shall be marked and immediately removed from the job site.
- E. Storing:
 - 1. Pipe shall be stored off the ground on sticking or pallets. Pipe shall be stacked with spigot ends projecting from the stack in opposite directions for alternate rows.
 - 2. Pipe and fittings shall be stored in a manner which will keep them at ambient outdoor temperatures and out of the sunlight.
 - 3. Valves, meter boxes, couplings, fittings, etc. shall be kept clean and dry.
- F. Defective Materials: All materials found at any time during the progress of the work to have cracks, flaws, or other defects will be rejected and marked and the Contractor shall promptly remove such defective material from the work site.
- G. If any defective item is discovered after it has been installed, it shall be removed and replaced with an exact replacement item in a satisfactory manner by the Contractor, at the Contractor's own expense. All pipe and fittings shall be thoroughly cleaned before installation and the interior shall be kept clean until testing
- H. Any gouges or scratches that extend 10 percent or more into the pipe wall shall be cause for rejection of that pipe. The undamaged portion may cut off and used. Rejected materials shall be clearly marked as rejected, segregated and removed from the site.

PART 2 – PRODUCTS

2.1 FORCE MAINS

- A. Plastic Water Pipe (Push-On Joints): Plastic pipe shall be Polyvinyl Chloride (PVC) conforming to ASTM D1784, ASTM D2241 and/or AWWA C900 as applicable, latest

revisions, with integral bell push-on gasketed joint conforming to ASTM D3139. PVC water mains shall be blue in color. The requirements for the specific type of plastic pipe to be used under this project shall be as given below unless otherwise noted on the Drawings.

4" thru 12" - PVC - DR 18 (DIPS O.D./AWWA C-900)

The pipe shall have an integral bell, rubber gasket joint and shall be capable of direct tapping. The PVC pipe shall be approved by the National Sanitation Foundation for potable water pipe and said stamp be inclusive on the pipe furnished along with the nominal size O.D., pressure class, dimensional ratio.

2.2 DUCTILE IRON FITTINGS (UNDERGROUND)

- A. Fittings for PVC Pipe: Fittings that are three (3) inches in diameter or larger shall be mechanical joint S.S.B., unless otherwise shown on the Drawings, and shall be made of ductile cast iron with a pressure rating of 350 psi, and cement lined and asphalt coated. All fittings shall meet or exceed ANSI A21.53 /AWWA C153 and ANSI A21.11 /AWWA C111 specifications and shall be manufactured by Tyler Union or approved equal. All follower glands shall be mechanical joint restraint devices as specified under "Mechanical Joint Restraint Devices" of these Specifications. Fittings two (2) inches and smaller, unless otherwise shown on the Drawings, shall be PVC (DR 21) gasketed fittings manufactured by the Harco Fittings, LLC of Lychburg, Virginia, Spears Manufacturing Company of Sylmar, California, or approved equal. Ductile cast iron fittings shall be wrapped in polyethylene wrap as specified herein.
- B. Bolts and Nuts for Mechanical Joint Fittings: Bolts and nuts for mechanical joints shall consist of cor-ten steel.

2.3 NON-CORROSIVE METALLIC WIRE

- A. A non-corrosive metallic wire installed over PVC pipe for detection purposes shall be copper wire, type TW, A.W.G. #12 gauge solid. Wire splices shall be made using a direct bury splice kit.

2.4 WIRE SPLICE KITS

- A. A wire splice shall be Direct Bury Splice Kit as manufactured by 3M or approved equal.

2.5 JOINT RESTRAINTS FOR PVC PIPE

- A. Thrust Restraint: Thrust restraint devices shall be Mega-lug or approved equal and shall be factory tested and pressure rated in accordance with ASTM F1674.
 - 1. Joint restraint devices shall be designed specifically for use with PVC pipe of the joint type and pressure rating specified.
 - 2. Restrained joints shall be used for a sufficient distance from each bend, tee, plug, valve, or other fitting to resist thrust which will be developed at the design pressure of the pipe. For the purposes of thrust restraint, working pressure shall be 30 psi, design pressure shall be the pipe pressure class indicated below.

Pipe Size	Application	Pressure Class
4"	Plant Water	235 psi

3. The length of pipe with restrained joints to resist thrust forces shall be the sole responsibility of Contractor and determined by the Pipe Manufacturer using the following parameters:
 - a. Laying condition equal to AWWA C605 Type 3 bedding.
 - b. No thrust restraint contribution shall be allowed for pipe in casing.
 - c. Soil density = 100 pcf

2.6 MECHANICAL JOINT RESTRAINT DEVICES

- A. Mechanical joint restraint devices shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI A21.11 and ANSI A21.53 of the latest revisions. Twist-off nuts shall be used to ensure proper actuating of the restraining devices. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG or approved equal.

2.7 TIE LUGS

- A. Tie lugs shall be used for the restraint of mechanical joints. Tie lugs shall be installed between the mechanical joint bell and follower gland. Tie lugs shall be cast from ductile iron with a tensile strength of 80,000 psi and a yield strength of 60,000 psi. Tie lugs shall be used to anchor all thread rods which shall, in turn, extend laterally to span across the mechanical joints to be restrained.

2.8 PIPELINE MARKERS

- A. Blue Carsonite Utility Marker - 375 (66" long) with CW-112 or CW-I 16 and P101 (custom) decals as distributed by Jim Cox Sales (1-800-838-7377) or Approved Equal. The P-101 decal shall have the Owner's contact information (Name and Phone Number) inscribed on its face.

PART 3 – EXECUTION

3.1 GENERAL

- A. All pipe and associated appurtenances shall be installed as indicated on the drawings. Any deviations must be approved by the Engineer before installation.

3.2 PIPE BEDDING CONDITIONS

- A. All pipes and associated appurtenances laid in open trench excavations shall be uniformly supported over their full length on beddings of the types specified, if any, as shown on the drawings. Flat-bottomed trenches shall be excavated and dewatered prior to preparing the specified foundations. All work shall be performed in a dry trench. Where pipe bedding conditions of a higher type than those shown on the drawings or than those called for in the specifications are ordered as a result of the contractor's method of operation, the contractor shall be due no additional compensation.

3.3 INSPECTION OF PIPE BEFORE INSTALLATION

- A. All pipe, fittings and related items shall be carefully inspected in the field before lowering in the trench. Cracked, broken, warped, out of round or otherwise defective pipe, fittings, or other related items, as determined by the contractor or the engineer, shall be pulled and not installed. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the contractor at his own expense.

3.4 INSTALLATION OF WATER PIPE AND FITTINGS

- A. All pipe and fittings shall be installed in strict accordance with the manufacturer's recommendations with excavation and backfill in accordance with Section 31 23 33 – Trenching, Backfilling, Embedment and Encasement.
- B. PVC water main installation shall conform to AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
- C. Joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe and the joint surfaces cleaned and an approved lubricant applied in accordance with the manufacturer's recommendations. The plain end of the pipe to be installed shall then be inserted into the bell of the pipe to which it is to be joined and when in alignment pushed home with a come-along or by other means. Check that the reference mark on the spigot end is flush with the end of the bell.
- D. Mechanical joints at valves, fittings and where designated shall be in accordance with the AWWA C111 and the instructions of the manufacturer. Suitable PVC to cast iron adaptors shall be installed prior to installing fittings. PVC beveled spigot shall be cut flush prior to insertion in mechanical joint pipe. To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening the bolts. Bolts shall be tight to the specified torques. Under no condition shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.
- E. When installation is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved during installation. The deflection at joints shall not exceed that recommended by manufacturer. Fittings, in addition to those shown on the Drawings, shall be provided, if required, in crossing utilities that may be encountered upon opening the trench.

- F. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end and a reference mark made at the same distance from the pipe end as measured from a factory marked end from the same manufacturer.

- G. Restrained joints shall be installed where shown on the Drawings.

3.5 PIPE LAYING

- A. Every precaution shall be taken to prevent foreign material from entering water pipe while it is being placed in the trench. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a water tight plug or other means approved by the engineer. If water is in the trench, the seal shall remain in place until the trench is pumped enough to resume laying operations. No pipe shall be laid in water or when, in the opinion of the engineer, trench conditions are unsuitable.

3.6 DEPTH OF COVER

- A. PVC piping shall be laid with the Depth of Cover as indicated in the Drawings.

3.7 INSTALLATION OF POLYETHYLENE WRAP

- A. All underground ductile iron pipe, fittings and valves shall be encased with a polyethylene wrap. The wrap shall be installed in accordance with the manufacturer's recommendations and AWWA C600. The wrap shall be secured to the pipe, fittings, etc. with polyethylene compatible adhesive tape. All rips, tears or other damage shall be repaired with the adhesive tape.

3.8 INSTALLATION OF NON-CORROSIVE METALLIC WIRE

- A. The contractor shall install a non-corrosive metallic wire directly over and on the center of all plastic water lines. This wire shall be carried through with the line in locations where short sections of ductile pipe is used. The wire shall be continuous on all mains and service lines and shall be connected to all fixtures and appurtenances. The locator wire shall be attached to the water mains and service lines with duct tape at eight (8) foot intervals. The wire shall be connected to all valves and shall be brought up near all valve boxes and attached to an 18" x 5/8" smooth steel dowel with a metal clamp.

3.9 INSTALLATION OF WIRE SPLICE KIT

- A. Splice caps as specified shall be installed over wire splices then be folded adjacent to the wire run and wrapped tightly with electrical tape as shown on the drawings.

3.10 NON-CORROSIVE METALLIC WIRE TESTING

- A. Upon completion of all pipe installation, the contractor shall demonstrate that the wire is continuous and unbroken through the entire run of the pipe. Demonstration shall include full signal conductivity (including splices) when energizing for the entire run in the presence of the owner or engineer. If the wire is broken, the contractor shall repair or replace it. Pipeline installation will not be accepted until the wire passes this test.

3.11 INSTALLATION OF CONCRETE THRUST BLOCKING

- A. Concrete thrust blocking on water mains shall be provided at all tees, bends, dead ends, valves and other such appurtenances as indicated on the standard detail sheet of the drawings.

3.12 FIELD HYDROSTATIC AND LEAKAGE TESTS:

- A. After installation, the pipe shall be tested for compliance as specified herein. Furnish all necessary equipment and labor for the hydrostatic pressure test on the pipelines.
- B. Procedures for Hydrostatic Pressure and Leakage Tests:
 - 1. Hydrostatic Pressure and Leakage Tests shall be made in accordance with the requirements of Section 40 80 05 – Field Testing of Piping Systems.

3.13 DISINFECTION TEST, SAMPLING TAP, AND TEMPORARY LINE FLUSHING ASSEMBLY CHLORINATION

- A. General:
 - 1. The disinfection of water mains and appurtenances shall conform to the requirements of AWWA C651 – Disinfecting Water Mains, except as modified herein.
 - 2. The OWNER shall collect the bacteriological samples. The CONTRACTOR shall assist in the collection of samples from the completed system by providing acceptable sampling taps and temporary line flushing assemblies, as required, and suitable for satisfactory chlorination and flushing of the new line.
 - 3. Temporary line flushing assemblies shall be adequately sized to allow flushing of the main at a velocity of no less than 3 feet per second.
 - 4. The CONTRACTOR will be responsible for the successful disinfection of all water mains.
- B. Disinfection Procedures: Disinfection shall be accomplished in conformance with the following:
 - 1. Preliminary Flushing: The main shall be flushed, prior to chlorination, as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the pressure test has been made. It must be understood that flushing removes only lighter solids and cannot be relied upon to remove heavy material allowed to get into the main during laying. If no hydrant is installed at the end of the main, a tap should be provided large enough to develop a velocity in the main of at least 3 fps.
 - 2. Form of Applied Chlorine: Any of the following methods of procedure (arranged in order of preference) shall be followed, subject to the approval of the ENGINEER:
 - a. Liquid chlorine gas-water mixture
 - b. Direct chlorine feed
 - c. Calcium or sodium hypochlorite and water mixture

3. **Liquid Chlorine:** A chlorine mixture shall be applied by means of a solution-feed chlorinating device in combination with a booster pump for injecting the chlorine-gas water mixture into the main to be disinfected. Chlorinating devices for feeding solutions of the chlorine gas or the gas itself must provide means for preventing the backflow of water into the chlorine cylinder. Liquid chlorine shall be used only by personnel familiar with the proper use of the equipment and the emergency preparedness required with the use of the gas.
4. **Chlorine-Bearing Compounds in Water:** On approval of the ENGINEER, a mixture of water and a chlorine-bearing compound of known chlorine content may be substituted for liquid chlorine.
5. **Compounds to be Used:** The chlorine-bearing compounds that may be used are: 1) calcium hypochlorite granules, 2) sodium hypochlorite solutions, and 3) calcium hypochlorite tablets.
6. **Preparation of Mixtures:** The chlorine water solution is prepared by dissolving or mixing the tablets, granules or solution with water in the proportion required for the desired concentration. The following table gives the amount of chlorine required for each 100 feet of pipe of various sizes for a 50 ppm chlorine dosage.

Pipe Size (Inches)	Volume of 100' Length (Gal)	Chlorine (lb)	1% Chlorine Water Solution (Gal)
4	65.3	0.027	0.33
6	146.5	0.061	0.73
8	261.0	0.108	1.30
10	408.0	0.170	2.04
12	588	0.240	2.88

7. **Point of Application:** The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension or any valved section of it and through a corporation stop inserted in the top of the newly laid pipe. The water injector for delivering the chlorine-bearing water into the pipe should be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipeline extension. In a new system, application of chlorine may be made advantageously at the pump station, the elevated tank, the standpipe, or the reservoir. When properly cleaned first, these units are thus chlorinated adequately.
8. **Rate of Application:** Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine.
9. **Preventing Reverse Flow:** Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Check valves may be used if desired. Ensure that a positive flow is developed in the direction of the new line before chlorinating. Ensure that chlorine solution is not allowed to backfeed into the existing system thereby potentially creating a health and safety hazard for system users.
10. **Retention Period:** Treated water shall be retained in the pipe long enough to destroy a non-spore-forming bacteria. This period should be at least three (3) hours and preferably longer as may be directed.

11. Chlorinating Valves and Hydrants: In the process of chlorinating new laid pipe, all valves or other appurtenances shall be operated when the pipeline is filled with the chlorinating agent.
12. Residual Required: After the chlorine treated water has been retained for the required time, the chlorine residual at pipe extremities and at other representative points shall be at least 5 ppm.
13. Repetition of Procedure: Should the initial treatment fail to result in the conditions specified above, the original chlorination procedure shall be repeated until a 5 ppm residual is obtained.

END OF SECTION

SECTION 33 05 33

HIGH DENSITY POLYETHYLENE (HDPE) PIPE, FITTINGS, AND JOINING/FUSION

PART 1 – GENERAL

1.1 SECTION INCLUDES:

- A. Requirements regarding all labor, tools, materials, equipment, and incidentals to perform all necessary work for the installation of high density polyethylene pipe (HDPE) piping, completed and in place, as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures

1.3 REFERENCES

- A. American National Standards Institute (ANSI)/ American Water Works Association (AWWA)
 - 1. ANSI/AWWA C651 Disinfecting Water Mains
 - 2. ANSI/AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, 3/4 in. (19 mm) Through 3 In. (76 mm) for Water Service
 - 3. ANSI/AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 mm Through 1,650 mm) for Waterworks
 - 4. AWWA M55 Manual of Water Supply Practices, PE Pipe–Design and Installation
- B. Plastics Pipe Institute (PPI)
 - 1. PPI Handbook of Polyethylene Pipe
 - 2. PPI Municipal Advisory Board (MAB) MAB Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe
 - 3. PPI Material Handling Guide for HDPE Pipe & Fittings
 - 4. PPI TR-33 - Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe
 - 5. PPI TR-34 - Disinfection of Newly Constructed Polyethylene Water Mains
 - 6. PPI TR-41 - Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping
 - 7. PPI TR-46 - Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe
 - 8. PPI TN-38 - Bolt Torque Polyethylene Flanged Joints
- C. American Society for Testing and Materials (ASTM)
 - 1. ASTM B843 - Standard Specification for Magnesium Alloy Anodes for Cathodic Protection
 - 2. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

3. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter- Controlled Polyethylene Pipe and Tubing
4. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping
5. ASTM F2880 - Standard Specification for Lap-Joint Type Flange Adapters for Polyethylene Pressure Pipe in Nominal Pipe Sizes 3/4 in. to 65 in.
6. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
7. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
8. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
9. ASTM F585 - Standard Guide for Insertion of Flexible Polyethylene Pipe Into Existing Sewers
10. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
11. ASTM F1055 - Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing
12. ASTM F1417 - Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air
13. ASTM F1804 - Standard Practice for Determining Allowable Tensile Load for Polyethylene (PE) Gas Pipe During Pull-In Installation
14. ASTM F1962 - Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings
15. ASTM F2164 - Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure
16. ASTM F2206 - Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE)
17. ASTM F2620 - Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
18. ASTM F3124 - Standard Practice for Data Recording the Procedure Used to Produce Heat Butt Fusion Joints in Plastic Piping Systems or Fittings
19. ASTM F3183 - Standard Practice for Guided Side Bend Evaluation of Polyethylene Pipe Butt Fusion Joint
20. ASTM F3190 - Standard Practice for Heat Fusion Equipment (HFE) Operator Qualification on Polyethylene (PE) and Polyamide (PA) Pipe and Fittings

1.4 QUALITY ASSURANCE (NOT USED)

1.5 SUBMITTALS

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures for all pipe, fittings, and appurtenances.
- B. Contractor shall also submit the following to the Engineer for approval:
 - 1. Certified dimensional as-built drawings/profile of all installed pipe, specials and fittings.
 - 2. Details of fittings and specials such as elbows, tees, outlets, connections, test bulkheads, nozzles or other special items where shown on the Construction Drawings. All connections to jointed gasketed pipe materials, valves or fire hydrants must be restrained and supported independently to withstand the pressure transients, soil settlement, and external loading conditions.
 - 3. The Supplier of the material shall submit, through the Contractor, a Certificate of Compliance that the HDPE pipe and fittings furnished for this project meet or exceed the standards set forth in this specification. The Contractor shall submit these certificates to the Engineer prior to installation of the pipe materials.
 - 4. Provide a certification that personnel responsible for fusing the pipe have been trained and qualified per ASTM F3190
- C. For items that do not meet all of the requirements of this specification, the bid/submittal shall include a written description of the deviations, along with data that show the magnitude and the justification for the deviation from the specification. The decision to accept material deviating from this specification shall be the responsibility of the specifying engineer and must be approved in writing.

1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)

PART 2 – PRODUCTS

2.1 HIGH DENSITY POLYETHYLENE MATERIALS

- A. Resin and Material Requirements
 - 1. All material shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D3350 with a minimum cell classification of 445474C or 445574C. HDPE pipe and fittings shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. HDPE products shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.
- B. HDPE Pipe
 - 1. Pipe shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.1.A. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black of not less than 2 percent. The manufacturer of the HDPE resin shall certify the cell classification indicated.

2. Pipe sizes 3" DIPS/4" IPS and larger shall have a manufacturing standard of ASTM F714, while IPS pipe 3" and smaller shall be manufactured to the dimensional requirements listed in ASTM D3035. Dimension Ratio (DR) and Outside Diameter (IPS/DIPS) shall be as specified on plans.
3. Pipe shall be manufactured by an ISO 9001 certified manufacturer. The pipe manufacturer shall have an ongoing Quality Control program for incoming and outgoing materials, and shall assure that the pipe will meet the material requirements of this specification. HDPE resins for manufacturing of pipe shall be checked for density, melt flow rate, and contamination. For potable water systems the facility shall have the necessary testing equipment to verify that pipe meets the AWWA and NSF standards. Pipe shall be checked for outside diameter, wall thickness, length, and surface finish on the inside and outside. The Manufacturer's production facilities shall be open for inspection by the Owner or Engineer.
4. All pipe may be color coded for the intended service. When required, the color coding shall be permanently co-extruded stripes on the pipe outside surface as part of the pipe's manufacturing process. Painting HDPE pipe to accomplish color coding is not permitted.

C. HDPE Fittings

1. Butt Fusion Fittings- Fittings shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.1.A. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans or accepted by owner/engineer.
 - a. Molded fittings shall comply with the requirements of ASTM D3261.
 - b. All fabricated elbows, tees, reducing tees and end caps shall be produced and meet the requirements of ASTM F2206, as manufactured by ISCO Industries, Inc or other approved manufacturer holding an ISO 9001 quality system certificate. Each fitting will be marked per ASTM F2206 Section 10 including the nominal size and fitting EDR, which will meet or exceed the pipe DR identified for the project. Fabricated fittings shall be manufactured using a data recording device to record fusion pressure and temperature, and shall be stamped with unique joint number that corresponds to the joint report. A graphic representation of the temperature and pressure data for all fusion joints made producing fittings shall be maintained for a minimum of 5 years as part of the quality control and will be available upon request of owner. Test results to validate ASTM F2206 Section 7.3 and 9 shall be provided to owner or owner's representative upon request.
 - c. Socket fittings shall meet ASTM D2683.
 - d. Electrofusion Fittings - Fittings shall be made of HDPE material with a minimum material designation code of PE 4710 and with a minimum Cell Classification as noted in 2.1.A. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans.
2. Bolted Connections – Flanged and Mechanical Joint Adapters can be made to ASTM D3261. Flange adapters, if machined, may also meet the requirements of

ASTM F2880. Flanges and MJ Adapters shall be fused onto the pipe and have a minimum pressure rating equal to or greater than the pipe unless otherwise specified on the plans.

- a. Metallic back-up rings (Van-Stone style lap joint flanges), shall have a radius on the inside diameter of the bore so as to be compatible with HDPE Flanges. Back up rings shall have bolt pattern that will mate with AWWA C207 Class D (or B or E), ASME/ANSI B 16.5 Class 150, ASME/ANSI B 16.1 Class 125, or ASME/ANSI B16.47 Series A.
 - b. Flange assemblies shall be assembled and torqued according to PPI TN-38, "Bolt Torque for Polyethylene Flanged Joints."
 - c. Where shown on the drawings, 4" and larger transitions to mechanical joint fittings and valves shall be accomplished using a MJ Adapter with kit. The D.I./HDPE mechanical joint adaptor shall consist of:
 - 1) A molded or fabricated HDPE mechanical joint transition fitting.
 - 2) A rubber gasket.
 - 3) A mechanical joint backup drive ring.
 - 4) Corten mechanical joint tee bolts.
3. Mechanical Fittings: The use of mechanical coupling and saddles shall be approved by the owner or engineer prior to installation. Mechanical Fittings shall be designed for use and compatible with HDPE pipe. Mechanical fittings shall have a pressure rating equal to or greater than the pipe.
- a. Couplings without self-restraining capabilities (integrated serrated teeth or grippers) shall include a plan for external restraint or isolation from pipeline generated forces.
 - b. Mechanical Saddles shall have wide straps for distribution of clamping loads. No U- bolts shall be allowed.
 - c. When required by mechanical coupling manufacturer, pipe stiffeners shall be employed to support the interior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 304 or 316 stainless steel, with a wedged style design to fit the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE.

D. Fusion Unit Requirements

1. All Fusion Equipment, whether new or used, rented or owned, shall comply with the requirements of ISO 12176-1 "Equipment for Fusion Jointing Polyethylene Systems".
2. Butt fusion equipment must be in satisfactory working order and the hydraulic system must be leak free. Heater plates shall be free from scrapes, gouges, and have a consistent clean coated surface. The pressure gauge and thermometer should be properly calibrated. When requested by the owner, records showing a maintenance service/inspection within 3 months prior to use for this project shall be provided.

3. Rental Butt Fusion Equipment must be maintained by a McElroy Authorized Service and Repair Center with at least one McElroy Certified Master Mechanic on staff. When requested by owner or his authority, an inspection report detailing the components inspected within 3 months prior to arrival at jobsite will be provided.
4. For 16" and larger pipe sizes, the butt fusion machine shall be capable of autonomously calculating the drag pressure and perform the shift sequence autonomously.
5. Electrofusion Processors shall be maintained and calibrated per manufacturer's requirements and recommendations.

E. Approved Suppliers

1. All Pipe, Fittings, and Fusion Equipment shall be provided by one supplier. Approved suppliers are ISCO Industries, Inc. or approved equal.

2.2 PIPELINE LOCATING MATERIALS

- A. Detectable Marker Tape - Plastic marker tape shall be 5 mil minimum thickness with a solid aluminum core of .35 mil minimum thickness and a minimum width of 2". The background of the tape shall be colored based on pipe service with black lettering continuously printed. Marker tape shall have a minimum 35 lbs./inch tensile strength. The installation of the tape shall be at 18 inches below finish grade.
- B. Tracer Wire - All HDPE pipe 4" and greater shall be installed with an extra high-strength, copper clad steel tracer wire including 45 mil HDPE jacket that has a minimum average break load of at least 1,150 lbs. The jacket shall be colored based on pipe service, with blue for potable water or green for sewer. Tracer wire gauge shall be 12 AWG, 10 AWG, or 8 AWG depending upon application and installation procedure. This wire shall to be continuous and brought up in the valve boxes at the ends of each line segment with splices made only by methods per the equipment manufacturer's recommendation. All miscellaneous splicing components shall be furnished and installed by the Contractor.

PART 3 – EXECUTION

3.1 GENERAL

- A. All HDPE pipe and fittings shall be cut, joined, and installed in accordance with the manufacturer's recommendations. Joining, laying, and pulling of polyethylene pipe shall be accomplished by personnel experienced in working with polyethylene pipe systems.

3.2 TRANSPORTATION, UNLOADING, AND STORAGE

- A. The manufacturer shall package product in a manner designed to deliver the pipe and fittings to the project neatly, intact and without physical damage. During transportation each pipe shall rest on suitable pads, strips skids, or blocks securely wedged or tied in place.
- B. During loading, transportation, and unloading, every precaution should be taken to prevent damage to the pipe. The handling of the pipeline shall be in such a manner that

the pipe is not damaged by dragging it over sharp and cutting objects. Cuts or gouges that reduce the wall thickness by more than 10% are not acceptable and must be cut out and discarded.

- C. Handle the pipe in accordance with the PPI Handbook of Polyethylene Pipe, Chapter 2. All pipe and accessories shall be loaded and unloaded by lifting with hoists or by skidding in order to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skidways shall not be rolled or skidded against pipe on the ground. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or interior of the pipe. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are lowered into the trench to be laid.
- D. Materials, if stored, shall be kept safe from damage and shall not be stacked higher than the limits recommended by the manufacturer. The bottom tiers shall be kept off the ground on timbers, rails, or concrete. Pipe shall not be stored close to heat sources. The contractor shall be responsible for all security, damage and loss of pipe, excluding Acts of God.
- E. The interior of the pipe as well as all sealing surfaces of mating components (i.e. flange faces) shall be kept free from dirt or foreign matter at all times. The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged to prevent insects, animals, or foreign material from entering the pipe line or pipe section. The practice of stuffing cloth or paper in the open ends of the pipe will not be permitted. Use waterproof nightcaps to prevent the entrance of any type of natural precipitation into the carrier or containment pipe and secure to the pipe in such a manner that the wind cannot blow them loose. Where possible, the pipe shall be raised and supported at a suitable distance from the open end such that the open end will be below the level of the pipe at the point of support.

3.3 RECEIPT INSPECTION

- A. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are installed or lowered into the trench to be laid. Defective, damaged, or unsound pipe will be rejected. Cuts, punctures, or gouges that penetrate or reduce the wall thickness by 10% or more are not acceptable and must be removed and discarded. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.

3.4 FUSION AND JOINING

- A. Fusion Joining Requirements:
 - 1. All HDPE pipe shall be joined to by the heat fusion process which produces homogeneous, sealed, leak-tight joints. Tie-ins between sections of HDPE pipe shall be made by butt fusion whenever possible.
 - 2. Butt Fusion: The pipe shall be joined by the butt fusion procedure outlined in ASTM F2620 or PPI TR-33. All fusion joints shall be made in compliance with the pipe or fitting manufacturer's recommendations. Fusion joints shall be made by qualified fusion technicians per ASTM F3190. A record or certificate of training for the fusion operator must be provided that documents training to the fundamentals of ASTM F2620. Considerations should be given to and provisions

made for adverse weather conditions, such as temperatures below freezing, precipitation, or wind, which is accepted by the owner/engineer. The use of a controlled cooling cycle procedure to reduce cooling time is acceptable only as part of a controlled cooling cycle procedure where testing demonstrates that acceptable joints are produced using the controlled cooling cycle procedure.

3. Electrofusion: Electrofusion joining shall be done in accordance with the manufacturers recommended procedure. Other sources of electrofusion joining information are PPI TN 34 and PPI Municipal Advisory Board (MAB) Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe. The process of electrofusion requires an electric source, commonly called an electrofusion processor that has wire leads and a method to read electronically (by laser) or otherwise input the barcode of the fitting. The electrofusion processor must be capable of reading and storing the input parameters and the fusion results for later download to a record file. Qualification of the fusion technician shall be demonstrated by evidence electrofusion training within the past year on the equipment to be utilized for this project.

B. Fusion Operators:

1. The employer of the fusion machine operator is responsible for the fusion joint quality of the fusion weld made by that individual. The employer is responsible for documenting all training and qualification records for that individual, including compliance to any code requirements for fusion/bonder operators.
2. All HDPE fusion equipment operators shall be qualified to the procedure used to perform pipe joining. Fusion equipment operators shall have current, formal training on all fusion equipment employed on the project. Training received more than two years prior to operation with no evidence of activity within the past 6 months shall not be considered current.
3. For Projects with at least 5,000 feet or with pipe larger than 24 inches, operators or their supervisor must have a current McElroy Fusion Training Certificate for the equipment to be used on the project.
4. When the fusion machine operator is employed by the HDPE pipe and fusion machine supplier, the supplier shall maintain an ISO 9001 Certified Quality Management System.

C. Butt Fusion Equipment:

1. For 6" and larger pipe sizes, the pipe butt fusion machine shall be a self-contained hydraulic fusion machine capable of butt fusing HDPE pipe. The carriage must be removable from the chassis for in-ditch use. The machine must be compatible with an electronic data recording device. Accessories will include all butt fusion inserts for the specified range of pipe sizes, a pyrometer kit for checking the surface temperature of the heater, extension cord of appropriate gauge (25' minimum), and hydraulic extension hoses (minimum of four). The butt fusion machine will be McElroy, or approved equivalent.
2. For 16" and larger pipe sizes, the butt fusion machine shall be capable of autonomously calculating the drag pressure and perform the shift sequence autonomously.

3. In areas where there may be insufficient space for layout of the entire length of fused pipe to be pulled-back, the Contractor shall utilize a continuous HDPE pipe fusion equipment such as a PolyHorse by McElroy or other means in order to fuse the length of pipe necessary for the installation.

D. Fusion Data Recording:

1. For 6" and larger pipe sizes, McElroy DataLogger or equivalent fusion data recorder shall be used to record all fusion welds on hydraulically operated fusion machines. The device shall be capable of meeting the requirements of ASTM F3124, "Standard Practice for Data Recording the Procedure used to Produce Heat Butt Fusion Joints in Plastic Piping Systems or Fittings". The device, or combination of devices, shall record the following variables of each fused joint:
 - a. Heater surface temperature- immediately before inserting the heater plate, measure with a pyrometer and manually enter into the weld record
 - b. Gauge pressure during the initial heat cycle
 - c. Gauge pressure and elapsed time during the heat-soak cycle
 - d. Heater removal (dwell) time
 - e. Gauge pressure and elapsed time during the fusing/cool cycle
 - f. Drag pressure
 - g. Pipe diameter and wall thickness
 - h. Type of HDPE material (Specification and Classification) and manufacturer
 - i. Fusion Machine Identification
2. The device shall record the operator name and a unique operator ID number, along with the date and time of each weld.
3. Records showing the device is up to date on all required calibration should be available for presentation when requested.
4. All fusion welds should be traceable to the report (via operator and weld ID) with an indentation weld stamp or by permanent paint marker/pen next to fusion weld.
5. A weld location map may be requested, prior to commencement of work, by the owner or owner's representative.

E. Butt Fusion Examination and Testing:

1. Examinations
 - a. Visual: For pipe sections, examine the full exterior circumference for bead uniformity before cutting. After cutting the pipe section, review the interior bead. All beads should have visually acceptable bead formation as shown in Fig 4 and Appendix X2 of ASTM F2620. In addition, the following characteristics are expected:
 - 1) There shall be no evidence of cracks or incomplete fusing
 - 2) There shall be no evidence of captured objects (e.g., pipe shavings, facer ribbons) between bonded surfaces

- 3) Variations in upset bead heights on opposite sides of the cleavage and around the circumference of fused pipe joints are acceptable
- 4) The apex of the cleavage between the upset beads of the fused joint shall remain above the base material surface
- 5) Fused joints shall not display visible angular misalignment, and outside diameter mismatch shall be less than 10% of the nominal wall thickness
- 6) Fusion data record review that meet criteria of section 3.04.D.1 can be used as additional verification of visual indicators

b. Fusion Data Record Review

- 1) The fusion data record for each fused joint shall be compared to the approved fusion procedure. The reviewer shall verify the following:
 - a) That all data required by section 3.04.D.1 was recorded
 - b) Interfacial pressure was within the acceptable range
 - c) Heater surface temperature was within the acceptable range
 - d) Butt fusion pressure applied during the fusing/cool cycle was correctly calculated to include drag pressure, fell within the acceptable range for the applicable size and agrees with the recorded hydraulic fusing pressure
 - e) Butt fusing pressure was reduced to a value less than or equal to drag pressure at the beginning of the heat soak cycle
 - f) Fusing machine was opened at the end of the heat soak cycle, the heater was removed, and the end were brought together at the fusion pressure with the acceptable time range
 - g) Cooling time at butt fusing pressure met the minimum time specified
- 2) If the recorded data in section 3.04.D.1 is outside the limits of the acceptable range, the joint is unacceptable, and must be removed and replaced.
- 3) Frequency. Records for test fusion joints should be reviewed immediately after the joint is completed. Fusion joints for jobsite fusions should be reviewed daily or before being covered with backfill.

2. Mechanical Tests

- a. Contractor shall mechanically test the first fusion of each operator and each machine used on the project. Installation shall not continue until a fusion test has passed the test. Additional mechanical test are not required as long as long as the fusion are reviewed with the frequency specified in Section 3.04.E. Testing of fusion joints with no fusion data record review shall be at a frequency specified by the Owner or Engineer.
- b. The fusion shall be allowed to cool completely, then fusion test straps shall be cut out.

- c. All samples shall be labeled with operator information. Testing must be done at 73 degrees F plus or minus 5 degrees. The test temperature and sample size are critical to testing. Testing performed at cold or elevated temperatures may not give similar results to tests performed at ambient temperatures.
- d. Each pipe sample weld shall be subjected to testing at two locations 180 degrees apart from each other in the joint weld. All specimens shall be tested by one of the following methods:
 - 1) Reverse Bend Test are allowed for pipe sizes 4" IPS or smaller. The specimens shall be prepared and tested in accordance with ASTM F2620, Appendix X4.
 - 2) Guided Side Bend Test are allowed for all wall thicknesses of 1" or greater. The specimens shall be removed and tested in accordance with ASTM F3183.
 - 3) Hydrostatic Burst Test is allowed for pipe sizes 2"-24". The specimen length should measure 6 times pipe diameter with the butt fusion joint in the center of the specimen. The specimen should be tested in a tank filled with water, and testing conditions monitored and recorded with computerized equipment. The specimen will be tested at 4 times pipe rated pressure for 5 minutes with no failure of joint allowed.
- e. Results of any mechanical test should be documented. Information on the weld and operator should be transferred from the sample to the testing record.

3.5 INSTALLATION

A. Direct Burial

- 1. Buried HDPE pipe and fittings shall be installed per engineering drawings and ASTM D2774, ASTM D2321 and AWWA Manual of Water Supply Practices M55 Chapter 8. The Design Window identified in AWWA M55 Chapter 5 shall be considered acceptable design and installation conditions.
- 2. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below top of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, pipe bedding shall be placed to fill any voids created and the backfill shall be re-compacted to provide uniform side support for the pipe.
- 3. Pipe embedment - Embedment material should be Class I, Class II, or Class III materials as defined by ASTM D-2321 Section 6. The use of Class IV or Class V materials is not recommended, however, they may be used only with the evaluation and approval of the engineer at a demonstrated achievable compaction
- 4. Bedding: Pipe bedding shall be in conformance with ASTM D2321 Section 8. Compaction rates should be as specified in ASTM D2321. Deviations shall be approved by the engineer.

5. Haunching and backfill shall be as specified in ASTM D2321 Section 9 with Class I, II, or III materials. Compaction shall be in excess of 85% Proctor, providing a minimum modulus of 1000 psi or greater.

B. Pull-In Installation

1. Per ASTM F1804 and/or www.HDPEapp.com, the contractor shall determine and document the maximum proposed pull-in length and pull-in force for the pressure class and pipe diameter to be pulled into an open trench. Pull-in lengths will not exceed the maximum lengths for the class and diameter pipe. A commercially available load limiter (weak link) approved by the Engineer shall be used between the puller and the pipe.
2. Prior to pulling the pipeline, contractor shall place rollers or other approved devices beneath the pipe to avoid unnecessary damage and to reduce pipe drag.
3. Trenchless installations:
 - a. For Horizontal Directional Drilling (HDD), refer to ASTM F1962, PPI TR-46, PPI PE Handbook (Chapter 12) and www.PPIBoreAid.com
 - b. For sliplining, refer to ASTM F585, PPI PE Handbook (Chapter 11) and www.HDPEapp.com
 - c. For pipe bursting, refer to PPI PE Handbook (Chapter 16)

C. Appurtenances

1. All appurtenances (tees, elbows, services, valves, air relief valves, fire hydrants, etc.), must be independently supported and shall not rely on the pipeline and its connections for this support. Excessive stresses may be encountered when appurtenances are inadequately supported.
2. Hydrant Assemblies shall be installed and field tested according to the requirements of AWWA M17.
3. Installation of Tracer Wire. When tracer wire is required, the Contractor shall install along the entire section of pipeline and along all service connections as listed below. The tracer wire shall be installed simultaneously with the polyethylene piping system. Tracer wire shall be installed by the Contractor once backfill has been placed and compacted to at least 12 inches above the top of the pipe and not more than 18 inches above the top of the pipe. Tracer wire shall be properly spliced at each end connection and each service connection. Care should be taken to adequately wrap and protect wire at all splice locations. No bare tracer wire shall be accepted. Provide Magnesium alloy anode for cathodic protection that conforms to the requirements of ASTM B843. Install tracer wire per local and manufacturer's requirements.

3.6 PIGGING, FLUSHING, CLEANING, AND DISINFECTING

- A. All mains shall be pigged, cleaned and flushed to remove all dirt, sand, debris and other foreign matter. The Contractor shall be responsible for developing a pigging and flushing plan to be submitted to the Engineer for approval prior to pigging and flushing.
- B. Disinfection:

1. Cleaning and disinfecting of potable water systems shall be in accordance with AWWA C651 and AWWA M55 Chapter 10, and PPI Handbook of Polyethylene Pipe Chapter 2 (2nd Edition).
2. The liquid disinfection chemical solution should be limited to less than 12% active chlorine. The time-duration of the disinfection should not exceed 24 hours. Chlorine tablets or powders are not permitted.
3. Upon completion, the system should be thoroughly flushed with fresh water, and retested to verify the disinfectant chlorine level has been reduced to potable drinking water concentrations in all service water tubing and branch lateral pipes

3.7 TESTING AND LEAKAGE

- A. The contractor shall ensure testing can be accomplished in a safe manner, including protection of personnel, equipment, and public in the event of a failure during testing. The contractor shall restrain pipe, components, and test equipment as required. All pumps, valves, temporary connections, meters, gauges and other measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Owner's Engineer.
- B. The pressure gauges or data recorders should be calibrated and sufficiently sized to provide mid-range data that result in easy reading, interpretation. Gauges shall be accurate to within 2% of full scale
- C. The test pressure may be up to 1.5 times the system design pressure, based on the lowest point in elevation in the test section. The contractor shall ensure that the designated test pressure does not exceed the maximum allowable test pressure specified by the manufacturer for any component in the test section.
- D. Test pressures require consideration of thermal conditions. Polyethylene piping materials are typically pressure rated at 73°F (23°C) and PE piping at temperatures greater than 80°F (26°C) require reduced test pressures. (Note that higher pipe temperatures should consider both ambient temperatures and radiant solar heating of exposed black HDPE pipe) Guidance for elevated temperatures can be found in the appendix of Chapter 3 (Material Properties) of the PPI Handbook of PE Pipe.
- E. Gravity Pipelines-The Contractor shall perform a low-pressure air test for gravity flow pipelines to the requirements and specifications of ASTM F1417. Warning: All pneumatic test, regardless of pressure, can be dangerous and safety procedures shall be identified, documented, approved by the owner and engineer, and followed.
- F. Pressure Pipelines-Pressure testing shall be conducted in accordance with requirements and recommendations of ASTM F2164 (Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure), AWWA M55 Chapter 9, and PPI Handbook of Polyethylene Pipe Chapter 2 (2nd Edition). Pneumatic (compressed air) leakage testing of HDPE pressure piping is prohibited for safety reasons.
 1. The section of pipe to be tested shall be filled with potable or generally clean water (uncontaminated river/lake water) approved by the Owner/Engineer. While the system is being filled with water, air shall be carefully and completely exhausted.
 2. The test procedure for HDPE pipe consists of two steps: 1) the initial phase or expansion phase and 2) the test phase. During the initial/expansion phase, sufficient

make-up water shall be added hourly for 3 hours to return to the test pressure. During the test phase, the expansion phase pressure is reduced by 10 psi to test phase pressure and monitored for at least one hour (3 hours maximum).

3. Under no circumstances shall the total time under test exceed eight (8) hours. If the test is not completed due to leakage, equipment failure or any other reason, depressurize the test section and permit the system to "relax" for eight (8) hours prior to the next testing sequence.
 4. In accordance with section 9.8 of ASTM F2164, the pipe shall pass if the final pressure is within 5% of the test phase pressure for the testing period (3 hours maximum). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the Owner.
- G. All pressure and leakage testing shall be done in the presence of a representative of the Owner and Engineer.

END OF SECTION

SECTION 33 05 61**PRECAST CONCRETE MANHOLES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required to install concrete manholes, frames and covers and appurtenances as shown on the Drawings and as specified and in accordance with TCEQ regulations. Manholes shall be constructed of precast concrete sections or cast-in-place concrete unless otherwise noted elsewhere. All manholes shall be watertight.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 33 05 05.30 – Sanitary Sewer Acceptance Testing

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A48 – Standard Specification for Gray Iron Castings
 - 2. ASTM C76 – Standard Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - 3. ASTM C443 – Standard Specification for Joints for Concrete Pipe and Manholes, using Rubber Gaskets
 - 4. ASTM C478 – Standard Specification for Circular Precast Reinforced Manhole Sections
 - 5. ASTM C923 – Standard Specifications for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals
 - 6. ASTM D2240 – Standard Test Method for Rubber Property – Durometer Hardness
 - 7. ASTM D2665 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

1.4 QUALITY ASSURANCE

- A. The quality of materials, the process of manufacture, and the finished sections will be subject to inspection and approval by the Engineer. Such inspection may be made at the place of manufacture, or after delivery, or at both places. The materials shall be subject to rejection at any time on account of failure to meet any of the Specification requirements; even though samples may have been accepted as satisfactory at the place of manufacture. Material rejected after delivery to the job site shall be marked for identification and shall be removed from the job site at once. Materials which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, or removed and replaced, entirely at the Contractor's expense.

- B. At the time of inspection, the materials will be carefully examined for compliance with the latest ASTM designations specified and these Specifications, and with the approved manufacturer's drawings. Manhole sections will be inspected for general appearance, dimension, blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
- C. Imperfections in manhole sections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that repairs will result in a strong manhole section. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall give a minimum compressive strength of 4,000 psi at seven days and 5,000 psi at 28 days, when tested in three-inch by six-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.
- D. Manhole sections shall be subject to rejection on account of failure to conform to any of the requirements specified herein or having defects as follows.
 - 1. Variations in any dimensions exceeding the permissible variation allowed in ASTM C478
 - 2. A piece broken out of the bell, spigot, tongue or groove in such size that the watertightness of the joint will be impaired
 - 3. Any shattering or flaking of concrete or other conditions indicating an improper concrete mix
 - 4. Cracks sufficient to impair the strength, durability, or serviceability of the pipe
 - 5. Joint Sections with spalls, cracks, fractures, or other imperfections that will adversely affect the performance of the joints

1.5 SUBMITTALS

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures.
- B. Submit Shop Drawings showing details of construction, joints, pipe connection to manhole, and manhole frames and covers.
- C. Submit leakage test report of manholes.
- D. Submit concrete mix design for cast-in-place concrete manholes.

- 1.6 DELIVERY, STORAGE, AND HANDLING (NOT USED)
- 1.7 SYSTEM DESCRIPTION/DESIGN REQUIREMENTS (NOT USED)
- 1.8 MAINTENANCE/SPARE PARTS (NOT USED)
- 1.9 WARRANTY/EXTENDED WARRANTY (NOT USED)

PART 2 – PRODUCTS

2.1 CONCRETE

- A. Materials, handling, forms, finishing, curing, and other work will be as specified in Division 03 - Concrete.

2.2 PRECAST SECTIONS

- A. Sections shall be circular precast concrete conforming to ASTM C478. Unless otherwise noted, minimum thickness of barrel sections shall be as listed under wall 'B' in the class Table. Opening shall be circular or u-shaped boxout for each connecting pipe, with surfaces grooved or roughened to improve grout bonds. Upper section of manhole shall be concentric, unless noted otherwise on the Drawings, to allow access into manholes. The inside diameter of manhole shall not be less than 48-inches.
- B. Precast concrete barrel sections with precast top slab and precast concrete, transition sections shall be designed for a minimum of HS-20 loading.
- C. Sections shall be cured by an approved method and shall not be shipped nor subjected to loading until the concrete compressive strength has attained 3,000 psi and not before five days after fabrication and/or repair, whichever is longer.
- D. The date of manufacture and the name and trademark of the manufacturer shall be clearly marked on the inside of each precast section.
- E. Precast concrete bases shall be constructed and installed as shown on the Drawings. The minimum thickness of the bottom slab of the precast bases shall be 12-inches.
- F. Adjustment rings shall be precast, reinforced concrete rings having a minimum thickness of 2-inches and width of 5-inches. The internal diameter shall not be less than 30-inches.
- G. Precast Manhole sections shall be furnished with lifting lugs or lifting holes. Lifting lugs shall be 180° apart. Lifting holes shall be plugged with a non-shrink grout.
- H. Precast sections shall have a tongue and groove joint configuration with rubber gasket seals.

2.3 GASKETS

- A. Rubber gaskets shall be neoprene or another synthetic material conforming to ASTM C443. The gasket shall have a 40 plus or minus five hardness when measured by ASTM D2240, Type A durometer.

2.4 CAST-IN-PLACE CONCRETE MANHOLES

- A. Cast-in-place concrete manholes shall conform to the drawings. The concrete strength shall be 4,000 psi at 28-days for the construction of the base, walls, cone and top slab. The concrete shall be in accordance with Division 3 - Concrete. The concrete shall be vibrated to assure a monolithic structure free from infiltration.

2.5 FRAMES AND COVERS

- A. Provide cast iron frames and covers conforming to ASTM A48, Class 30, gray cast iron. The manhole cover shall have the word "SANITARY SEWER" as applicable to the application cast on to it. The letter shall be 1 ½" in size.
- B. Manhole cover shall conform to the City, District or Agency's Standard Details.
- C. Manhole frame shall have a minimum 30-inch diameter clear opening.
- D. Manholes frames and covers shall be designed for HS-20 loading.
- E. Pressure type manhole covers shall contain no holes or openings except as required for bolts.

2.6 PIPE CONNECTIONS TO MANHOLE

- A. Resilient connectors between manhole structure and pipe shall meet the requirements of ASTM C923. The connection shall be made watertight with rubber gasket assembly such as A-LOK, or KOR-N-SEAL.

2.7 VENT PIPES

- A. Provide PVC vent pipes for manholes where indicated on drawings conforming to ASTM D2665.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Manhole Installation
 - 1. Manhole shall be constructed to the dimensions shown on the Drawings and as specified. Work shall be protected against flooding and floatation.
 - 2. Bases of manholes shall be placed on a bed of 12-inch screened gravel as shown on the Drawings. Cast-in-place manholes shall be constructed in compliance with the requirements of Division 3 - Concrete and the details shown on the Drawings.
 - 3. Precast concrete barrel sections shall be set so as to be vertical and with sections in true alignment with a ¼-inch maximum tolerance to be allowed. Joints of precast barrel sections shall be sealed with a rubber "O" ring set in a recess. Lift holes for handling barrel sections shall be filled with non-shrink grout and finished flush with the adjoining surfaces. Allow grout to set for 24 hours before backfilling. Backfilling shall be performed in a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint.

4. Unless otherwise shown on the Drawings, manhole foundations shall consist of a reinforced concrete slab, 12-inch thick minimum, with #5 bars at 12-inch centers each way top and bottom. The foundation shall be a minimum of one foot larger than the outside diameter of the manhole.
 5. Grout precast manhole section into base.
 6. Flow channels and shelves shall be constructed of concrete as shown on the Drawings and in compliance with TECQ's regulations. The manhole bottom from wall line to flow channels shall be sloped and troweled smooth on a grade 1-inch per foot with a liberal radius applied at flow channel intercepts.
 7. Provide precast concrete rings between precast section and cast iron ring. Set manhole ring and cover to grade.
 8. Manhole frames and covers shall be set in a non-shrink grout bed.
- B. Manhole pipe connections shall be accomplished as specified in Paragraph 2.6 of this section. Pipe stubs for future extensions shall also be connected and the stub end closed by a suitable watertight plug, and mark with tape.
- C. Manholes constructed in advance of paving projects shall be constructed with the top of the concrete portion of the manhole 23-inches below the final finished grade. The ring and cover shall be placed on a built-up section of approved grade rings and sealers between rings and other materials.

3.2 TESTING

- A. Manholes shall be tested for leakage by hydrostatic exfiltration testing or vacuum testing. Manholes shall be tested after installation with all connections in place.
- B. Hydrostatic Test the Manholes in accordance with Section 33 05 05.30 – Sanitary Sewer Acceptance Testing.
- C. Vacuum Test the Manholes in accordance with Section 33 05 05.30 – Sanitary Sewer Acceptance Testing.

3.3 CLEANING

- A. All new manholes shall be thoroughly cleaned of silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 40 05 06**PIPING SPECIALTIES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required to install all Piping Specialties as shown on the Drawings or as specified.
- B. The Piping Specialties shall include, but not be limited to the following: (Note: All items listed below may not be required in this Contract).
 - 1. Hose hydrants
 - 2. Mechanical type wall seals
 - 3. Service clamps
 - 4. Dielectric pipe fittings/insulators
 - 5. Harnessing and restraint
 - 6. Sleeve ("Dresser type") couplings
 - 7. Adapters
 - 8. Quick connect couplings
 - 9. Expansion/vibration isolation joints (fittings)
 - 10. Wall and floor fittings
 - 11. Gauges and accessories
 - 12. Valve operators
 - 13. Strainers
 - 14. Corporation Stops
 - 15. Stainless steel expansion joints
 - 16. Flanged Coupling Adapters

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 01 78 23 – Equipment Operation and Maintenance Data
- C. Division 09: Finishes
- D. Division 40: Process Interconnections
- E. Section 40 80 05 – Field Testing of Piping Systems

1.3 REFERENCES

- A. American National Standards Institute (ANSI)

1. ANSI B2.1 – Specification for Welding Procedure and Performance Qualification
- B. American Society for Testing and Materials (ASTM)
1. ASTM A36 – Standard Specification for Carbon Structural Steel
 2. ASTM A48 – Standard Specification for Gray Iron Castings
 3. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 4. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 5. ASTM A183 - Standard Specification for Carbon Steel Track Bolts and Nuts
 6. ASTM A193 – Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
 7. ASTM A194 – Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
 8. ASTM A197 – Standard Specification for Cupola Malleable Iron
 9. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 10. ASTM A278 - Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures Up to 650 degrees F
 11. ASTM A283 – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
 12. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength
 13. ASTM A512 – Standard Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing
 14. ASTM A513 – Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
 15. ASTM A536 - Standard Specification for Ductile Iron Castings
 16. ASTM B16 – Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines
 17. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings
 18. ASTM B88 - Standard Specification for Seamless Copper Water Tube
 19. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications
 20. ASTM D2000 – Standard Classification System for Rubber Products in Automotive Applications
 21. ASTM E8 – Standard Test Methods for Tension Testing of Metallic Materials

- C. American Water Works Association (AWWA):
 - 1. AWWA C209 – Cold-Applied Tape Coatings for Steel Water Pipe, Special Sections, Connections and Fittings
 - 2. AWWA C210- Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings
 - 3. AWWA C213 – Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
 - 4. AWWA C219 – Bolted Sleeve-Type Couplings for Plain-End Pipe
 - 5. AWWA C606 - Grooved and Shouldered Joints
 - 6. AWWA C800 – Underground Service Line Valves and Fittings
 - 7. AWWA Manual M-11 – Steel Pipe – A Guide for Design and Installation
- D. Federal Specifications (F.S.):
 - 1. MIL-C-27487 – Military Specification: Coupling Halves, Quick Disconnect, Cam-Locking Type
- E. American Society of Mechanical Engineers (ASME)
 - 1. ASME B1.1 – Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)
 - 2. ASME B1.20.1 – Pipe Threads, General Purpose (Inch)
 - 3. ASME B16.22 – Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
 - 4. ASM B18.2.2 – Square and Hex Nuts
 - 5. ASME B31.3 - Process Piping
- F. National Sanitation Foundation (NSF)
 - 1. NSF 61 – Drinking Water System Components – Health Effects

1.4 QUALITY ASSURANCE

- A. Items listed herein shall be products of manufacturers who have a minimum of five (5) years of experience in the manufacturing of the particular equipment item to be furnished.

1.5 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures. They shall show as a minimum all details and materials of construction and dimensions.
- B. Gasket manufacturer shall submit certificate that gasket material is suitable for the joints provided, service conditions specified herein and suitable for the field test pressure.
- C. Submit operating and maintenance instruction in compliance with Section 01 78 23 – Equipment Operation and Maintenance Data.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

PART 2 – PRODUCTS

2.1 GENERAL

- A. Joint, size and material - unless otherwise noted or required by the Owner:
 - 1. Joints referred to herein shall be of the same nominal diameter as the pipe or fittings they are connected to.
 - 2. Appurtenance shall be of the same nominal diameter as the pipe or fittings they are connected to.
- B. Ensure that valves and appurtenances have ends/joints that are compatible with, and may be fastened to the adjoining pipe. This may mean furnishing special adapters as required. These adapters shall be suitable for direct bury, with proper dielectric insulation and as a minimum, if metallic non-stainless steel or galvanized, coated with two coats of Coal Tar Epoxy.
- C. Materials to be used in contact with the raw water (for drinking water applications) or potable water process shall be classified as acceptable by NSF61.

2.2 HOSE HYDRANTS

- A. Hose hydrants for installation on the non-potable water lines shall consist of a 3/4 inch hose connection. The hydrants shall be Woodford Model 24P or equal.

2.3 MECHANICAL TYPE WALL SEALS

- A. Mechanical type seals shall consist of an adjustable modular bolted, synthetic rubber and plastic sealing element as shown on Drawings. The sealing element shall be Link-Seal LS-300-C as manufactured by Eaton, or equal.

2.4 SERVICE CLAMPS

- A. Service clamps shall have malleable or ductile iron bodies which extend at least 360 degrees around the circumference of the pipe and shall have neoprene gaskets cemented to the saddle body. Bodies shall be tapped for IPS. Clamps shall be of the double strap design.
- B. Service clamps shall be IPS service clamps as manufactured by Mueller Co., or equal.

2.5 DIELECTRIC PIPE FITTINGS/INSULATORS

- A. Dielectric insulating flange gasket kits shall be installed when dissimilar metal pipe connects to prevent galvanic action. Flange insulation kits shall be installed where a stainless steel flange is mated with flanges constructed of bronze alloys, carbon steel alloys, or nickel alloys (Monel and Hastelloy) flanges; where process piping mates with valves and other equipment and appurtenances of dissimilar metals furnished under Sections in Division 11 - Furnishes: where exposed piping makes a vertical transitions to buried piping; and where otherwise as shown on the Drawings.

- B. Insulating flange gaskets shall be furnished as a kit including the dielectric gasket, bolt sleeves and washers in accordance to the nominal flange size.
- C. Each dielectric insulating gasket shall be a full face isolating and sealing gasket, Type "E", 1/8" thick, epoxy-glass retainer with bolt holes cut to match matting flange drilling. The retainer shall contain a precision tapered groove to accommodate the controlled compression of a FKM (Viton) sealing element. The quad-ring seal shall be pressure energized. The epoxy-glass retainer shall have 550-volts/mil dielectric strength and a minimum 50,000 psi compressive strength.
- D. Insulating bolt-sleeves shall be manufactured of Mylar having a dielectric strength of not less than 4,000-volts/mil.
- E. Insulating washers shall be manufactured of G-10 epoxy-glass having a dielectric strength of 400 to 500-volts/mil. Insulating washers shall be installed with metallic backing washers to prevent damage to the epoxy-glass washers during bolting. The metallic washers shall be constructed of the same material as the bolts.
- F. Dielectric insulating flange gasket kits shall be:
 - 1. LineBacker manufactured by Pipeline Seal and Insulator, Houston, Texas.
 - 2. Trojan Quad Seal manufactured by Advance Products and Systems, Lafayette, Louisiana.
 - 3. Jack O-ring gaskets manufactured by Central Plastics, Shawnee, Oklahoma.

2.6 DIELECTRIC UNIONS FOR COPPER TUBE

- A. Dielectric unions for copper water tube, ½-inch to 2-inch diameter, shall be installed where dissimilar metal connect to prevent galvanic action. The body shall be manufactured of ASTM B16 brass and feature female NPT threads adhering to ASME B1.20.1 and solder joints adhering to ASME B16.22. Dielectric unions shall have Nitrile (BUNA) or EPDM gaskets and be rated for 250 psi at 1800 F.

<i>Connection Type</i>	<i>Copper Alloy Pipe Connection</i>	<i>Joined Material Pipe Connection</i>
Soldered	ASTM B16	ASTM A48 Cast Iron*
Soldered	ASTM B16	ASTM A197 Malleable Iron*
Threaded	ASTM B584 Bronze	ASTM A48 Cast Iron*
Threaded	ASTM B584 Bronze	ASTM A197 Malleable Iron*

*Material may be galvanized.

- B. Acceptable Manufacturers:
 - 1. Watts, Andover, Massachusetts
 - 2. Wilkins, Paso Robles, California

2.7 FLANGE BOLTS AND NUTS

- A. All flange bolt lengths shall be selected by the Contractor such that three threads, as a minimum, protrude from the hex nut and washer after assembly. Flange bolts for dielectric insulating flange kits shall be fully-threaded along their length. The Contractor is cautioned that flange bolts having smooth shank segments along their length will not fit in Mylar sleeves or molded sleeve washers.
- B. All bolts, nuts, and washers in the locations listed below shall be Type 316 stainless steel as indicated below:
 - 1. All buried locations
 - 2. All submerged locations
 - 3. All locations subject to seasonal or occasional flooding
 - 4. Inside Hydraulic Structures below the top of structures
 - 5. Inside vaults, manholes, and junction structures
 - 6. All chemical handling areas
 - 7. Inside trenches, containment walls, and curbed areas
 - 8. All locations exposed to weather
 - 9. Locations indicated by the Contract Documents or designated by the Engineer to provide with stainless steel bolts.
- C. Type 316 stainless steel flange bolts shall have ASME B1.1, coarse threads, Class 2A fit, and conform to ASTM A193, Grade B8M.
- D. Flange nuts shall have ASME B1.1, coarse threads, Class 2A fit, and conform to ASTM A194 Grade 8M, Type 316 stainless steel, having square or hexagonal heavy dimensions in accordance with ASME B18.2.2. The hardness of nut shall be different than the hardness bolts to minimize galling.
- E. For locations other than listed in Paragraph 2.07.B, flange bolts shall have ASME B1.1, Class 2A threads, and be manufactured of ASTM A193, Grade B7 steel. Bolts shall conform to ASME B18.2.1.
- F. For locations other than listed in Paragraph 2.07.B, flange nuts shall have Class 2A fit, and be manufactured of ASTM A194, Grade 2H steel, having square or hex heavy dimensions in accordance with ASME B18.2.2.

2.8 DISMANTLING JOINTS

- A. Dismantling joints of the proper type shall be provided in the location shown on the Drawings.
- B. Dismantling joints shall be installed as specified herein, when installed between different types of pipe.
- C. Tie rods, bolts, nuts, and all other hardware shall be 316 stainless steel.
- D. Gaskets shall be Buna-N.

- E. Dismantling joints shall be Smith-Blair Model 975, Romac Style DJ400 or approved equal.

2.9 ANTI-SEIZE BOLTING LUBRICANTS

- A. Flange bolts shall be installed using a nickel-seize lubricant capable of achieving the required bolt torque and sealing stress, and permitting future disassembly with minimal manual input.
- B. Anti-seize compound shall be classified as acceptable for potable water by the NSF.
- C. Acceptable Manufacturers:
 - 1. Never-Seez White Food Grade PTFE Lubricant manufactured by Bostik, Wauwatosa, Wisconsin.
 - 2. Loctite Nickle Anti-Seize Lubricant manufactured by Henkel Technologies, Rocky Hill, Connecticut.
- D. Flange bolts shall be adequately degreased of all corrosion inhibiting slush oil and excess nickel anti-seize prior to field application of prime and finish coatings.

2.10 NON-INSULATING FLANGE GASKET MATERIALS

- A. Non-insulating gaskets for all flange configurations shall be submitted in accordance with Paragraph 1.5 of this Section. No field-cut or field modified gaskets will be allowed.
- B. Gaskets shall be full face for use with flat face flanges and ring type for use with raised face flanges. Gaskets shall be 1/8-inch thick. Blind flange gasket shall cover entire inside surface of blind flange.
- C. Gasket material shall be suitable for the joints provided, service conditions specified herein and suitable for field test pressure.
- D. Gaskets shall be classified as acceptable for potable water service by NSF 61.
- E. Gaskets shall be suitable for 250 degree F operating temperature, unless higher temperature required on individual systems.

2.11 AWWA GROOVED-JOINT COUPLINGS

- A. AWWA rigid radius grooved-joint couplings for above grade ductile iron pipe, 4-inch to 36-inch diameter, shall be installed where shown on the Drawings. Grooved-joint couplings shall conform to AWWA C606 and constructed of ASTM A536, Grade 65-45-12 ductile iron.
- B. Grooved-joint couplings, 4-inch to 36-inch diameter shall be:
 - 1. Style 31 AWWA coupling for ductile iron pipe manufactured by Victaulic Company.
- C. Couplings for transition between ductile iron and IPS steel pipe, 4-inch to 12-inch diameter, shall be:

1. Style 307 transition coupling manufactured by Victaulic Company.

2.12 TIE-ROD RESTRAINED DISMANTLING JOINTS

- A. Tie-rod restrained dismantling joints shall be installed where shown on the Drawings and at locations where a disassembly gap is necessary to complete a piping assembly. Dismantling joints shall be constructed of ASTM A536, Grade 65-45-12 ductile iron or ASTM A283, Grade C carbon steel. Tie rods shall be 300 series stainless steel.
- B. The pressure rating of the tie-rod restrained dismantling joints shall be at least the field test pressure it is subjected during the pressure testing of the connecting pipeline, or the pressure class of the pipeline, whichever is higher.
- C. Apply fusion bonded epoxy-type protective coating system in accordance with AWWA C213, to interior and exterior of dismantling joints. Coating for interior surface shall be NSF 61 approved for potable water. Interior and exterior of dismantling joints shall have Manufacturer's standard epoxy system complete with prime and finish coats minimum of 12 mils DFT.
- D. Acceptable Manufacturers:
 1. Dresser Industries – Style 131
 2. Smith-Blair – Model 975
 3. Romac Industries – Style DJ400

2.13 HARNESSING AND RESTRAINT

- A. Unless otherwise noted, size and material for tie rods, clamps, plates, and hex nuts shall be as shown on the Drawings, or in the AWWA Manual M-11. Manufactured restraining clamp assemblies shall be as manufactured by Stellar Corporation or fabricated equal.
- B. All flexible couplings and flanged coupling adapters shall be harnessed. Harnesses shall conform to AWWA Manual M-11 except as modified by the Drawings or this specification.
- C. Restrained joints (such as welded, locking mechanical joints) shall be of the type specified with the individual type of pipe. If not specified, restrained (locking) mechanical joint pipe shall be of the manufacturer's standard design utilizing a locking device (ring or ears) integrally cast with the pipe.
- D. For up through 18 inch diameter ductile iron pipe only the following may be used as an alternative to other restraint system:
 1. The optional mechanical joint restraints shall be incorporated in the design of a follower gland. The gland shall be manufactured of ductile iron conforming to ASTM A536. Dimensions of the gland shall be such that it can be used with standard mechanical joint bell and tee-head bolts as specified with the pipe.
 2. The restraint mechanism shall consist of numerous individually activated gripping surfaces to maximize restraint capability. Gripping surfaces on the pipe shall be wedges designed to spread the bearing surfaces on the pipe. Twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuating of restraining devices. When the nut is sheared off, standard hex nut shall remain.

3. The mechanical joint restraint device for ductile iron pipe shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1.
4. Mechanical joint restraint devices shall be of the type listed below or equal.
 - a. For Ductile Iron Pipe: Flex Ring or Lock Ring by American Ductile Iron Pipe.
- E. Pump manufacturer shall design thrust harness for pump suction and discharge piping in accordance with Hydraulic Institute Standards. Pump manufacturer shall provide this information to the Contractor. Contractor shall provide any and all restraints, exceeding those shown on the Drawings that are required by the pump manufacturer at no additional cost to the Owner.
- F. The Contractor shall be responsible for anchorage including restraint as noted in elsewhere in Division 40.

2.14 SLEEVE ("DRESSER TYPE") COUPLINGS

- A. Sleeve type couplings shall conform to the requirements of AWWA C219. The pressure rating of the couplings shall be at least the field test pressure it is subjected during the pressure testing of the connecting pipeline or the pressure class of the pipeline whichever is higher.
- B. The couplings shall be of a gasketed, sleeve-type with diameter to properly fit the pipe. Each coupling shall consist of cylindrical sleeve, two follower rings, two gaskets and a set of bolts and nuts.
 1. Sleeve: Sleeve shall be ASTM A53, ASTM A512, ASTM A513, ASTM A536 Grade 65-45-12 or carbon steel having a minimum yield strength of 30,000 psi. Sleeve shall be lined with 12 mil DFT fusion bonded epoxy compatible with potable water. Minimum sleeve length shall be five inches for pipe 12-inches and smaller, seven inches for pipe sizes 14-inches thru 24-inches, and 10-inches for pipe larger than 24-inches. Sleeve for stainless steel piping shall be fabricated of ASTM A240, Type 316 stainless steel.
 2. Follower Rings: Ductile Iron ASTM A536 Grade 65-45-12, AISI C1012, AISI C1015 Steel, and AISI C1018 Steel or AISI C1020 Steel. Follower rings for stainless steel pipe shall be fabricated of ASTM A240, Type 316 stainless steel.
 3. Bolts and Nuts: Bolts and nuts are as specified in Paragraph 2.7 of this Section.
 4. Gaskets shall be of synthetic rubber suitable for service and operating conditions.
 5. Finish: Fusion bonded epoxy 12 mil DFT as per AWWA C213.
- C. Sleeve type couplings shall have pipe stop removed for exposed piping.
- D. Acceptable Manufacturers:
 1. Dresser Industries - Style 38, 138, or 253
 2. Romac Industries, Inc. - Style 400, 501, or XR501
 3. Smith-Blair - Model 411

- E. Sleeve type couplings shall be installed where shown on the Drawings and at locations where a disassembly gap is necessary to complete a piping assembly.
- F. Contractor at his option may install additional couplings other than shown on the Drawings for ease of installations without any additional cost to the Owner.
- G. In addition to those locations noted on the Drawings, sleeve couplings shall be provided on piping buried directly under a structure at the structure's expansion joints. Special treatment will be required where pipe is encased in concrete, utilizing minimum 3-inch thick Styrofoam placed perpendicular to horizontal centerline coupling.
- H. Joint harness shall be provided on all couplings and shall be designed for maximum test pressure to which the line will be subjected.
- I. All sleeve couplings shall be thrust restraint.

2.15 INSULATED SLEEVE COUPLINGS

- A. Couplings shall meet the basic requirements specified in Paragraph 2.14 of this Section.
- B. Insulated sleeve coupling shall be Dresser Style 39, or equivalent Smith Blair or Baker. Insulated coupling shall include boots for both pipe ends, and shall insulate each end from electrical current flow. The middle sleeve ring shall be sized to fit over the insulation boots and properly seal the connection. Where sleeve couplings are restrained using a thrust harness with bolts, over drill the bolt holes and insulating washers.

2.16 FLANGE COUPLING ADAPTERS

- A. Flange coupling adapters of the proper type shall be provided between different types of pipe. They shall be of the insulated type as acceptable to the Engineer.
- B. Flanged coupling adapters shall be similar to sleeve type couplings Dresser Style 127 or 128, similar models by ITT, or equal.
- C. Joint harness shall be provided on all flanged coupling adapters and shall be designed for maximum pressure to which the line will be subjected.
- D. Construction:
 - 1. Body and follower: Carbon Steel, Ductile Iron ASTM A536, Grade 65-45-12.
 - 2. End Ring: Ductile Iron ASTM A536, Grade 65-45-12.
 - 3. Flange: ANSI Class 125 or 250 flat face. Match class to that of piping system.
 - 4. Bolts and nuts: As per Paragraph 2.7 of this Section.
 - 5. Gaskets shall be of synthetic rubber suitable for service and operating conditions.
 - 6. Pressure Rating: The pressure rating of the flange coupling adapters shall be at least the field test pressure it is subjected to during the pressure testing of the connecting pipeline or the pressure class of the pipeline whichever is higher.
- E. Restraining or harnessing system shall be as shown on the contract drawings for flange coupling adapter.

F. Factory Painting:

1. Apply fusion bonded epoxy-type protective coating system in accordance with AWWA C213, to interior and exterior of adapters. Coating for interior surface shall be NSF 61 approved for potable water. Interior and exterior of flange coupling adapters shall have Manufacturer's standard epoxy system complete with prime and finish coats minimum of 12 mils DFT.
2. Do not paint bolts and gaskets.
3. Coatings used on exterior of couplings which will be exposed shall be compatible with specified coating system for piping so that coupling can be painted a common color.

2.17 DEPEND-O-LOK COUPLINGS

A. Depend-O-Lok split type bolted couplings shall meet the requirements of AWWA C219. Couplings type and size shall be as indicated on the Drawings. The pressure rating of the Depend-O-Lok couplings shall be at least the field test pressure it is subjected during the pressure testing of the connecting pipeline or the pressure class of the pipeline whichever is higher. Couplings shall pass an insulation test of 5,000 mega ohms.

B. Construction:

1. The housing shall be one or two-piece with a double arch cross section that closes around pipe ends that are smooth for joint flexibility or expansion and contraction requirements or pipe ends with steel restraint rings affixed for pipe end restraint requirements. Depend-O-Lok ExE couplings are flexible, unrestrained pipe joints. FxE couplings are flexible, expansion joints. FxF couplings are flexible, restrained joints. Flexibility, contraction and expansion and joint restraint are as specified in the Supplier's latest literature.
2. The housing shall be sized so that the inside diameter fits the outside diameter of the pipe. The coupling housing thickness shall be sufficient to handle the service loads.
3. Bolts or studs and nuts shall secure the closure plates.
4. Housing and closure plates shall be carbon steel conforming to ASTM A36 or stainless steel conforming to ASTM A240 Type 316L. Sealing plates shall be stainless steel conforming to ASTM A240 Type 316L.
5. Gaskets and sealing pad bonded to the sealing plate shall be of the synthetic rubber suitable for operating condition. Gasket material properties shall meet or exceed the requirements of ASTM D2000. Gaskets shall be classified as acceptable for potable water service by NSF 61.
6. Restraint rings shall be furnished with the couplings and shall be of the same material as the coupling housings.
7. Painting: Interior and exterior of carbon steel couplings shall be coated with liquid epoxy per the requirements of AWWA C210.
8. Buried couplings shall be protected against corrosion by providing heat shrink sleeves or cold applied tape conforming to AWWA C209.

C. Acceptable Manufacturers:

1. Depend-O-Lok couplings shall be as manufactured by Victaulic Depend-O-Lok, Inc.
2. Heat Shrink Sleeves shall be as manufactured by Canusa-CPS or Raychem.

2.18 MEGALUG RESTRAINED JOINTS

- A. Joint restraint devices for ductile iron and PVC pipe shall be Megalug as manufactured by EBAA Iron, Inc.
- B. The devices shall have a working pressure rating same as the adjoining piping they connect to. Ratings are for water pressure and must include a minimum safety factor of 2 to 1 for all pipe sizes.
- C. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.
- D. Three (3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory specifications and ASTM A536. Testing for tensile, yield and elongation shall be performed in accordance with ASTM E8.
- E. The restraint devices shall be coated using MEGA-BOND coating system.

2.19 QUICK CONNECT COUPLINGS

- A. Couplings shall be of the cam and groove type consisting of a male adapter conforming to F.S. MIL-C-27487. Male adapters shall be designed to receive a female coupler without requiring threading, bolting, or tools. Connections shall remain tight and leakproof under pressures up to 100 psig. Each adapter shall be furnished with a dust cap complete with an 18-inch long security chain of corrosion resistant material. Couplings shall be as manufactured by Dover Corporation, Ever-tite, or equal.
- B. Adapters shall be furnished in accordance with the Drawings or as required by the installation.

2.20 EXPANSION/VIBRATION ISOLATION JOINTS (FITTINGS)

- A. Expansion joints shall be single arch type of butyl rubber construction with carcass of high-grade woven cotton or suitable synthetic fiber and individual solid steel ring reinforcement. Soft rubber fillers shall be integrally cured into the arches to provide a smooth flow path to prevent settling of materials into the arch. Joints shall be constructed to pipe size and to meet working pressure and corrosive conditions. Joints shall have full faced fabric reinforced butyl flanges integral with the body. Split type steel or ductile iron back-up rings shall be provided to insure a good joint. Rings shall be designed for mating with ANSI 150 lb flanges. Joints shall be finish coated with Hypalon or equal paint.
- B. Expansion joints shall be furnished with control (harness) units. Harness units shall consist of minimum two drilled plates, stretcher bolts, and rubber washers backed by metal washers. Stretcher bolts shall prevent over-elongation of the joint. Extra nuts shall

be provided on the stretcher bolts on the inside of the plate to prevent overcompression. Nuts, bolts, and plates shall be 304 stainless steel.

- C. Expansion joints shall be Style 1015 filled arch as manufactured by General Rubber Corp. or equal.
- D. In addition to locations shown on the Drawings, expansion joints shall be utilized in exposed piping, within one foot of a building expansion joint, and on the discharge side of non-piston pumps, compressors, and rotating machinery.

2.21 WALL AND FLOOR FITTINGS

- A. Wall and floor castings, unless otherwise specified with the individual type of pipe, shall be ductile iron of the style shown on the Drawings with integral exterior water stop, standard models as manufactured by Clow, U.S. Pipe and Foundry, or equal.
- B. For plastic pipe or other pipe 2-1/2 inch diameter or less wall and floor fittings shall be ASTM A120, Schedule 40 steel sleeves with exterior steel water stop, all hot dipped galvanized after fabrication.

2.22 GAUGES AND ACCESSORIES

- A. All gauges unless otherwise noted be liquid filled and shall have 4-1/2 inch diameter face, with black letters on a white background and protected in their connecting piping by shut-off corporation stops or metal ball valve with level or tee handle. Gauges shall be supplied with pulsation dampers on all pressure lines. On other than potable water and air lines, gauges shall also be supplied with three-way flushing valves and diaphragm seals. Gauges shall have one percent accuracy over their full range and shall be as supplied by U.S. Gauge, Ashcroft, or March.

2.23 VALVE OPERATORS (INCLUDING FLOOR BOXES)

- A. The valve manufacturer shall supply and integrally mount all operators on valves at the factory. The valves and their individual operators shall be shipped as a unit.
- B. Unless otherwise noted, valves shall be manually operated; non-buried valves shall have an operating wheel, handle or lever mounted on the operator; buried valves shall have a non-rising stem with an AWWA 2-inch nut.
- C. Unless otherwise required by the Owner, all manual operating input shafts shall turn to the left (counter-clockwise) to open the valve.
- D. Each operating device shall have cast on it the work (OPEN) and an arrow indicating the direction of operation.
- E. Floor boxes for operating nuts recessed in concrete floors shall be standard cast iron type, cast-in-place with fastening top by Clow or equal.
- F. Chain wheel operators shall be supplied for all valves: Larger than 3 inch in diameter whose centerline is 6 ft. or more above the floor, where required for accessibility of valve operator, or as indicated on the Drawings. Chains shall be galvanized and loop within four feet of the floor. Chainwheel diameter shall match that of the handwheel.

1. Acceptable Manufacturers:
 - a. Babitt Steam Specialty, New Bedford, Massachusetts
 - b. Roto Hammer Industries, Tulsa, Oklahoma
- G. Unless otherwise noted, gear operators shall be provided for: All valves with operating shafts of larger than 8 inch nominal diameter (unless otherwise noted); for all buried valves with their operating shaft mounted horizontally (butterfly, plug, etc.); where specified and/or indicated on the Drawings; where manual operator effort is greater than 40 ft-lbs. Gear operators shall normally be of the beveled type with output shaft perpendicular to valve shaft, having a removable handwheel mounted on the output shaft. Gearing shall be machine-cut steel designed for smooth operator. Bearings shall be permanently lubricated, provided to take all thrusts and seals provided to contain lubricants. Housings shall be excluded from moisture and dirt. Manual operator input effort to the handwheel shall be a maximum of 40 ft-lbs. for operator the valve from full open to full close, under line pressure. Gear operators shall indicate valve position and have adjustable stops.

2.24 STRAINERS

- A. "Y" Type Strainers:
 1. Manual strainers furnished for pipe diameters smaller than 2 inches in diameter shall be "Y" type, capable of removing solids 0.01 inches diameter and larger. The strainer body shall be of semi-steel construction for steel pipe, and brass or bronze for copper pipe and shall conform to ASTM A278, Class 30. Strainers on plastic pipe shall be of the same material as the pipe. Strainer elements, including woven wire mesh, shall be constructed of stainless steel.
 2. Design of the strainer body shall be such that the clean-out plug and screw may be easily removed to permit inspection and cleaning without disassembly of inlet and outlet piping. End connections shall be ANSI screwed pipe threads.
 3. Sufficient spare screens shall be furnished for replacement of all "Y" type units at least once. Strainers shall be designed for a maximum operating pressure of 150 psig. They shall be as manufactured by GA Industries, Inc., or equal.
- B. Manual Basket Strainers:
 1. Manual basket strainers shall be furnished for pipe 2 inches in diameter and larger, as per the Drawings. Strainer body shall be of cast iron construction. Strainer elements, shall be constructed of Type 304 stainless steel. Design of the basket strainer body shall be such that the bolted lid and basket may be easily removed for inspection and cleaning without disassembly of inlet and outlet piping.
 2. A trap with a blow-off port shall be provided for removing any material that may settle at the bottom. Strainers shall be designed for a maximum operating pressure of 150 psig, and shall be 74-D as manufactured by GA Industries, Inc., or equal.
 3. Proper blowoff piping with valve shall be supplied, run to nearest drain.
- C. PVC Duplex Basket Strainer:
 1. Provide and install one 6-inch PVC duplex basket strainer where shown in as shown on drawings.

2. Strainer shall be of PVC construction, rated for a working pressure of up to 50 PSI. Baskets shall be removable without the need for tools.
3. Strainer shall be integrally fitted with PVC ball or butterfly valves to enable diversion of flow through either of the two baskets, while the other basket is isolated for cleaning. PVC ball valves shall be provided at each basket drain.
4. Strainer shall have two stainless steel baskets, each with 1/16" perforations, providing a minimum open area ratio of 4:1. Pressure drop across the strainer at maximum flow shall not exceed 1 psi.
5. Bolt bases securely to floor using 316 stainless steel capsule anchors.
6. Strainer shall be as manufactured by Hayward Flow Control Systems, Eaton Filtration, or approved equal.

2.25 CORPORATION STOPS

- A. Corporation stops shall be of bronze or brass, and shall be designed and manufactured in accordance with AWWA Standard C800, except as modified herein. Corporation stops shall have Mueller inlet threads, except that corporation stops for use with service clamps shall have IPS threads. Where corporation stops are used with plastic pipe, a brass companion flange shall be provided on the outlet of each corporation stop.

2.26 STAINLESS STEEL EXPANSION JOINTS

- A. The expansion joints shall be OMNI-FLEX as manufactured by Victualic, Incorporated. Unless noted otherwise all expansion joints shall be anchored with tie rods as recommended by the expansion joint manufacturer, with no less than two rods each. Expansion joints shall be furnished for installation at the locations shown on the Drawings. Thermal expansion and contraction that will occur in the pipe resulting axial and/or lateral movement of the pipe shall be based on a maximum temperature variation of 250 degrees Fahrenheit. The expansion bellows shall be produced from fully annealed stainless steel stock rolled into a tube, seam welded and formed into corrugations. Ends of the expansion bellows shall be prepared for stainless steel plate flanges conforming to ANSI/AWWA dimensions welded directly to the integral ends of the stainless steel bellows.

2.27 RUBBER EXPANSION JOINTS

- A. Expansion joints shall be single arch-type of butyl rubber construction with UV protection coating and carcass of high-grade woven cotton or suitable synthetic fiber and individual solid steel ring reinforcement. Soft rubber fillers shall be integrally cured into the arches to provide a smooth flow path to prevent settling of materials into the arch. Joints shall be constructed to pipe size and meet working pressure and corrosive conditions. Joints shall have full-faced fabric reinforced butyl flanges integral with the body. Split-type steel or ductile iron backup rings shall be provided to insure a good joint. Rings shall be designed for mating with ANSI 150 lb. flanges. Joints shall be finish coated with Hypalon or equal paint.
- B. Expansion joints shall be furnished with control (harness) units. Harness units shall consist of minimum two drilled plates, stretcher bolts, and rubber washers backed by metal washers. Stretcher bolts shall prevent over-elongation of the joint. Extra nuts shall

be provided on the stretcher bolts on the inside of the plate to prevent over compression. Retaining ring, nuts, bolts, and plates shall be 316L stainless steel.

- C. Expansion joints shall be Style 1101 filled arch as manufactured by General Rubber Corp. or equal.
- D. Expansion joints to be used for low pressure air applications shall be rated for temperatures up to 350°F.
- E. In addition to locations shown on the Drawings, expansion joints shall be utilized in exposed piping within one foot of a building expansion joint, and on the discharge side of non-piston pumps, compressors, and rotating machinery.

2.28 APPURTENANCES AND MISCELLANEOUS ITEMS

- A. Gaskets, glands, bolts, nuts, and other required hardware shall be provided for connection of piping and appurtenances. Bolts and nuts shall be high strength, Type 316 stainless steel if submerged, buried, in vaults or subject to splashing, or corrosive environment. All other bolts, nuts, and studs shall conform to ASTM A307 Grade B. Gaskets for flanges shall be full face and suitable for 200 degrees F operating temperature, unless higher temperature required on individual systems.
- B. Plugs, caps and similar accessories shall be of the same material as the pipe, and of the locking type, unless otherwise noted.
- C. Unions shall be of the same material as the pipe.
- D. Special dielectric protective tape shall be fabric reinforced petroleum tape as manufactured by Denso, Inc., or equal.

2.29 EMERGENCY SAFETY SHOWERS AND EYEWASH UNITS

- A. Furnish and install where shown on the Drawings. All assemblies shall be provided with stay-open ball valves. Provide eye wash with strainer on supply line. Units shall be complete with automatic flow control devices as required to limit emergency shower flow to 20 gpm and eye wash flow to 2.4 gpm. An emergency identification sign shall be included with each unit. Emergency safety shower and Eye Wash Assemblies shall be manufactured by Haws, Guardian, Western, Bradley, or Speakman. All units shall be provided with a tepid water system.
- B. Interior Emergency Shower/Eye Wash Unit (ESEW-A)
 - 1. Furnish and install a combination emergency shower and eye wash unit where shown on the Drawings.
 - 2. Units shall have a 10-in cyclac plastic shower head and eye wash bowl, stay open ball valves and hand and foot control for eye wash.
 - 3. Units shall be complete with automatic flow control devices as required to limit emergency shower flow to 20 gpm and eye wash flow to 3 gpm.
 - 4. Unit shall be equipped with a flow switch to provide a dry contact alarm signal when the unit is in use. The contact will be monitored by the plant SCADA system. Unit shall include strobe light and horn.

5. Unit shall be modified to include a 8-ft hand held recoil hose assembly with bracket for spray head and equal to Haws Model #8906, Guardian Model #G1716 or Bradley Model #S-19-600
- C. Exterior Freeze-Proof Emergency Shower/Eye Wash Unit (ESEW-B)
1. Furnish and install where shown on the Drawings, a combination emergency shower and eye wash unit equipped with heating cable and insulation and designed to operate at temperatures as low as minus 40 degrees F.
 2. Equipment shall include a ABS plastic shower head, stay-open ball valve, automatic volume control on both shower and eye wash, removable polyethylene foam insulation encased in ABS plastic jacket and a NEMA 4 enclosed thermostat. Shower flow shall be limited to 20 gpm. Eye wash shall include strainer, flow shall be 2.4 gpm.
 3. Unit shall have integral purge valve that opens when water temperature falls below 45 Deg. F. The valve shall be located opposite the water supply connection and purge approximately 6 gpm to prevent freezing in case of power failure.
 4. The unit shall be factory modified (special order) to include an additional 24-inch long section of heat trace wire exposed at piping inlet connection. Wrap heat trace wire around potable water supply from building. Insulate over heat trace and jacket outdoor exposed potable water piping.
 5. Unit shall be equal to Haws Model #8317CTFP. Other acceptable manufacturers are Guardian and Bradley.

PART 3 – EXECUTION

3.1 INSTALLATION GENERAL

- A. Items shall be installed per Manufacturer's instructions in the locations shown. Damage to items shall be repaired to the satisfaction of the Owner before they are installed.
- B. Install brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting items, check Drawings which have a direct bearing on their location to be responsible for the proper location of these appurtenances during construction of structures.
- C. Items shall be carefully inspected for defects in construction and materials; debris and foreign material cleaned out of openings, etc.; operating mechanisms operated to check their proper functioning, and nuts and bolts checked for tightness. Equipment which does not operate easily, or is otherwise defective, shall be repaired or replaced.
- D. Where installation is covered by a referenced Standard Specification, installation shall be in accordance with that Specification, except as herein modified.
- E. Unless otherwise noted, joints for items shall be made up utilizing the same procedures as specified under the applicable type connecting pipe joint.

3.2 INSTALLATION OF SLEEVE (DRESSER) TYPE COUPLINGS

- A. Unless otherwise required by the manufacturer's instructions, prior to installation of sleeve-type couplings, pipe ends shall be cleaned thoroughly for a distance of at least 12 inches. Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6 inches from the end, the middle ring shall be placed on the already installed pipe and shall be inserted into the middle ring flair and brought to proper position in relation to the pipe already laid. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.
- B. After the bolts have been inserted and nuts have been made up finger-tight, diametrically opposite nuts shall be progressively and uniformly tightened around the joint, by use of a torque wrench of the appropriate size and torque for the bolts.
- C. The correct torque as indicated by a torque wrench shall not exceed 75 ft-lb for 5/8 inch bolts and 90 ft-lb for 3/4 inch bolts.
- D. If a wrench other than a torque wrench is used, it should be no longer than 12 inches so that when used by the average person the above torque values shall not be exceeded.
- E. To prevent sleeve-type couplings from pulling apart under pressure, a suitable harnessing or flange clamp assembly shall be provided and installed where shown on the Drawings, or required elsewhere under in the Specifications concerning Anchorage.
- F. Note the additional locations required for sleeve couplings per Part 2 of this Section.

3.3 FLANGED COUPLINGS ADAPTERS

- A. Flanged coupling adapters shall be installed in strict accordance with the coupling manufacturer's recommendations. After the pipe is in place and bolted tight, the proper locations of holes for the anchor studs shall be determined and the pipe shall be field-filled. Holes for anchor studs shall be drilled completely through the wall pipe. Hole diameter shall not be more than 1/8 inch larger than the diameter of the stud projection.
- B. The inner surface of couplings shall be prepared for coating in accordance with instructions of the coating manufacturer and shall then be coated with liquid epoxy in accordance with AWWA C210. The remaining surfaces, except flange mating surfaces, shall be cleaned and shop primed with universal primer.

3.4 INSTALLATION OF DEPEND-O-LOK COUPLINGS

- A. Depend-O-Lok couplings shall be installed in strict accordance with the manufacturer's instructions in the locations shown on Drawings. The coupling shall be assembled with bolts at the closure plates, tightened to assure snug coupling with the pipe.
- B. Manufacturer's factory trained field representative shall instruct the Contractor's field personnel for the calculation of pipe expansion and contraction based on temperature during field installation and design temperature to the joint for providing gap at the joint. The factory trained representative shall also instruct the Contractor's field personnel for the installation of couplings. The coupling manufacturer shall provide these services for a minimum of eight hours in the field or shall be present during installation of first two (2) couplings whichever requires longer presence in the field.

- C. Manufacturer's factory trained field representative shall submit the certificate of proper installation of couplings.

3.5 INSTALLATION OF TIE-ROD RESTRAINED DISMANTLING JOINTS

- A. Tie-rod restrained dismantling joints shall be installed in strict accordance with the manufacturer's instructions in the locations shown on Drawings. Tie-rods must pass through the flanges on each end of the dismantling joint. Length of all tie rods shall be same.

3.6 INSTALLATION OF GROOVED JOINTS COUPLINGS

- A. Installation of AWWA grooved joint couplings and pipe shall be in accordance with the latest version of Manual I-300 "Field Installation Handbook for AWWA Products" published by Victaulic Company.
- B. Coupling gaskets shall be installed with the Victaulic lubricant compatible with the elastomer used. Lubrication of the gasket exterior, gasket sealing lips, housings, and pipe ends shall be done prior to joining to prevent gasket pinching.
- C. Coupling nuts shall be tightened evenly by alternating sides until metal-to-metal contact occurs at the bolt pads. For angle-bolt-pad couplings, even offsets must be present at the bolt pads to obtain pipe-joint rigidity.

3.7 INSTALLATION OF EXPANSION/VIBRATION ISOLATION FITTINGS

- A. Piping systems shall be aligned prior to installation of expansion fittings. Alignment shall be provided by fitting a rigid pipe spool in place of the expansion joint. Prior to testing of the piping system, the pipe spool shall be replaced with the specified expansion fitting.
- B. In addition to the locations noted on the Drawings, and in Part 2 of this Section, expansion fittings and anchors shall be located and spaced as specified by the Expansion Joint Manufacturer's Association under ambient conditions. They shall not be installed during times of temperature extreme or in a fully compressed or fully expanded condition.

3.8 INSTALLATION OF WALL AND FLOOR FITTINGS

- A. Wall pipes and pipe sleeves embedded in concrete walls, floors, and slabs shall be embedded as shown. Support all pipes embedded in concrete walls, floors, and slabs with form work to prevent contact with the reinforcing steel.

3.9 INSTALLATION OF OTHER EQUIPMENT, APPURTENANCES AND MISCELLANEOUS ITEMS

- A. Unions and wall fitting shall be installed as indicated on the Drawings.
- B. Hardware and appurtenances shall be installed as required and in accordance with the Manufacturer's recommendations, as acceptable to the Owner.
- C. Use Teflon tape on screwed fittings.

3.10 FIELD TESTING

- A. Testing and correction of deficiencies shall be in accordance with Section 40 80 05 – Field Testing of Piping Systems.

3.11 FIELD PAINTING

- A. Field painting is specified in Division 9. Buried metal items or those in vaults shall receive two coats of coal tar epoxy. The total DFT shall be 16 to 20 mils.

END OF SECTION

SECTION 40 05 07**HANGERS AND SUPPORTS FOR PROCESS PIPING****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, tools and related items required to furnish and install all pipe hangers, brackets, saddles, clamps and pipe rolls for all types of piping and duct systems. Pipe hangers and supports shall be furnished complete with all necessary inserts, bolts, nuts, threaded rods, washers and other accessories.
- B. The absence of pipe supports and details on the Drawings shall not relieve the Contractor of the responsibility for providing them. Pipe supports indicated on the Drawings are shown only to convey the intent of the design for a particular location and are not intended to represent a complete system.

1.2 RELATED WORK

- A. Division 1 - General Requirements
- B. Section 01 33 00 – Submittal Procedures
- C. Division 40 - Process Interconnections

1.3 REFERENCES

- A. American Welding Society (AWS)
 - 1. AWS D1.1/D1.1M - Structural Welding Code – Steel
- B. American Society of Mechanical Engineers (ASME)
 - 1. ASME B31.9 - Building Services Piping
- C. American Society for Testing and Materials (ASTM)
 - 1. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings for General Purpose Piping
 - 2. ASTM A576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality
- D. American Water Works Association (AWWA)
 - 1. AWWA Manual M45 – Fiberglass Pipe Design
- E. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS):
 - 1. SP-58 - Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation
 - 2. SP-69 - Pipe Hangers and Supports - Selection and Application
 - 3. SP-89 – Pipe Hangers and Supports – Fabrication and Installation Practices

1.4 QUALITY ASSURANCE

A. Support System Design

1. Engage the services of a professional engineer licensed in the state where the project is located. The professional engineer who is ordinarily engaged in the business of pipe support system analysis, to analyze system piping and service conditions, and to develop a detailed support system, specific to the piping material, pipe joints, valves and piping appurtenances proposed for use.
2. The support system shall include:
 - a. Criteria by piping system
 - b. Summary of Contractor-selected related components including joints, class, valves, appurtenances etc., and commercial supports and especially including pipe materials
 - c. Dead weight and dynamic analysis, including system thermal effects and pressure thrusts
 - d. Support arrangements shall be coordinated to eliminate interference with similar systems to be installed under HVAC, Plumbing and Electrical; to account for structural expansion joints and to maintain access for both personnel and for the removal of equipment. Support systems shall not include use of monorail or bridge crane support. Nor shall they rely on the horizontal structural struts.
 - e. Commercial hardware and custom supports shall comply with the requirements of this Section.

B. Pipe supports shall be manufactured by a company regularly engaged in the production of pipe supports. Acceptable Manufacturers:

1. Pipe Hangers and Channel Support Systems:
 - a. Cooper B-Line Systems
 - b. Grinnell/Anvil International
 - c. Piping Technology & Products
 - d. TOLCO a brand of NIBCO
 - e. PHS Industries
 - f. Unistrut/Tyco
 - g. Powerstrut
2. Powder-Actuated Fastener Systems:
 - a. Hilti
 - b. Red Head
 - c. Masterset Fastening Systems

C. Other Publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

1. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS):
 - a. SP-58 - Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation
 - b. SP-69 - Pipe Hangers and Supports - Selection and Application (Application for copies should be addressed to the Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street N.E., Vienna, VA 22180)

1.5 SUBMITTALS

- A. Submittals shall comply with Section 01 33 00 – Submittal Procedure, Submittals and Shop Drawings, Product Data and Samples, shall include complete layouts, schedules, location plans and complete total bill of materials for all pipe support systems, and shall include the maximum load carrying capacity of the support and the support system arrangement.
- B. Complete piping drawings indicating the type of hanger and/or support, location, magnitude of load transmitted to the structure and type of anchor, guide and other pipe supporting appurtenances including structural fasteners.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.
- E. Delegated Design Submittals:
 1. Submit signed and sealed Shop Drawings with design calculations and assumptions for load carrying capacity of trapeze, multiple pipe, and riser support hangers.
 2. Indicate sizing methods used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- F. Calculations showing the size of supports using allowable stresses of material are identified in MSS SP-58. All calculations shall be signed and sealed by a licensed professional engineer.
- G. Submit product data and details on each support.
 1. Product data on each support and hanger component
 2. Detail of each different type of support
 3. Location of each pipe support
 4. Detailed information on anti-seize compound

1.6 DELIVERY, HANDLING AND STORAGE

- A. All supports and hangers shall be crated, delivered and uncrated so as to protect against any damage.
- B. All parts shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until installation is completed.

- C. Finished metal surfaces not galvanized, that are not of stainless steel construction, or that are not coated, shall be grease coated, to prevent rust and corrosion.

1.7 DESIGN CONDITIONS

- A. In certain locations, pipe supports, anchors, and expansion joints have been shown on the drawings, but no attempt has been made to indicate every pipe support, anchor, and expansion joint. It shall be the Contractor's responsibility to design, furnish and install a complete system of pipe supports, to provide expansion joints, and to anchor all piping, in accordance with this section. Additional pipe supports may be required adjacent to expansion joints or couplings.
- B. Concrete and fabricated steel supports shall be as indicated on the drawings, as specified in other sections or, in the absence of such requirements, as permitted by the Engineer.
- C. All piping shall be rigidly supported and anchored so that there is no movement or visible sagging between supports with pipes full of fluid.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. The Contractor may propose minor adjustments to the piping arrangements in order to simplify the supports, or in order to resolve minor conflicts in the Work. Such an adjustment may involve minor change to the pipe centerline elevation so that a single trapeze support may be used. Supports shall be sufficiently close together such that the sag of the pipe is within limits that will permit drainage. Where ducts interfere with the proper location of hangers, furnish and install trapeze hangers.
- B. Design and Construction. Pipe hangers and supports shall be designed and constructed to meet the requirements of MSS SP-58 and MSS SP-69.
- C. Supports shall be provided at changes in direction. Changes in the direction shall be supported as close as practical to the fitting to avoid introducing excessive torsional stresses into the system. No piping shall be supported from other piping or from metal stairs, ladders and walkways unless specifically directed by the Owner's Representative.
- D. Whenever expansion and contraction of piping is expected, a sufficient number of expansion loops or joints shall be provided, together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints permitting the piping to expand and contract freely in directions away from the anchored points. All components shall be structurally suitable to withstand all loads imposed. Effects of thermal expansion and contraction of the pipe shall be accounted for in the pipe support selection and installation.
- E. All hangers, brackets, clamps, and supports shall be Type 316 stainless steel unless noted otherwise. Do not use perforated strap hangers. When two (2) or more pipes are run parallel, they may be supported on trapeze hangers.
- F. All submerged piping, as well as piping, conduits, and equipment in hydraulic structures within 24 inches of water level, shall be supported with support assemblies including

framing, hardware, and anchors, constructed of Type 316 stainless steel, unless otherwise indicated.

- G. All piping in chemical and corrosive areas shall be supported with support assemblies, including framing hardware and anchors, constructed of Type 316 stainless steel or FRP, unless otherwise indicated.
- H. All outdoor piping shall be supported with support assemblies including framing, hardware, and anchors constructed of Type 316 stainless steel.
- I. Unless otherwise shown on the drawings, all horizontal runs of piping suspended from the walkways or roof construction, shall be suspended by means of approved hangers.
- J. Fiberglass Reinforced Pipe (FRP): Wear protection pad shall be used at each pipe support. It shall be designed in accordance with AWWA Manual M45. The wear protection pad material shall be as per the manufacturer's recommendation and based on the application. It shall be from one of the following:
 - 1. Support Saddles manufactured by NOV Fiber Glass System
 - 2. Blank or Wear Saddles manufactured by Ameron International
 - 3. Wear pads manufactured by Conley
- K. All individually suspended horizontal pipes in the building shall be supported by stainless steel rods sized as follows:

<i>Pipe Size (in Inches)</i>	<i>Rod Size (in Inches)</i>
2 and smaller	3/8
2-1/2 - 3-1/2	1/2
4 - 5	5/8
6	3/4
8 through 12	7/8
14 through 18	1
20 through 24	1-1/4

- L. Channel struts and pipe clamps may be used to support multiple lines running in close proximity. Use expansion shields with bolts and horizontal drilled holes in existing concrete construction to support new piping.
- M. Metal Framing:
 - 1. Provide channels fabricated from not less than 12-gauge sheet steel, 1-5/8" wide and not less than 1-5/8" deep.
 - 2. Coatings:
 - a. Galvanizing: Hot-dip galvanize all steel components.
 - b. PVC: At the factory, apply a minimum 10-mil-thick PVC coating, bonded to metal.
 - 3. Use stainless steel channels and components in all areas unless noted otherwise.

4. Acceptable Manufacturers:
 - a. B-Line Systems, Inc.
 - b. Power Strut
 - c. Unitstrut
- N. All anchor bolts shall be stainless steel as specified in Division 05 - Metals. Space anchor bolts a maximum of 24-inches on center, with not less than two bolts per piece of framing.
- O. Continuous slotted inserts may be used to support multiple lines running in close proximity on either individual hangers or on trapeze. Use expansion shields with bolts and horizontal drilled holes in existing concrete construction to support new piping.
- P. Where flexible couplings are required at equipment, tank, etc., at the end opposite to the piece of equipment, tank, etc., shall be rigidly supported, to prevent transferring forces to the equipment. Fixed or restraining support shall not be installed between equipment and flexible coupling.
- Q. All uninsulated non-metallic piping such as PVC, CPVC, etc., shall be protected from local stress concentrations at each support point. Protection shall be provided by galvanized steel protection shields or 1/16-inch thick neoprene sheet. Where 360-degree arc support is required, such as U bolts, protection shields or 1/16-inch thick neoprene sheet shall be provided for the entire pipe circumference. Protection shields shall have an 18-gauge minimum thickness, not less than 12-inch in length and be securely fastened to pipe with stainless steel metal strap not less than ½-inch wide.
- R. Hangers supporting and contacting copper lines three inches in size and smaller shall be hinged ring hangers and adjusters. Where pipe hangers and supports come in contact with copper piping provide protection from galvanic corrosion by: wrapping pipe with 1/16 inch thick neoprene sheet material and galvanized protection shield; isolators similar to Elcen Figure 228; or copper plated or PVC coated hangers and supports.
- S. Provide neoprene isolators between the pipe and support components where dissimilar metals come in contact.
- T. Hangers supporting four inches and larger ferrous pipe shall be with two nuts for each support.
- U. All vertical risers shall be supported by riser clamps or supports at each floor and every five feet. Install four-inch square plate on masonry with attached rod using hangers fastened to risers. All vertical pipes passing through pipe sleeves shall be secured using a pipe collar.
- V. Where supports or anchors are used on copper piping, copper plate U-bolts and chairs or rubber inserts to eliminate dissimilar metal contact.
- W. For horizontal piping along equipment room walls, use brackets with hangers and rods as specified unless otherwise shown on the Drawings.
- X. Install supports and hangers to permit free expansion and contraction in the piping system. Where necessary to control expansion and contraction, piping shall be guided

and firmly anchored. Anchors shall be approved by the Engineer. Design for equal effectiveness for both longitudinal and transverse thrust. No piping shall be self-supporting, nor shall it be supported from equipment connections. Transmission of vibration, noise, etc., shall be considered, and any special suspension with vibration dampeners to minimize transmission shall be used where necessary. Shooting of anchors into concrete will not be allowed.

- Y. Where ducts interfere with the proper location of hangers, furnish and install trapeze hangers.

2.2 TYPE

- A. Pipe hangers and supports shall be selected from one of the types shown on Figure 1 of MSS SP-58 and MSS SP-69 or as indicated on the drawing, where applicable. Plastic pipe support spacing shall be as specified in this Section and in accordance with the plastic pipe Manufacturer's recommendations whichever is smaller.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Pipe Support Spacing:

1. General:

- a. Pipe hanger and support installation shall comply with the requirements of MSS SP-69, MSS SP-89 and this Section. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- b. Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems. Field assembled channel system shall be installed according to manufacturer's written instructions.
- c. Locate pipe supports at maximum spacing scheduled unless indicated otherwise.
- d. Provide at least one support for each length of pipe, at each change of direction, and at each valve.
- e. Locate pipe supports as shown in Table 3 of MSS SP-69 for piping not scheduled below or shown otherwise.
- f. Provide continuous support as required for small tubing to properly support the tubing along the pipe run and at connections to equipment.

2. Steel, stainless steel, cast-iron pipe support schedule:

PIPE SIZES – IN	* MAXIMUM SPAN (FT)	ROD SIZE – IN
2 and less	5	3/8
2 ½ thru 3 ½	10	½
4 thru 5	10	5/8
6	10	3/4
8 thru 12	15	7/8

3. Copper Pipe Support Schedule:

PIPE SIZES – IN	* MAXIMUM SPAN (FT)	ROD SIZE – IN
2-1/2 and less	5	1/2
3 thru 6	10	3/4
8 and greater	15	7/8

4. PVC, ABS Pipe Support Schedule:

PIPE SIZES – IN	* MAXIMUM SPAN (FT)	ROD SIZE – IN
1-1/4 and less	3	3/8
1-1/2 thru 3 4	1/2	
4 and greater	5	3/4

*Maximum fluid temperature of 120 Deg F.

Support spacings apply to continuous spans with no concentrated load.

B. Application:

1. Support piping approximately 1-1/2 inches out from the face of walls and at least three inches below ceilings.
2. Concrete inserts or L-shaped anchor bolts shall be used to support piping from new cast-in-place concrete. Epoxy or Expansion (as specified in Division 05 - Metals) anchors shall be used to fasten supports to existing concrete and masonry.
3. Design loads for inserts, brackets, clamps, and other support items shall not exceed the manufacturer's recommended loads.
4. Pipe supports shall be manufactured for the size and type of pipe to which they are applied. Threaded rods shall be sufficient threading to permit the maximum adjustment available in the support item.
5. Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead ending. Anchors shall be located as required to force expansion and contraction movement to occur at expansion joints, loops or elbows, and as required to prevent excessive bending stresses and opening of mechanical couplings. Anchorage for temperature changes shall be centered between elbows and mechanical joints used as expansion joints. Anchorage for bellows type expansion joints may be located adjacent to the joint.
6. Pipe guides shall be provided adjacent to bellows type expansion joints. Guides will not be required when mechanical couplings are permitted as expansion joints. Guides shall be placed on both sides of expansion joints except where anchors are adjacent to the joints. Unless otherwise indicated on the drawings, one guide shall be within four pipe diameters from the joint and a second guide with 14 pipe diameters from the first guide. Pipe supports shall allow adequate movement; pipe guides shall not be used for support. Pipe guides shall be installed as recommended by the manufacturer.
7. Concentrated loads (valves, flanges, etc.) shall be supported directly or supported immediately adjacent to the load.
8. Changes in the direction shall be supported as close as practical to the fitting to avoid introducing excessive torsional stresses into the system.
9. Valves shall be braced against operating torque.

- C. Adjustment: All hangers shall be adjustable. Wall hangers shall have slotted bolt holes. Ceiling hangers shall have turnbuckles. Floor supports shall have extended anchor bolts such that the support can be wedged to proper elevation and grouted. Provide a minimum of one inch of grout.
- D. Pipe Rack: Pipe supported on pipe rack shall be supported on channels. Clamp pipes on the channel support by pipe clamps.
- E. Touch Up:
 - 1. Touch up all scratches or cuts on steel components with an approved zinc chromate or a 90 percent zinc paint.
 - 2. Use a PVC compound on PVC-coated components.

3.2 INSULATED PIPE

- A. All insulated piping shall be furnished with a rigid foam insulating saddle at each pipe support location.
- B. Insulation shall pass through the supports. Size supports for the full outside diameter of the insulation.

3.3 PLASTIC OR FIBERGLASS PIPE

- A. Plastic or fiberglass pipe shall have cradles and rubber pads to distribute the load over a length of at least six inches, or more if indicated on the drawings, at all supports.

END OF SECTION

SECTION 40 05 19**DUCTILE IRON PIPE AND FITTINGS****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, tools, and incidentals required to install, in the locations inside, under and outside of structures as shown on the Drawings, all ductile iron piping, cast iron or ductile iron fittings, and appurtenances as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Division 03 – Concrete
- C. Division 09 – Finishes
- D. Applicable piping sections included in Division 40 – Process Interconnections.
- E. Section 40 80 05 – Field Testing of Piping Systems

1.3 REFERENCES

- A. American National Standards Institute (ANSI)/ American Water Works Association (AWWA)
 - 1. ANSI/AWWA C150/A21.50 – Thickness Design of Ductile-Iron Pipe
 - 2. ANSI/AWWA C151/A21.51 – Ductile-Iron Pipe, Centrifugally Cast
 - 3. ANSI/AWWA C153/A21.53 – Ductile-Iron Compact Fittings for Water Service
- B. American National Standards Institute (ANSI)
 - 1. ANSI A21.11 – Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 - 2. ANSI B16.1 – Gray Iron Pipe Flanges and Flanged Fittings
- C. American Water Works Association (AWWA)
 - 1. AWWA C105 – Polyethylene Encasement for Ductile-Iron Pipe Systems
 - 2. AWWA C110 – Ductile-Iron and Gray-Iron Fittings
 - 3. AWWA C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 - 4. AWWA C115 – Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threated Flanges
 - 5. AWWA C600 – Installation of Ductile-Iron Mains and Their Appurtenances
- D. American Society for Testing and Materials (ASTM)
 - 1. ASTM B-117 – Standard Method of Salt Spray (Fog) Testing

2. ASTM D714 – Standard Test Method for Evaluating Degree of Blistering of Paints
3. ASTM E-96 – Standard Test Methods for Water Vapor Transmission of Materials
4. ASTM G-22 - Standard Practice for Determining Resistance of Plastics to Bacteria
5. ASTM G-95 – Standard Test Method for Cathodic Disbondment Test of Pipeline Coatings (Attached Cell Method)

E. European Committee for Standardization (CEN)

1. CEN - EN 598 – Ductile Iron Pipes, Fittings, Accessories and Their Joints for Sewerage Applications – Requirements and Test Methods

1.4 QUALITY ASSURANCE

- A. All of the ductile iron pipe and cast-iron or ductile iron fittings shall be furnished by the manufacturers who are fully experienced, reputable, and qualified in the manufacture of the materials to be furnished. All ductile iron pipe shall be cast cleaned, lined, coated, tested, and certified at a single manufacturing facility with all manufacturing units contiguous to one another. The pipe and fittings shall be designed, constructed, installed in accordance with the best practices and methods and shall comply with these Specifications as applicable.

1.5 SUBMITTALS

- A. Submit to the Engineer in accordance with Section 01 33 00 – Submittal Procedures, a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
- B. All ductile iron pipe and cast iron or ductile iron fittings to be installed under this Contract shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. Furnish in duplicate to the Owner sworn certificates of such tests and their results. In addition, all ductile iron pipe and fittings to be installed under this Contract may be inspected at the foundry for compliance with these Specifications by an independent testing laboratory selected by the Owner. The manufacturer's cooperation shall be required in these inspections.
- C. Shop Drawings including piping layouts within, under, or between structures shall be submitted to the Engineer for review in accordance with General Requirements and shall include dimensioning, methods and locations of supports and all other pertinent technical specifications for all piping to be furnished.
- D. Submit product data on pipe, fitting and appurtenances describing materials of construction and dimensional data.
- E. Submit calculations showing thrust forces and restrained length. Thrust forces shall be calculated based on 150 percent of design pressure.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 DESCRIPTION OF SYSTEMS

- A. Piping shall be installed in those locations as shown on the Drawings.

- B. The equipment and materials specified herein is intended to be standard types of ductile iron pipe and cast-iron or ductile iron fittings for use in transporting water or wastewater.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Ductile Iron Pipe:

1. Ductile iron pipe shall be designed in accordance with ANSI/AWWA C150/A21.50 standard and manufactured in accordance with the ANSI/AWWA C151/A21.51 standard. Interior and flanged pipes shall be designed in accordance with ANSI/AWWA C153/A21.53. All pipes shall have a minimum pressure rating as indicated below, or higher ratings as indicated in the application of its intended use.

TABLE 1: DUCTILE IRON PIPE PRESSURE CLASSIFICATIONS

<i>Pipe Sizes (in)</i>	<i>Pressure Class (psi)</i>
4 - 12	350
14 - 20	250
24	200
30 - 64	150

2. Ductile iron pipe and fittings shall be ceramic epoxy lined with a minimum of 40 mils of Protecto 401 manufactured by Induron or another amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. A manufacturer certified applicator shall make application. Provide manufacturer's standard coating inside of all ductile iron pipe and fitting, except exposed pipe and fittings shall be shop primed and field painted on the outside as specified in Section 09 91 00 - Painting and Coating.
 3. Buried joints shall be push-on or mechanical joint type. Joints above finished grade or in vaults and pump station shall be flanged unless shown otherwise on the Drawings.
- B. Fittings: Exposed pipe shall be flanged unless noted otherwise. Exposed fittings for use with flanged joints on ductile pipe shall be cast iron or ductile iron fittings conforming to ANSI B16.1 or AWWA C110. Flanges shall be faced and drilled in accordance with ANSI B16.1, Class 125. All fittings shall be pressure rated at 250 psig. Compact fittings manufactured in accordance with ANSI/AWWA C153/A21.53 may be provided for buried service.
- C. Flanges: All exposed pipe shall be flanged unless noted otherwise. Flanges for ductile or cast iron pipe shall be ductile or cast iron flanges screwed on threaded ends of the pipe. Flanges shall conform to ANSI B16.1, Class 125. Screwed-on flanges shall be

attached to the pipe in the shop; attachment, aligning and facing shall conform to AWWA C115.

- D. Mechanical Joints: Mechanical joints shall only be used on buried pipe or where specifically noted on the drawings for exposed pipe. Mechanical joints for use with ductile iron pipe shall conform to AWWA C111, except gaskets shall be neoprene or other synthetic rubber. Natural rubber will not be acceptable. Mechanical joints shall be restrained, and bolts shall be T-head type complying with AWWA C111. Mechanical joints shall be MegaLug as made by EBAA Iron Inc., or RomaGrip as made by Romac Industries, Inc.
- E. Push-on Joints: Push-on joints shall conform to AWWA C111.
- F. Seal strips, where required on the Drawings shall be link seal as manufactured by Thunderline Corporation, Wayne, Michigan, or equal.
- G. Sleeve Type Couplings:
 - 1. Sleeve-type couplings shall be as made by Dresser Manufacturing Division, Bradford, PA, Smith-Blair, Inc., San Francisco, California, R.H. Baker & Company, Inc., Huntington Park, California, or Romac Industries, Inc., Bothell, Washington.
 - 2. Couplings for buried pipe shall be of cast iron and shall be Dresser Style 39, Smith-Blair Style 416, or Baker Allcast. The couplings shall be provided with stainless steel bolts and nuts unless indicated otherwise.
 - 3. Couplings for exposed pipe shall be of steel and shall be Dresser Style 38, Smith-Blair Style 411, or Baker Allsteel.
 - 4. Joint harnesses shall be provided on all couplings and shall be designed for maximum pressure to which the line will be subjected. The couplings shall be provided with black steel bolts and nuts unless indicated otherwise.
 - 5. All couplings shall be furnished with the pipe stop removed.
 - 6. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
- H. Restrained joints shall be “Flex-Ring” or “Lock Ring” by American Cast Iron Pipe Company.
- I. Filler flanges and beveled filler flanges shall be furnished and installed as required. Filler flanges and beveled filler flanges shall be furnished faced and drilled complete with extra length bolts. Filler flanges shall be Clow Figure F-1984 or equal and beveled filler flanges shall be Clow Figure F-1986 or equal.
- J. Polyethylene Encasement: Encasement for buried pipe shall be 8 mil continuous polyethylene encasement conforming to AWWA C105.

PART 3 – EXECUTION

3.1 HANDLING PIPE AND FITTINGS

- A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as recommended by the manufacturer.
- B. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no expense to the Owner. All pipe and fittings shall be thoroughly cleaned before installing, shall be kept clean until they are used in the work, and when installed, shall conform to the lines and grades required.
- C. Ceramic epoxy lined pipe and ceramic epoxy lined fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling.

3.2 LAYING EXTERIOR PIPE AND FITTINGS

- A. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA Standard Specification C600 except as otherwise provided herein. For buried piping a firm, even bearing throughout the length of the pipe shall be constructed by tamping selected material at the sides of the pipe up to the springline.
- B. All pipe shall be sound and clean before installing. When installing is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved in installing. Fittings, in addition to those shown on the plans, shall be provided, if required, to avoid interference with existing piping, conduit, etc. Provide restrained mechanical coupling where required for closures and fitup.
- C. When pipe cutting is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a Tyton bell shall be beveled to conform to the manufactured spigot end. All lining shall be undamaged.
- D. Pipe and fittings shall be restrained in order to overcome thrust forces. Restrained lengths shall be determined in accordance with the DIPRA Thrust Restraint Formulation for Polyethylene encased DIP.
- E. Unless otherwise shown or approved by the Engineer, all outside pipe lines shall have a 5-foot minimum cover.
- F. Jointing Ductile-Iron Pipe:
 - 1. Mechanical joints at valves, fittings, and where designated shall be in accordance with the "Notes on Method of Installation" under ANSI Specification A21.11 and the instructions of the manufacturer (use on buried pipe and only where indicated

on the drawings on exposed pipe). To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening the bolts. Bolts shall be tight to the specified torques. Under no condition shall extension wrenches or pipe over handle or ordinary ratchet wrench be used to secure greater leverage.

2. Flanged joints shall be made using ring gaskets of rubber with cloth insertion. Gaskets 12-inch in diameter and smaller shall be 1/16-inch thick; larger than 12-inch 3/32-inch thick. Flanged joints shall be made with bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall conform to the same American Standard Specification for Low- Carbon Steel, Externally and Internally Threaded Standard Fasteners, Designation A307-68. Bolt studs and studs shall be of the same quality as machine bolts.
 - a. Bolts in flanged joints or mechanical joints shall be tightened alternately and evenly. After installation two heavy bitumastic coatings comparable to Inertol No. 66 Special Heavy shall be applied to bolts and nuts.
3. Use sleeve-type coupling where required for closures and fitup and where indicated on the drawings. Fully restrain all sleeve couplings. Prior to installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8 inches. Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares. After the bolts have been inserted and all nuts have been made up fingertight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed 75 ft-lb for 5/8-inch bolts and 90 ft-lb for 3/4-inch bolts.
4. All valves, fittings and other appurtenances needed upon the pipe lines shall be set and jointed as indicated on the Drawings or as required.
5. After assembly and inspection and before backfill, all exterior surfaces of buried sleeve coupling and bolts and nuts shall be heavily and thoroughly coated with an approved heavy-bodied (high solids content) bituminous mastic.

3.3 TESTING

- A. All pipe lines shall be hydrostatically tested for leakage in accordance with procedures outlined in Section 40 80 05 - Field Testing of Piping Systems, for compliance with the specifications.
- B. Ceramic Epoxy Lining
 1. The ceramic epoxy lining shall have a permeability rating of 0.00 when tested according to Method A of ASTM E-96-66, Procedure A with a test duration of 30 days.
 2. The following test shall be run on coupons from the factory ceramic lined ductile iron pipe:

- a. ASTM B-117 Salt Spray (scribed panel): Results to equal 0.0 undercutting after two years.
 - b. ASTM G-95 Cathodic Disbondment 1.5 volts @ 77°F: Results to equal no more than 0.5 mm undercutting after 30 days.
 - c. Immersion testing rated using ASTM D-714-87.
 - 1) 20% Sulfuric acid: No effect after two years
 - 2) 140°F 25% Sodium Hydroxide: No effect after two years
 - 3) 160°F Distilled Water: No effect after two years
 - d. 120°F Tap Water (scribed panel): 0.0 undercutting after two years with no effect.
 - e. ASTM G-22 90 Standard practice for determining resistance of Synthetic Polymeric materials to bacteria. The test should determine the resistance to growth of Acidithiobacillus Bacteria and should be conducted at 30 degrees centigrade for a period of 7 days on a minimum of 4 panels. The growth must be limited only to trace amounts of bacteria.
3. The ceramic epoxy lining shall have an abrasion resistance of no more than 3 mils (.075 mm) loss after one million cycles using European Standard EN 598: 1994 Section 7.8 Abrasion Resistance.
 4. Documentation of compliance with the above test requirements shall be provided to the Engineer prior to shipment of ceramic epoxy lined ductile iron pipe.

3.4 INSPECTION AND CERTIFICATION

- A. All ceramic epoxy lined ductile iron pipe and ceramic epoxy lined fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC PA-2 Film Thickness Rating.
- B. The interior ceramic epoxy lining of all pipe barrels and fittings shall be tested for pinholes with a non-destructive 2,500 volt test. Any defects found shall be repaired prior to shipment.
- C. Each ceramic epoxy lined pipe joint and ceramic epoxy lined fitting shall be marked with the date of application of the lining system along with its numerical sequence of application on that date and records maintained by the applicator of his work.
- D. The ceramic epoxy lined pipe or ceramic epoxy lined fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified.

END OF SECTION

SECTION 40 05 31.13**PROCESS PVC PRESSURE PIPE****PART 1 – GENERAL****1.1 SECTION INCLUDE**

- A. Requirements regarding all labor, materials, equipment, tools and incidentals required to install Polyvinyl Chloride (PVC) pressure pipe, complete and in place, as shown on in the Drawing and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Division 01 - General Requirements
- C. Division 03 - Concrete
- D. Section 09 91 00 - Painting and Coating
- E. Section 40 05 07 – Hangers and Supports for Process Piping
- F. Applicable piping sections included in Division 40
- G. Section 80 05 40 – Field Testing of Piping Systems

1.3 REFERENCES

- A. American Water Works Association (AWWA)/American National Standards Institute (ANSI)
 - 1. AWWA/ANSI C110/A21.10 – Ductile-Iron and Gray-Iron Fittings, 3-in through 48-in (76mm through 1,219mm) for Water
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM D1784 – Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - 2. ASTM D1785 – Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
 - 3. ASTM D2466 – Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings Schedule 40
 - 4. ASTM D2467 – Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
 - 5. ASTM D2564 – Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems

6. ASTM D2855 – Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets

1.4 QUALITY ASSURANCE

- A. PVC pipe and fittings shall be from a single manufacturer. Inspection of the pipe will also be made by the Owner after delivery. The pipe shall be subject to rejection on account of failure to meet Specification requirements, even though pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job.

1.5 SUBMITTALS

- A. Submit shop drawings and product data as provided in Section 01 33 00 – Submittal Procedures for:
 1. Piping layouts and schedules, including dimensioning, fittings, locations of valves, and appurtenances, joint details, methods and locations of supports.
 2. All data and information required for the complete piping systems. Dimensions shall be on the actual equipment to be furnished.
- B. Prior to shipment of pipe, submit certified test reports that the pipe for the Contract was manufactured and tested in compliance with ASTM and ANSI / AWWA Standards specified.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

PART 2 – PRODUCTS

2.1 PVC PRESSURE PIPE

- A. Pipe and fittings shall be manufactured from ASTM D1785.
- B. Wall thickness shall be Schedule 80.
- C. Fittings shall be socket-type conforming to ASTM D2467.
- D. Pipe and fitting joints shall be of the socket type, designed for cold solvent welding conforming to ASTM D2564 and ASTM D2855.
- E. Flat-faced flanges with troling pattern conforming to ANSI B16.5 Class 150 rated at 150 psi at 80°F.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General: All PVC pipes shall be installed in a neat and workmanlike manner, properly aligned, and cut from measurements taken at the site to avoid interferences with structural members, architectural features, openings, and equipment. Exposed pipes shall afford maximum headroom and access to equipment, and where necessary all piping shall be installed with sufficient slopes for venting or drainage of liquids and

condensate to low points. All installations shall be acceptable to the Engineer. Contractor shall strictly follow manufacturer's installation recommendations and requirements of this specification for assembly, chamfering of plain ends, applying solvents, and supporting pipe.

- B. Supports and Anchors: All piping shall be firmly supported with fabricated or commercial hangers or supports in accordance with Section 40 05 07 – Hangers and Supports for Process Piping. Where necessary to avoid stress on equipment or structural members, the pipes shall be anchored or harnessed. Expansion loops and guides shall compensate for pipe expansion due to temperature differences.
- C. Valves and Unions: Unless otherwise indicated, all connections to fixtures, groups of fixtures, and equipment shall be provided with a shutoff valve and union, unless the valve has flanged ends. Unions shall be provided at threaded valves, equipment, and other devices requiring occasional removal or disconnection.

3.2 PIPE PREPARATION

- A. Prior to installation, each pipe length shall be carefully inspected, flushed clean of any debris or dust, and be straightened, if not true. All pipe fittings shall be equally cleaned before assembly.

3.3 PIPE JOINTS

- A. Solvent-Welded Joints: Solvent-welded joints shall be made with fresh cleaner, primer and PVC solvent cement on clean, dry pipe ends in accordance with manufacturer recommendations for the specific piping application. It is the responsibility of the Contractor to confirm product compatibility and submit to the Engineer during the submittal process.
- B. Flange Joints: Flanged joints shall be made with gaskets suitable for chlorine saturated water and Type 316 stainless steel bolts and nuts. Care shall be taken not to over-torque the bolts.

3.4 INSPECTION AND FIELD TESTING

- A. Inspection: All finished installations shall remain undisturbed for 24 hours to develop complete strength at all joints and be carefully inspected for proper joints and sufficient supports, anchoring, interferences, and damage to pipe, fittings, and coating. Damage shall be repaired to the satisfaction of the Owner.
- B. Field Testing: All piping systems shall be pressure tested as specified in Section 40 80 05. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum working pressure. The Contractor shall furnish all test equipment, labor, materials, and devices at no extra cost to the Owner.
 - 1. Leakage may be determined by loss of pressure, soap solution, chemical indicator, or other positive and accurate method. All fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines are plugged or capped as required during the testing procedures.

2. Leaks shall be repaired to the satisfaction of the Owner, and the system shall be retested until no leaks are found.

END OF SECTION

SECTION 40 05 50**MISCELLANEOUS VALVES AND FITTINGS****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding labor, materials, equipment, tools and incidentals required to install miscellaneous instruments, valves, and fittings, complete in place, as shown on the Drawings and as specified herein.
- B. The equipment shall include, but not be limited to the following: (Note: All items listed below may not be required in this Contract).
 - 1. Solenoid Valves
 - 2. Air Release Valves
 - 3. Combination Vacuum Relief Air Inlet/Air Release Valve
 - 4. Surge Check Valves (For use with Air Vacuum and Air Release Valves)
 - 5. Gate Valves – 12 Inches or Smaller
 - 6. Tapping Saddle
 - 7. Tapping Sleeves
 - 8. Valve Boxes (Underground)
 - 9. Vacuum Regulators

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 01 78 23 – Equipment Operation and Maintenance Data
- C. Division 09 - Finishes
- D. Section 09 91 00 – Painting and Coating
- E. Section 31 23 33 Trenching, Backfilling, Embedment and Encasement
- F. Section 40 05 06 – Piping Specialties
- G. Section 40 05 07 – Hangers and Supports for Process Piping
- H. Applicable Piping Sections Included In Division 40

1.3 REFERENCES

- A. American Society of Mechanical Engineers (ASME)/American National Standards Institute (ANSI)
 - 1. ASME/ANSI B2.1 – Pipe Threads (Except Dryseal)

B. American Society of Testing and Materials (ASTM)

1. ASTM A36 – Standard Specification for Carbon Structural Steel
2. ASTM A48 – Standard Specification for Gray Iron Castings
3. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
4. ASTM A126 – Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
5. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications
6. ASTM A276 – Standard Specification for Stainless Steel Bars and Shapes
7. ASTM A283 – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
8. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
9. ASTM A313 – Standard Specification for Stainless Steel Spring Wire
10. ASTM A351 – Standard Specification for Castings, Austenitic, for Pressure-Containing Parts
11. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings
12. ASTM B505 – Standard Specification for Copper Alloy Continuous Castings
13. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications
14. ASTM D2133 – Standard Specification for Acetal Resin Injection Molding and Extrusion Materials

C. American Water Works Association (AWWA)

1. AWWA C506 - Backflow Prevention Devices-Reduced Pressure Principle and Double Check Valve Types
2. AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service
3. AWWA C550 – Protective Interior Coatings for Valves and Hydrants

1.4 QUALITY ASSURANCE

- A. Valves listed herein shall be products of manufactures that have a minimum of five (5) years of experience in the manufacturing of the particular equipment item to be furnished.
- B. Valves of the same type shall be identical, varying only with size, and the product of one manufacturer.

1.5 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures. The submittal shall show as a minimum all details and materials of construction and dimensions.
- B. Submit operating and maintenance instructions as provided in Section 01 78 23– Equipment Operation and Maintenance Data.
- C. Valves specified to be manufactured in accordance with AWWA and other standards must be submitted with an appropriate affidavit of compliance.

1.6 DELIVERY, STORAGE AND HANDLING (Not Used)

1.7 TOOLS AND SPARE PARTS

- A. Special tools and the manufacturer's standard spare parts, if required for normal operation and maintenance, shall be supplied with the equipment as specified.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Valves and appurtenances shall have the name of the maker, flow directional arrows, size, and the working pressure for which they are designed, cast in raised letters upon appropriate part of the valve body.
- B. Valves shall have a minimum working pressure of 150 psi or be the same working pressure as the pipe they connect to, and suitable for the pressures noted where they are installed.
- C. Joints, size and material unless otherwise noted or required by the Engineer:
 - 1. Joints referred to herein shall be of the same type and material as the pipe or fittings they are connect to;
 - 2. Valves and appurtenances shall be of the same nominal diameter as the pipe or fittings they are connected to;
 - 3. Buried valves shall have mechanical joint ends unless noted otherwise on the Drawings.
- D. Ensure that valves and appurtenances have ends/joints that are compatible with, and may be fastened to the adjoining pipe. This may mean furnishing special adaptors as required. These adaptors shall be suitable for direct bury, with proper dielectrically insulation and as a minimum, if metallic non stainless steel or galvanized, coated with two coats of coal tar epoxy.
- E. Buried valves and operators, and those located outdoors, particularly buried, or within maximum 2 feet above liquid, or in vaults or where noted shall be especially designed for service as if buried in the ground where water may completely submerge the valve and operator.

2.2 SOLENOID VALVES

- A. Solenoid valves shall be packless piston type direct acting, 2-way or 3-way valves and shall be ASCO Valve Red Hat as manufactured by Automatic Switch Co., an equal by Atkomatic Valve Co., Inc., for air and water service.
- B. Valves on water seal lines shall be of the normally closed type, interconnected with pumping unit to shut down if no seal water flow.
- C. Valves shall have forged brass bodies, NPT end connections of the size shown on the Drawings, 300 or 400 series stainless steel internal parts, and Buna-N or Ethylene Propylene valve seats. Valves shall have a same working pressure as the connecting pipe and zero minimum operating pressure differentials. Connections shall be threaded.
- D. Except as otherwise specified, valves shall have NEMA 4 solenoid enclosures, shall be suitable for operation on a 120V, 60 Hz, single phase power supply, and shall be provided with a continuous duty Class F coil and a manual operator.
- E. Solenoid valves on bypass piping shall be installed whether shown or not.
- F. Note that solenoid valves may be shown on Electrical and/or Mechanical Drawings, or may only be specified.

2.3 AIR RELEASE VALVES

- A. Valves shall be installed to release any small accumulations of air, which may collect while the main pipe is in operation and under pressure.
- B. The small orifice assembly (Air Release Valve) shall automatically release air accumulations from the pipe while under positive pressure. When the valve body fills with air, the small orifice float ball falls to open the small orifice and exhaust the air to atmosphere. When the air has been exhausted, the small orifice shall be buoyed up and tightly close the small orifice.
- C. The small orifice assembly shall be furnished with cast iron body and cover ASTM A126-B. The float ball shall be constructed of stainless steel and attached to a stainless steel lever mechanism. A resilient, Buna-N seat shall be attached to the lever mechanism for drop-tight closure.
- D. Separate air release valves shall be Crispin, APCO, ValMatic or Golden Anderson (GA).

2.4 COMBINATION VACUUM RELIEF AIR INLET/AIR RELEASE VALVE

- A. Combination Vacuum Relief/Air Inlet/Air Release Valves (double body, double orifice) shall allow large volume air entry through the large diameter air inlet orifice, when vacuum occurs in a system, then close air tight trapping air, as the system returns to positive pressure. While the large orifice is closed, the smaller size air release orifice shall remain open, to slowly release trapped air in a controlled manner, to prevent water hammer and excess pressure surges. The small orifice shall operate (open) up to 300 psi. The size of the small orifice is shown on the Drawings.

- B. The small orifice Air Release Valve shall operate with a compound level mechanism of stainless steel, actuated by a stainless steel float, designed to withstand 500 psi.
- C. The Air Inlet Valve, internal plug and seat, shall be heavy cast brass; the seat retained in the body by a heavy cover; have a (molded not glued) resilient Buna-N seal, for positive shut-off and plug, center guided both ends, to prevent jamming. The plug shall be normally closed by means of a stainless steel spring and shall open when a vacuum pressure different exceeds 0.25 psi or less. The Combination Air Inlet Valve shall be rated 300 lb. Class.
- D. The valve internals, shall be replaceable, without removing valve from the line and the materials of construction certified, conforming to following ASTM specifications:

<i>Part name</i>	<i>Materials</i>	<i>Specification</i>
Body, Cover	Cast Iron	ASTM A126 Gr. B
Baffle (1/2", 1", 2")	Delrin	ASTM D2133
Baffle (3")	Cast Iron	ASTM A48 Cl. 30
Plug & Seat	Brass	ASTM B584
Exterior Paint	Phenolic Primer Red Oxide	FDA Approved for Potable Water
Float	Stainless steel	ASTM A240
Seat/Needle	Buna-N	Nitrile Rubber
Spring	Stainless steel	ASTM A276
Hood	Galv. iron or steel	Commercial Grade
Lever Mech.	Stainless steel	ASTM A351 T316

- E. Combination Vacuum Relief/Air Inlet Valve/Air Release (Flanged Type) Valve shall be GA Industries, APCO, Valmatic or Crispin.

2.5 SURGE CHECK VALVES (FOR USE WITH AIR VACUUM AND AIR RELEASE VALVES)

- A. Surge check valves shall be installed on the inlet of the air vacuum and air release valve to eliminate a surge of water from prematurely closing or damaging the air release valve.
- B. The valves shall be ANSI class 250 flanged, cast iron construction with bronze valve disc and seat ring and stainless steel spring.
- C. The valve disc shall have drilled holes. These holes allow water to pass after the disc has been seated. The water slowly fills the air and vacuum valve to buoy its float and

seal the valve. As the pressure equalizes, a stainless steel spring pushes the disc away from the seat to its original position.

D. Refer to Air Vacuum and Air Release Valve specifications for valve detail.

E. The materials shall conform to the requirements following:

<i>Part name</i>	<i>Materials</i>
Body	Cast Iron ASTM A126 Class B
Seat Ring	Bronze ASTM B62
Valve Disc	Bronze ASTM B62
Spring	Stainless Steel ASTM A313
Bushing	Bronze ASTM B505

F. Product and Manufacturer

1. The Manufacturer shall be the same as the Manufacturer selected for the air vacuum and air release valves. The model shall be per the Manufacturer's recommendation.

2.6 GATE VALVES – 12 INCHES OR SMALLER:

A. 4"-12": Gate valves shall be iron bodied, resilient seated and in accordance with AWWA C-509, latest revision:

1. All valves shall have a working pressure of 250 psi and shall be hydrostatically tested from both directions. The shell shall be tested at 400 psi, with no leakage. The body, bonnet, and stuffing box shall be flanged with ATSM A-307 Grade B bolts and nuts, and rust proofed in accordance with ASTM A123.
2. Stems shall be machined from modified manganese bronze rod with an integral forged thrust collar machined to size. Stem seals shall be one "O" ring above and one stem "O" ring below the thrust collar forming a lubricant reservoir to isolate and lubricate the thrust collar, bearing surfaces and "O" rings.
3. Valve discs shall be cast ASTM B-62 bronze stem nut to provide disc rigidity and positive travel stop to prevent over compression of the resilient seat. The disc seat shall be open to flow on one side to prevent collection of debris.
4. The disc seat rings shall be molded natural rubber, internally steel reinforced and machined, epoxy coated matting surface in the valve body. The disc seat rings shall be attached to the disc by self-setting type 304 S.S. replaceable screws.
5. All internal ferrous materials shall be factory coated with a thermoset epoxy to a dry film thickness of 4 mils.
6. All buried valves shall have non-rising stem.

7. Exterior coating shall be epoxy coating in accordance with AWWA C550. The minimum thickness shall be 12 mils.
 8. Ends shall be with flanged, mechanical joint, or push-on end as indicated on the plans and in accordance with AWWA C-509.
 9. The valve shall be Mueller, Kennedy, Clow or M&H.
- B. 2" and smaller: Gate valves 2" and smaller for water and wastewater shall be 200 psi water on gate valves with Grade A bronze bodies, bonnet, and disc. All other parts shall be bronze also, except the wheel and wheel nut which shall be iron or steel. The valve shall be rising stem, union bonnet, solid wedge reversible disc valve with stuffing box filled with durable packing. The valve shall be Crane No. 428-UB, Grinnell Fig. No. 3030 or approved equal.

2.7 TAPPING SADDLE

- A. Tapping saddles shall be fabricated from steel plates conforming to ASTM A283 (Grade B, C, or D) or ASTM A36.

2.8 TAPPING SLEEVES

- A. Tapping sleeves shall be constructed of Grade 18-8 Type 304 Stainless Steel and be of the split sleeve design. Sleeves shall be provided with a gridded gasket which totally surrounds the pipe to be tapped. The gasket shall be composed of nitrile conforming to ASTM D2240. The sleeves shall be manufactured to withstand a maximum working pressure of 150 psi. The outlet or branch shall be constructed of stainless steel and be designed to accommodate a standard mechanical joint resilient wedge gate valve. Tapping sleeves shall be Ford "Fast MJ style", Power Seal "3490 MJ" or approved equal. Tapping sleeves shall be wrapped in polyethylene wrap as specified herein.

2.9 VALVE BOXES (UNDERGROUND)

- A. Valve boxes shall be three (3) piece adjustable, five and one-quarter ($5\frac{1}{4}$ ") inch shaft diameter, high grade screw-type cast iron valve boxes as manufactured by the Tyler Corporation of Tyler, Texas, Series 6850 or approved equal.
- B. Valve boxes shall be installed upon the valve with the use of a valve box stabilizer. The valve box stabilizer shall be Valve Box Adapter, Inc. or approved equal.

2.10 VACUUM REGULATORS

- A. Vacuum regulators shall be designed for handling chlorine gas.
- B. Manufacturers
1. Hydro Instruments
 2. Approved Equal

2.11 SHOP PAINTING

- A. Surface preparation and shop painting shall be as specified in Section 09 91 00 – Painting and Coating.

PART 3 – EXECUTION

3.1 INSTALLATION GENERAL

- A. Items shall be installed per Manufacturer's instructions in the locations shown. Any damage to items shall be repaired to the satisfaction of the Engineer before they are installed.
- B. Install brackets, extension rods, guides, the various types of operators and appurtenances as shown the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, check Drawings, which have a direct bearing on their location and be responsible for the proper location of these appurtenances during the construction of structures.
- C. Items shall be carefully inspected for defects in construction and materials; debris and foreign material cleaned out of openings, etc.; operating mechanisms operated to check their proper functioning, and nuts and bolts checked for tightness. Equipment, which does not operate easily, or is otherwise defective, shall be repaired or replaced at no additional cost to the Owner.
- D. Where installation is covered by a referenced Standard Specification, installation shall be in accordance with that Specification, except as herein modified.
- E. Unless otherwise noted, joints for items shall be made up utilizing the same procedures as specified under the applicable type connecting pipe joint.

3.2 FIELD PAINTING

- A. Field painting is specified in Division 9 - Finishes. Buried metal items or these in vaults or not otherwise coated shall receive two coats of bitumastic paint.

3.3 INSTALLATION OF UNDERGROUND VALVES AND VALVE BOXES:

- A. All valves and valve boxes shall be backfilled per Section 31 23 33 – Trenching, Backfilling, Embedment and Encasement.
- B. The valve boxes shall have a concrete pad poured at the top of the box as detailed on the Drawings.

3.4 TAPPING LINES:

- A. Tapping work shall be performed under the direct inspection of the ENGINEER. The ENGINEER shall be notified 24 hours in advance of any planned line tap. Tap coupons shall be labeled and provided to the ENGINEER after each completed tap has been made.
- B. The CONTRACTOR shall verify the outer dimension and type of existing lines which are to be tapped for tying the new line to the existing lines prior to ordering connection equipment and fittings. Any deviation from the data shown on the Drawings shall be brought to the attention of the ENGINEER for resolution.

- C. Install tapping saddles, tapping sleeves, and valves in accordance with the manufacturer's instructions. Before drilling, pressure test the tapping saddles, tapping sleeves, and valves. Install DIMJ plug in valves prior to testing. Pressure test to 150 psig for thirty minutes. Visually check all connections for leaks.

END OF SECTION

SECTION 40 23 00**PLANT PIPING, GENERAL****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, tools, materials, equipment, and incidentals required to install plant piping and associated appurtenances, complete and in place, as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Division 01 – General Requirements
- B. Section 01 33 00 – Submittal Procedures
- C. Division 03 – Concrete
- D. Section 09 91 00 – Painting and Coating
- E. Division 31 – Earthwork
- F. Section 31 00 00 – Earthwork
- G. Section 31 23 33 – Trenching, Backfilling, Embedment and Encasement
- H. Section 31 23 33.14 – Trench Shielding
- I. Section 40 80 05 – Field Testing of Piping Systems

1.3 REFERENCES (NOT USED)**1.4 QUALITY ASSURANCE (NOT USED)****1.5 SUBMITTALS**

- A. In addition to the submittal requirements of Division 01 – General Requirements and Section 01 33 00 – Submittal Procedures, the following information shall be provided:
 - 1. A specific selection of pipe material and joint type for each pipeline.
 - 2. Double-line drawings of each piping support system to the scale stated on the Contract drawings, locating each support and hanger, identifying the type by catalog number or shop drawing detail number, and showing anchor locations and identifying them by shop drawing detail number.
 - 3. Detail installation drawings, catalog information, and complete component selection list for metal framing pipe support system in the buildings, pipe galleries, trenches, and other locations employing metal framing pipe support systems.
 - 4. Pipe leak test reports

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.7 PIPE IDENTIFICATION PAINTING

- A. All exposed piping shall be painted as specified in Section 09 91 00 – Painting and Coating by color and labeling shall be identified as specified in Section 40 05 97 - Identification for Process Equipment.

PART 2 – PRODUCTS

2.1 WATER SOURCE

- A. Water for testing under this Section will be provided by the Owner.
- B. The Contractor shall make complete and satisfactory arrangements with the Owner prior to obtaining water for testing purposes. It shall be the responsibility of the Contractor to provide all equipment necessary to transport the water from the source to the structure to be tested.

PART 3 – EXECUTION

3.1 PIPE PREPARATION AND HANDLING

- A. Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed or the buried pipe or fitting is lowered into the trench. The interior and exterior protective coating shall be inspected, and all damaged areas patched in the field with material similar to the original. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
- B. Use proper equipment, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe into trenches under any circumstances.

3.2 INSTALLATION OF BURIED PIPING

- A. Preparation of Trench: Trench excavation shall be as specified in Section 31 23 33 - Trenching, Backfilling, Embedment and Encasement.
- B. Removal of Water: Provide and maintain ample means and devices at all times to remove and dispose of all water entering the trench during the process of pipe laying. The trench shall be kept dry until the pipe laying and jointing are completed. Removal of water shall be in conformance with specifications in Section 31 23 33.14 - Trench Safety and Section 31 00 00 - Earthwork.
- C. Prevent Trench Water and Animals from Entering Pipe:
 - 1. During installation, keep the interior of all pipe, fittings, and other accessories as free as possible from dirt and foreign matter at all times.
 - 2. When the pipe laying is not in progress, including the noon hours, the open ends of pipe shall be sealed by a plug or cap to prevent trench water, animals, or foreign material from entering the pipe. If water has accumulated in the trench, the seal shall remain in place until the trench water has been removed to such an extent that it will not enter the pipe.

- D. Backfill in Pipe Zone: Backfill, embedment and encasement shall be as specified in Section 31 23 33 - Trenching, Backfilling, Embedment and Encasement.

3.3 INSTALLATION OF EXPOSED PIPING

- A. Unless shown otherwise, piping shall be parallel to building lines. Hangers on adjacent piping shall be aligned where possible on common size ranges.
- B. All pipe flanges shall be set level, plumb, and aligned. All flanged fittings shall be true and perpendicular to the axis of the pipe. All bolt holes in flanges shall straddle vertical centerline of pipes.
- C. Unions, mechanical coupling or flanged coupling adaptors shall be installed where required for piping or equipment installation, even though they are not shown on the plans. All mechanical couplings and flanged coupling adaptors shall be anchored with joint harnessed assemblies.
- D. Piping shall be installed without springing or forcing the pipe in a manner which would set up stresses in the pipe, valves, or connected equipment.
- E. Required straight runs of piping upstream and downstream of flow measuring devices shall be smooth.
- F. Where valve handwheels or chainwheels are shown, valve orientation shall also be as shown on drawings. Where valve handwheels or chainwheels are not shown, valves shall be orientated to permit easy access to the handwheels or chainwheels, and to avoid interferences.

3.4 INSTALLATION OF WALL PIPES AND PIPE SLEEVES

- A. Wall pipes and pipe sleeves embedded in concrete walls, floors, and slabs shall be embedded as shown. Support all pipes embedded in concrete walls, floors, and slabs with form work to prevent contact with the reinforcing steel.

3.5 INSTALLATION OF FLEXIBLE COUPLINGS, FLANGED COUPLINGS ADAPTERS, AND SERVICE CLAMPS

- A. Prior to installation, thoroughly clean oil, scale, rust, and dirt from the pipe to provide a clean seat for the gasket. Care shall be taken that the gaskets are wiped clean before they are installed.
- B. If necessary, flexible couplings and flanged coupling adapter gaskets may be lubricated with soapy water or manufacturer's standard lubricant before installation on the pipe ends.
- C. Install in accordance with the manufacturer's recommendations. Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time until all bolts have a uniform tightness. Workmen tightening bolts shall use torque-limiting wrenches, or approved type.

3.6 INSTALLATION OF INSULATING FLANGES, COUPLINGS, AND UNIONS

- A. Install insulating flanges, couplings, and unions wherever copper or stainless steel is connected to ductile iron, iron, or steel, galvanized steel piping, and wherever cathodically protected lines enter the buildings.

3.7 INTERIM CLEANING

- A. Care shall be exercised during fabrication to prevent the accumulation of weld rod, weld spatter, pipe cuttings and fillings, gravel, cleaning rags, etc., within piping sections. All piping shall be examined to assure removal of these and other foreign objects prior to assembly. Shop cleaning may employ any conventional commercial cleaning method if it does not corrode, deform, swell, or otherwise alter the physical properties of the material being cleaned.

3.8 FINAL CLEANING

- A. Following assembly and testing and prior to final acceptance, all pipelines installed under this section, except plant process air lines and instrument air lines, shall be flushed with water and all accumulated construction debris and other foreign matter removed. Flushing velocities shall be a minimum of 2.5 feet per second. Cone strainers shall be inserted in the connections to attached equipment and left there until cleaning has been accomplished to the satisfaction of the Owner's Representative. For large diameter pipe where it is impractical or impossible to flush the pipe at 2.5 fps velocity, clean the pipeline in place from the inside by brushing and sweeping, then flush the line at a lower velocity. Accumulated debris shall be removed through drains 2-inch and larger or by dropping spools and valves.
- B. Immediately following drainage of flushed lines, the piping shall be air dried with compressed air.
- C. Plant process air and instrument air piping shall be blown clean of loose debris with compressed air.

END OF SECTION

SECTION 40 80 05**FIELD TESTING OF PIPING SYSTEMS****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required to install field testing of piping systems (including test pumps, gauges, temporary valves, piping, etc.), complete and in place, as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 01 45 00 – Quality Control

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C1103 – Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

1.4 QUALITY ASSURANCE (NOT USED)**1.5 SUBMITTALS**

- A. General: Submittals shall be furnished in accordance with Section 01 33 00 – Submittal Procedures.
- B. Submit record data describing proposed testing methods, procedures, and apparatus for Engineer's record, prior to testing.
- C. Submit test schedule for each process line and test pressure for Engineer's review prior to testing.
- D. Submit a certified test report for each test to Engineer certifying the location of the joint or section tested, the test pressures at the start and end of each test, duration of the test, leakage and pertinent observations and comments.

1.6 DELIVERY, STORAGE AND HANDLING (NOT USED)**1.7 GENERAL SEQUENCE OF WORK**

- A. Submit for review proposed testing methods, procedures, and apparatus, before performing any test.
- B. Upon receipt of reviewed testing submittal, submit a schedule of testing dates and times at least 24 hours in advance of testing.
- C. Perform tests as specified herein.

1.8 DEFINITIONS

- A. Gravity pipe is defined as piping that depends upon the force of gravity for flow through the pipe, with the exception of process piping described in Paragraph D of Section 01 45 00 – Quality Control. "Gravity lines" shall refer to CCFRPM, clay pipe, reinforced concrete (non-cylinder-type) pipe, and other such pipes designed to normally operate in a partially full condition.
- B. Pressure pipe is defined as piping that is part of a pumped or pressurized system. "Pressure lines" shall refer to CCFRPM, ductile iron, RCCP, steel, and other such pipes designed to operate in a full condition, with the system's energy grade line at or above the top of the pipe during normal operating conditions.

PART 2 – PRODUCTS

2.1 EQUIPMENT

- A. Test equipment shall be selected, obtained, and maintained by the Contractor. All gauges shall be calibrated prior to beginning testing and often as necessary to provide accurate, reliable information.

PART 3 – EXECUTION

3.1 TESTING OF DRAINS, WASTEWATER, AND OTHER GRAVITY LINES

- A. General:
 - 1. For all pipe, the method of testing shall be either an exfiltration test or a low-pressure air joint test. For any flexible, non-metallic or non-concrete pipe, such as plastic (CCFRPM, PE, etc.) or fiber reinforced plastic pipe or similar flexible pipe materials, a deflection test shall be performed in addition to an exfiltration test.
 - 2. If field conditions permit and if approved by the Engineer, partially backfill the trench and leave the joints open for inspection and conducting of the initial service leak test. Do not conduct the acceptance test until backfilling to the proposed final grade is complete.
 - 3. Make first test promptly after first joint or section of line is laid and backfilled (as applicable). A section of pipe will normally be a run between two manholes, or between structures.
 - 4. Do not lay additional piping of the type being tested until test of first section is complete.
 - 5. Individual leaks will ordinarily be revealed by looking through sewer with a light while ground water level is over sewer, or immediately after water from exfiltration tests is emptied from sewer.
 - 6. Settlement in backfill during exfiltration tests will be taken as an indication of leakage.
 - 7. If demonstrated workmanship on one or more tests show that lines are sufficiently watertight, the Engineer may waive remaining testing on any given type or section of line.
 - 8. Contractor's Responsibility:

- a. Take such precautions as required to prevent damage to lines and appurtenances being tested.
 - b. Repair any damage resulting from tests.
 - c. Repair and retest all items which do not pass the tests as specified herein.
 - d. Conduct all tests in the presence of the Engineer, and to the satisfaction of the Engineer and all State and local authorities having jurisdiction.
 - e. All necessary pumps, water, pipe connections, meters, gauges, and any necessary apparatus to perform and conduct the tests shall be furnished by the Contractor. Contractor shall furnish all necessary equipment and make all tests at Contractor's expense without separate measurement and payment, but said expense shall be subsidiary to installation of pipe.
9. Water used for testing purposes shall be potable and/or non-potable water. Raw untreated wastewater (sewage) will not be allowed.

B. Low Pressure Air Joint Test:

1. All pipe joints shall be tested in accordance with ASTM C1103.
2. Equipment shall be the product of manufacturers having more than five (5) years regular production of successful joint testers. Joint tester shall be as manufactured by Cherne Industrial, Inc., of Edina, Minnesota, or approved equal.
3. Testing shall be performed on all joints after backfill has been installed and properly compacted, and as installation progresses. At no time shall pipe installation exceed 100 feet beyond the last joint tested.
4. Joints failing to meet the requirements of this test should be repaired to the satisfaction of the Engineer or the defective pipe shall be replaced. Rejected pipe shall be removed from the project. Installation shall be stopped until defective joints are repaired or replaced.
5. Follow equipment manufacturer's recommendations when performing tests; only experienced technicians shall perform tests.
6. The testing equipment shall be assembled and positioned over the center of the pipe joint and the end element tubes inflated to a maximum of 25 psi.
7. Pressurize the center joint test area to 4.0 psig and allow the temperature and pressure to stabilize at the minimum of 2.5 psig for a period of 2.0 minutes prior to testing.
8. To test, adjust the pressure to 3.5 psig and measure the time required to decrease the pressure from 3.5 psig to 2.5 psig.
9. The joint is acceptable if the time for the pressure to drop from 3.5 psig to 2.5 psig is greater than 20 seconds.

C. Deflection Test

1. For all flexible and/or semi-rigid non-metallic, non-concrete pipe such as CCFRP, PE, FRP, PVC, etc., a deflection test shall be performed in addition to any other required leakage tests.

2. Two deflection tests using a mandrel will be required for each pipe segment after installation. The first deflection test shall be performed after the pipe has been completely installed and backfilled where a mandrel shall be pulled through the entire line segment to determine whether the maximum allowable percent of deflection has been exceeded. The first deflection test shall be performed a maximum of 800 feet behind pipe laying operations. A second test shall be performed following installation of the entire line but a minimum of three (3) months after installation and backfill for any section by pulling a mandrel through the entire line to determine whether the maximum allowable deflection percent has been exceeded.
3. The diameter of the mandrel shall be the maximum allowable percent deflection specified less than the inside diameter of the sewer line. The maximum allowable percent deflection shall be based on the nominal diameter. All mandrels and measurements shall be based on the nominal diameter [i.e., 42-inch nominal pipe diameter with a maximum 5 percent deflection requirement will have a maximum allowable 5 percent deflection of 2.1 inches ($0.05 \times 42 = 2.1$); a mandrel outside diameter (minimum) of 39.9 inches ($42 - 2.1 = 39.9$); and a maximum deflection measurement of 2.1 inches].
4. In cases where the mandrel may hang due to excess deflection, the pipe shall be uncovered at this point and the conditions shall be corrected. Correction may be by reworking of the embedment and backfill, or by replacing that section of the pipe. This portion of the pipe shall again be backfilled, and the mandrel pulled through again, and this process repeated until the pipe is clear of all obstructions. The test shall be performed without mechanical pulling devices.

3.2 TESTING OF PRESSURE LINES

A. General:

1. Allow concrete blocking to cure for at least 5 days before testing.
2. Backfill and compact soil behind all blocking.
3. Backfill over pipe to extent necessary to restrain the piping. Backfill shall extend to within 1-foot of proposed final grade.
4. Conduct water leakage test after completing hydrostatic pressure tests.
5. Lines which fail to hold the specified test pressure for at least two hours or which exceed an allowable leakage rate specified below, shall be repaired and retested at the Contractor's expense.

B. Procedures for Leakage and Hydrostatic Pressure Tests:

1. Slowly fill isolated section of line with water.
2. Ensure that all air has been expelled through air and vacuum release valves, taps, or connections shown on Plans for permanent piping, valves, or accessories. Do not make additional taps solely for air expulsion purposes unless approved by Engineer. No additional compensation will be made for additional taps.
3. Apply specified test pressure based on the elevation of the lowest section of line under test and corrected to elevation of test gauge. Duration of test shall be two hours.

4. Allow concrete pipe to stand full of water at least 12 hours before starting leakage test.
5. At the end of the two hours of the test, the entire route of the pipeline shall be inspected to locate any leaks or breaks. Any defective joints, cracked or defective pipe, fittings, or valves discovered in consequence of this pressure test shall be removed and replaced with sound material in the manner provided and the test shall be repeated until satisfactory results are obtained. Any and all noticeable leaks shall be repaired regardless of whether the actual leakage is within the allowable. The pipe shall be retested over a period of two hours.
6. All pipe shall be tested for leakage by a hydrostatic pressure test. Lines shall be filled slowly, with a maximum velocity of 1-foot per second, while venting all air. If permanent air vents have not been installed, the Contractor shall install corporation cocks at all high points to expel air during initial filling and testing of the lines.
7. The duration of each leakage test shall be two (2) hours unless otherwise specified, and during the test the line shall be subjected to a continuous test specified pressure at the lowest elevation.
8. Leakage is defined as the net quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, necessary to maintain pressure within 5 psi of the specified leakage test pressure after the pipe has been filled with water and the air in the pipeline has been expelled. No installation shall be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD(P)^{0.5}}{133,200}$$

Where L = allowable leakage, in gallons per hour
 S = length of pipeline tested in feet
 D = nominal diameter of the pipe, inches
 P = average test pressure during the leakage test, psig

- a. The test pressure shall be applied by means of a pump connected to the pipe and to an approved water container, or other approved method, for accurate measurement. The test pressure shall be maintained (by additional pumping, if necessary) for the specified time. While the line is under pressure, the system and all exposed pipe, fittings, valves, and hydrants shall be carefully examined for leakage. All defective elements shall be repaired or replaced and the test repeated until all visible leakage has been stopped and the allowable leakage requirements have been met.
9. On completion of tests, any newly installed, approved taps shall be tightly plugged with brass fittings.
10. Thoroughly purge all compressed air lines after testing.

3.3 TEST PRESSURES FOR PRESSURE LINES

- A. All pressure pipelines (force mains, plant water, and potable water) shall be tested to 150 psi if not specified elsewhere. Process piping shall be tested at 50 psi if not specified elsewhere.

3.4 MANHOLE TESTING

- A. Manholes shall be tested for leakage by hydrostatic exfiltration testing or vacuum testing. Manholes shall be tested after installation with all connections in place.
- B. Hydrostatic Testing: The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot diameter per foot of manhole depth per hour. Hydrostatic exfiltration testing shall be performed as follows: all wastewater lines coming into the manhole shall be sealed with an internal pipe plug, and then the manhole shall be filled with water, and maintained full for at least one hour. For concrete manholes a wetting period of 24 hours may be used prior to testing in order to allow saturation of the concrete. If the manhole fails the hydrostatic test, the manhole shall be repaired and retested until it passes the test.
- C. Vacuum Testing: All lift holes and exterior joints shall be plugged with a non-shrink grout. No grout shall be placed in horizontal joints prior to testing. All pipes entering the manhole shall be plugged. Stub-outs, manhole boots, and pipe plugs shall be secured to prevent movement while the vacuum is drawn. A minimum 60-inch-lb torque wrench shall be used to tighten the external clamps that secure the test cover to the top of the manhole. The test head shall be placed at the inside of the top of the cone section, and the seal inflated in accordance with the manufacturer's recommendations. A vacuum of 10 inches of mercury shall be drawn, and the vacuum pump shut off. With all valves closed, the time for the vacuum to drop to 9 inches of mercury shall not be less than 2 minutes. If vacuum tests are used in lieu of hydrostatic tests, the test shall be done both before and after backfilling of the manhole has occurred. If the manhole fails a test, necessary repairs shall be made with a non-shrink grout while the vacuum is being drawn. The test shall be repeated. If the vacuum test is failed twice, the manhole shall be repaired, and a hydrostatic test shall be performed in accordance with Paragraph 3.2B of this Section. The manhole shall be retested as described above until a successful test is made.

END OF SECTION

SECTION 46 05 00**COMMON WORK RESULTS FOR WATER AND WASTEWATER EQUIPMENT****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Requirements regarding all labor, materials, equipment, and incidentals required to furnish construct, install, test, and operate all water and wastewater equipment, complete and in place, as shown on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 09 91 00 – Painting and Coating

1.3 REFERENCES

- A. Antifriction Bearing Manufacturers Association (ABMA)
- B. American Gear Manufacturers Association (AGMA)
- C. American National Standards Institute (ANSI)
 - 1. ANSI B16.1 – Gray Iron Pipe Flanges and Flanged Fittings
 - 2. ANSI B16.5 – Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24, Metric/Inch Standard
 - 3. ANSI B46.1 – Surface Texture (Roughness, Waviness, Lay)
 - 4. ANSI S12.6 – Methods for Measuring the Real-Ear Attenuation of Hearing Protectors
- D. American Public Health Association (APHA)
- E. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- F. American Society of Mechanical Engineers (ASME)
 - 1. ASME B1.20.1 – Pipe Threads, General Purpose, Inch
 - 2. ASME B31.1 – Power Piping
- G. American Society for Testing and Materials (ASTM)
 - 1. ASTM A108 – Steel Bar, Carbon and Alloy, Cold-Finished
- H. American Welding Society (AWS)
 - 1. AWS Welding Handbook
- I. American Water Works Association (AWWA)
 - 1. AWWA C206 – Field Welding of Steel Water Pipe

- 2. AWWA D100 – Welded Carbon Steel Tanks for Water Storage
- J. Federal Specifications (FS)
- K. National Electrical Manufacturers Association (NEMA)
- L. National Fire Protection Association (NFPA)
- M. Occupational Safety and Health Administration (OSHA)
 - 1. OSHA 29 CFR 1910
- N. Manufacturer's published recommendations and specifications

1.4 QUALITY ASSURANCE

- A. Inspection, Startup, and Field Adjustment: The CONTRACTOR shall demonstrate that all equipment meets the specified performance requirements. CONTRACTOR shall provide the services of an experienced, competent, and authorized service representative of the manufacturer of each item of major equipment who shall visit the site of Work to perform the following tasks:
 - 1. Assist the CONTRACTOR in the installation of the equipment.
 - 2. To inspect, check, adjust if necessary and approve the equipment installation.
 - 3. To start-up and field-test the equipment for proper operation, efficiency, and capacity.
 - 4. To perform necessary field adjustments during the test period until the equipment installation and operation are satisfactory to the ENGINEER.
 - 5. Provide agenda for operation and maintenance training to the Project Manager.
 - 6. To instruct the OWNER's personnel in the operation and maintenance of the equipment. Instruction shall include step-by-step trouble shooting procedures with all necessary test equipment.
- B. Costs: The costs of all inspection, startup, testing, adjustment, and instruction work performed by said factory-trained representatives at the site shall be borne by the CONTRACTOR. The OWNER will pay for costs of power and water. When available, the OWNER's operating personnel will provide assistance in the field-testing.
- C. Public Inspection: It shall be the responsibility of the CONTRACTOR to inform the local authorities, such as building and plumbing inspectors, Fire Marshall, OSHA inspectors, and others, to witness all required tests for piping, plumbing, fire protection systems, pressure vessels, safety systems, etc., to obtain all required permits and certificates, and pay all fees.
- D. Tolerances: Tolerances and clearances shall be as shown on the shop drawings and shall be closely adhered to. Machine work shall in all cases be of high-grade workmanship and finish, with due consideration to the special nature or function of the parts. Members without milled ends and which are to be framed to other steel parts of the structure may have a variation in the detailed length of not greater than 1/16-inch for members 30 feet or less in length, and not greater than 1/8-inch for members over 30 feet in length.

- E. Machine Finish: The type of finish shall be the most suitable for the application and shall be shown in micro-inches in accordance with ANSI B46.1. The following finishes shall be used:
 - 1. Surface roughness not greater than 63 micro-inches shall be required for all surfaces in sliding contact.
 - 2. Surface roughness not greater than 250 micro-inches shall be required for surfaces in contact where a tight joint is not required.
 - 3. Rough finish not greater than 500 micro-inches shall be required for other machined surfaces.
 - 4. Contact surfaces of shafts and stems which pass through stuffing boxes and contact surfaces of bearings shall be finished to not greater than 32 micro-inches.
- F. Manufacturer's Experience: Unless otherwise directed by the ENGINEER, all equipment furnished shall have a record of at least 3 years of successful, trouble free operation in similar applications, from the same manufacturer

1.5 SUBMITTALS

- A. Shop Drawings: The CONTRACTOR shall furnish complete shop drawings for all equipment specified in the various Sections, together with all piping, valves, and controls for review by the ENGINEER in accordance with Section 01 33 00 – Submittal Procedures.
- B. Tools: The CONTRACTOR shall supply one complete set of special wrenches and other special tools necessary for the assembly, adjustment, and dismantling of the equipment. All tools shall be of best quality hardened steel forgings with bright, finish wrench heads shall have work faces dressed to fit nuts. All tools shall be suitable for professional work and manufactured by a recognized supplier of professional tools such as Snap On, Crescent, Stanley, or equal. The set of tools shall be neatly mounted in a labeled toolbox of suitable design provided with a hinged cover.
- C. Spare Parts: The CONTRACTOR shall obtain and submit from the manufacturer a list of suggested spare parts for each piece of equipment. After approval, CONTRACTOR shall furnish such spare parts suitably packaged, identified with the equipment number, and labeled. CONTRACTOR shall also furnish the name, address, and telephone number of the nearest distributor for each piece of equipment. All spare parts are intended for use by the OWNER, only, after expiration of the Contract Document required warranty period.

1.6 DELIVERY, STORAGE AND HANDLING (Not Used)

1.7 UNIT RESPONSIBILITY

- A. Equipment systems made up of two or more components shall be provided as a unit by the manufacturer of the driven equipment. The manufacturer of the driven equipment shall assume the unit responsibility. Unless otherwise indicated, the CONTRACTOR shall cause each system component to be furnished by the manufacturer with unit responsibility. The extent of the manufacturer's responsibilities shall include engineering the specified equipment, preparation of all submittal materials, coordinating manufacture and procurement, compatibility and shipment of all specified

components, design of all equipment support, providing installation and testing specialists to assist the CONTRACTOR in completing the installation and commissioning the equipment, furnishing factory certified specialists to train the OWNER's staff, and the production and submission of specified operation and maintenance manuals. The CONTRACTOR is responsible to the OWNER for performance of all systems as indicated. The CONTRACTOR shall ensure the submittal of a Certificate of Unit Responsibility signed by the manufacturer with unit responsibility.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. High Noise Level Location: The CONTRACTOR shall provide one personal hearing protection station, as specified herein, at each high noise level location. This requirement shall not relieve the Contractor from meeting the equipment noise level requirements specified in Division 02 through 46. Said locations are defined as follows:
 1. Outdoor Location: Any single equipment item or any group of equipment items that produce noise exceeding OSHA noise level requirements for a 2-hour exposure of 100 dBA. Where such equipment is separated by a distance of more than 20 feet, measured between edges of footings, each group of equipment shall be provided with a separate hearing protection station.
 2. Indoor Location:
 - a. Any single equipment item, or any group of equipment items, located within a single room not normally occupied, that produces noise exceeding OSHA noise level requirements for a 2-hour exposure.
 - b. Any single equipment item, or any group of equipment items, located within a single room normally occupied by workers, that produces noise exceeding OSHA noise level requirements for an 8-hour exposure.
- B. Personal Hearing Protection: The CONTRACTOR shall supply, in their original unopened packaging, three pairs of high attenuation hearing protectors. The ear protectors shall be capable of meeting the requirements of ANSI S12.6 and shall produce a noise level reduction of 25 dBA at a frequency of 500 Hz. The hearing protectors shall have fluid filled ear cushions and an adjustable, padded headband. The protectors shall be stored in a weatherproof, labeled, steel cabinet, furnished by the CONTRACTOR and mounted in an approved location near the noise producing equipment.
- C. Service Factors: Service factors shall be applied in the selection or design of mechanical power transmission components. Unless otherwise specified, the following load classifications shall apply in determining service factors:

Type of Equipment Load Classification

Blower:

Centrifugal or vane

Uniform

Lobe

Moderate Shock

Reciprocating Air Compressor:

Multi-Cylinder	Moderate Shock

Moderate Shock	Heavy Shock

Pump:

Centrifugal or Rotary	Uniform

Reciprocating	Moderate Shock

- D. Welding: Unless otherwise specified or shown, all welding shall conform to the following:
1. Latest revision of AWWA D100
 2. Latest revision of AWWA C206
 3. All composite fabricated steel assemblies which are to be erected or installed inside a hydraulic structure, including any fixed or movable structural components of mechanical equipment, shall have continuous seal welds to prevent entrance of air or moisture.
 4. All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.
 5. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.
- E. Protective Coating: All equipment shall be painted or coated in accordance with Section 09 91 00 - Painting and Coating unless otherwise indicated. Non-ferrous metal and corrosion resisting steel surfaces shall be coated with grease or lubricating oil. Coated surfaces shall be protected from abrasion or other damage during handling, testing, storing, assembly, and shipping.
- F. Protection of Equipment: All equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. All space heaters shall be connected and operating for all stored equipment before payment for the stored equipment is approved. All equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry at all times. Pumps, motors, drives, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weather tight storage facilities prior to installation. For extended storage periods, plastic equipment wrappers should be avoided, to prevent accumulation of condensate in gears and bearings.

- G. Identification of Equipment Items: Each item of equipment shipped shall have a legible identifying mark corresponding to the equipment number shown or specified for the particular item.
- H. Vibration Level: All equipment subject to vibration shall be provided with restrained spring-type vibration isolators or pads per manufacturer's written recommendations.
- I. Shop Fabrication: Shop fabrication shall be performed in accordance with the Contract Documents and the ENGINEER'S accepted shop drawings.

2.2 EQUIPMENT SUPPORTS AND FOUNDATIONS

- A. Equipment Supports: All equipment supports, anchors, and restrainers shall be adequately designed for static, dynamic, wind, and seismic loads. The design horizontal seismic force shall be the greater of: that noted in the general structural notes or as required by the governing building code, or 10 percent of gravity. Submitted design calculations for equipment supports must bear the signature and seal of an engineer licensed in the State wherein the project is to be built, unless otherwise directed.
- B. Equipment Foundations: Equipment foundations shall be as per manufacturer's written recommendations. All mechanical equipment, tanks, control cabinets, etc., shall be mounted on minimum 4-inch high concrete bases, as shown on standard structural details, unless otherwise shown or specified.
- C. Shop Drawings: Shop drawings shall be submitted to the ENGINEER for review in accordance with the requirements of Section 01 33 00 – Submittal Procedures. Shop drawings will be considered incomplete unless clear, concise calculations are presented showing equipment anchorage forces and the capacities of the anchorage elements provided by the CONTRACTOR.

2.3 PIPE HANGERS, SUPPORTS, AND GUIDES

- A. All pipe connections to equipment shall be supported, anchored, and guided to avoid stresses and loads on equipment flanges and equipment.

2.4 FLANGES AND PIPE THREADS

- A. All flanges on equipment and appurtenances provided under this Section shall conform to ANSI B16.1, Class 125; or B16.5, Class 150, unless otherwise shown. All pipe threads shall be in accordance with ASME B1.20.1.

2.5 COUPLINGS

- A. Flexible couplings shall be provided between the driver and the driven equipment to accommodate slight angular misalignment, parallel misalignment, end float, and to cushion shock loads. Where required for vertical shafts, 3-piece spacer couplings or universal type couplings for extended shafts shall be installed.
- B. The CONTRACTOR shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application.

- C. Taper-lock bushings may be used to provide for easy installation and removal on shafts of various diameters.
- D. Where universal type couplings are shown, they shall be of the needle bearing type construction, equipped with commercial type grease fittings.

2.6 SHAFTING

- A. General: All shafting shall be continuous between bearings and shall be sized to transmit the power required. Keyways shall be accurately cut in line. Shafting shall not be turned down at the ends to accommodate bearings or sprockets whose bore is less than the diameter of the shaft. All shafts shall rotate in the end bearings and shall be turned and polished, straight, and true.
- B. Materials: Shafting materials shall be appropriate for the type of service and torque transmitted. Environmental elements such as corrosive gases, moisture, and fluids shall be taken into consideration. Materials shall be as shown or specified unless furnished as part of an equipment assembly.
 - 1. Low carbon cold-rolled steel shafting shall conform to ASTM A108, Grade 1018.
 - 2. Medium carbon cold-rolled shafting shall conform to ASTM A108, Grade 1045.
 - 3. Corrosion-resistant shafting shall be stainless steel or Monel, whichever is most suitable for the intended service.

2.7 BEARINGS

- A. General: Bearings shall conform to the standards of the Anti-Friction Bearing Manufacturers Association, Inc. (AFBMA).
- B. To assure satisfactory bearing application, fitting practice, mounting, lubrication, sealing, static rating, housing strength, and other important factors shall be considered in bearing selection.
- C. All relubricatable type bearings shall be equipped with a hydraulic grease fitting in an accessible location and shall have sufficient grease capacity in the bearing chamber.
- D. All lubricated-for-life bearings shall be factory-lubricated with the manufacturer's recommended grease to insure maximum bearing life and best performance.
- E. Bearing Life: Except where otherwise specified or shown, all bearings shall have a minimum L-10 life expectancy of 80,000 hours.
- F. Bearing housings shall be of cast iron or steel and bearing mounting arrangement shall be as specified or shown, or as recommended in the published standards of the manufacturer. Split-type housings may be used to facilitate installation, inspection, and disassembly.
- G. Sleeve-type bearings shall have a Babbitt or bronze liner.

2.8 GEARS AND GEAR DRIVES

- A. Unless otherwise specified, gears shall be of the helical or spiral-bevel type, designed and manufactured in accordance with AGMA Standards, with a minimum service factor of 1.7, a minimum L-10 bearing life of 80,000 hours and a minimum efficiency of 94 percent. Worm gears shall not be used, unless specifically approved by the ENGINEER.
- B. All gear speed reducers or increasers shall be of the enclosed type, oil- or grease lubricated and fully sealed, with a breather to allow air to escape but keep dust and dirt out. The casing shall be of cast iron or heavy-duty steel construction with lifting lugs and an inspection cover for each gear train. An oil level sight glass and an oil flow indicator shall be provided, arranged for easy reading.
- C. Gears and gear drives as part of an equipment assembly shall be shipped fully assembled for field installation.
- D. Material selections shall be left to the discretion of the manufacturer, provided the above AGMA values are met. Input and output shafts shall be adequately designed for the service and load requirements. Gears shall be computer-matched for minimum tolerance variation. The output shaft shall have 2 positive seals to prevent oil leakage.
- E. Oil level and drain location relative to the mounting arrangement shall be easily accessible. Oil coolers or heat exchangers with all required appurtenances shall be furnished when necessary.
- F. Where gear drive input or output shafts have to connect to couplings or sprockets supplied by others, the CONTRACTOR shall have the gear drive manufacturer supply matching key taped to the shaft for shipment.

2.9 V-BELT DRIVES

- A. V-belts and sheaves shall be of the best commercial grade and shall conform to ANSI, MPTA, and RMA Standards.
- B. Unless otherwise specified, sheaves shall be machined from the finest quality gray cast iron.
- C. All sheaves shall be statically balanced. In some applications where vibration is a problem, sheaves shall be dynamically balanced. Sheaves operating at belt speeds exceeding 6,500 fpm may be required to be of special materials and construction.
- D. To facilitate installation and disassembly, sheaves shall be furnished complete with taper lock or QD bushings as required.
- E. Finish bored sheaves shall be furnished complete with keyseat and set screws.
- F. Sliding motor bases shall be provided to adjust the tension of V-belts.

2.10 DRIVE GUARDS

- A. All power transmission, prime movers, machines, shaft extensions, and moving machine parts shall be guarded to conform with the OSHA Safety and Health Standards (29CFR1910). The guards shall be constructed of minimum 10 gage expanded,

flattened steel with smooth edges and corners, galvanized after fabrication and securely fastened. Where required for lubrication or maintenance, guards shall have hinged and latched access doors.

2.11 FLEXIBLE CONNECTORS

- A. General: Flexible connectors shall be installed in all piping connections to engines, blowers, compressors, and other vibrating equipment and in piping systems.

2.12 INSULATING CONNECTIONS

- A. General: Insulating bushings, unions, couplings, or flanges, as appropriate, shall be used.

2.13 GASKETS AND PACKINGS

- A. Packing around valve stems and reciprocating shafts shall be of compressible material, compatible with the fluid being used. Chevron-type "V" packing shall be Garlock No. 432, John Crane "Everseal," or equal.
- B. Packing around rotating shafts (other than valve stems) shall be "O"-rings, stuffing boxes, or mechanical seals, as recommended by the manufacturer and approved by the CONSULTING ENGINEER.

2.14 NAMEPLATES

- A. Equipment nameplates of 316 stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head 316 stainless steel screws or drive pins. Adhesives shall not be used in lieu of stainless steel screws. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the machine performance ratings.

2.15 SAFETY REQUIREMENTS

- A. Where work areas are located within a flammable or toxic gas environment, suitable gas detection, ventilating, and oxygen deficiency equipment shall be provided. Workers shall be equipped with approved breathing apparatus.

PART 3 – EXECUTION

3.1 COUPLINGS

- A. The CONTRACTOR shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application; installation shall be per equipment manufacturer's printed recommendations.

3.2 INSULATING CONNECTIONS

- A. All insulating connections shall be installed in accordance with the manufacturer's printed instructions.

3.3 PIPE HANGERS, SUPPORTS, AND GUIDES

- A. Hangers, supports, and guides shall be spaced in accordance with ASME B.31.1 standard, and as shown on the drawings.

3.4 PACKAGED EQUIPMENT

- A. When any system is furnished as pre-packaged equipment, the CONTRACTOR shall coordinate all necessary space and structural requirements, clearances, utility connections, signals, and outputs with his subcontractors, to avoid later change orders.
- B. If the packaged system has any additional features (as safety interlocks, etc.), other than specified, the CONTRACTOR shall coordinate such features with the CONSULTING ENGINEER and furnish all material and labor necessary for a complete installation as required by the manufacturer, at no additional cost to the OWNER.

END OF SECTION

ELECTRICAL GOVERNING SPECIFICATIONS

ISLA BLANCA RV PARK RENOVATION
SOUTH PADRE ISLAND, TEXAS

STRIDDE, CALLINS & ASSOCIATES, INC.
F-6328



Section	Title	Pgs.
Division 26 – Electrical		
26 00 00	Electrical Specifications	8
26 00 05	Electrical Specifications (General Conditions)	6

SECTION 26 00 00 - ELECTRICAL SPECIFICATIONS

1.1 GENERAL:

- A. Section 26 00 05 is a part of these Electrical Specifications for Isla Blanca RV Park Renovations, South Padre Island, Texas.

1.2 SCOPE:

- A. Work to be accomplished under these Specifications includes the furnishing of all labor, materials, and equipment required for the complete installation as described herein and as indicated on the Drawings.
- B. Work is to be completed from point of service to each outlet indicated on Drawings and/or specified herein with all accessory construction as may be required to make the installation of each piece of equipment complete and ready for normal service. In general, this work consists of the following:
 - 1. New underground conduit system for primary service from AEP point of service origin to new AEP switchgear. New underground conduit system for primary service from new AEP switchgear and from AEP dip poles to each new pad mounted transformer. New underground secondary service feeders from new pad mounted transformers to each new distribution panel. New poured in place concrete pads/foundations/enclosures for new transformers, switchgear and splice boxes by AEP. New conduit for secondary wire by AEP from new transformers to AEP light poles/fixtures.
 - 2. A system of conduits, conductors, RV outlet centers, distribution panelboards, panelboards, enclosed circuit breakers, switchgear racks and related items for the new secondary power distribution system.
 - 3. A partial system of conduits with Jetline pullcords, junction boxes, pull boxes, outlet boxes with plates, and related items for future IT/data transmission systems.
 - 4. A partial system of conduit sleeves below roadways for future use.
 - 5. Near complete demolition of the existing electrical distribution system except where existing switchgear is specifically indicated to remain on the drawings.
- C. Installation of this work, including all materials and labor shall be first class in every respect and in exact accordance with these Specifications and accompanying Drawings. It is intended that Specifications and accompanying Drawings shall include everything requisite and necessary for proper installation of electric wiring, even though every item may not be particularly mentioned in detail.

1.3 ELECTRICAL SERVICE:

- A. New service utilization voltage shall be solidly grounded, 120/240 volt, 1-phase, 3-wire nominal. Power company will provide service, indicated on Drawings. Contractor shall be responsible for contacting power company for all requirements.
- B. The electrical contractor shall be responsible for contacting AEP and coordinating the electrical service requirements and primary power and electrical service infrastructure requirements with AEP.
- C. AEP cost associated with permanent power shall be paid directly to AEP by the Owner. AEP cost for temporary construction power (if required) shall be paid to AEP by the contractor.

- D. Contractor shall furnish all new service equipment not furnished by power company for a complete installation. Contractor shall provide transformer grounding as directed by the power company.
- E. Contractor shall furnish the underground conduit system, pull boxes and related items for the entire underground primary system.
- F. Contractor shall furnish the concrete foundations as indicated on the Drawings for power company owned transformers. Contractor shall furnish the concrete pads and concrete enclosures as indicated on the Drawings for power company owned switchgear and splice boxes.
- G. Contractor shall furnish the underground conduit system with pullcords and related items for AEP leased lighting poles/fixtures.
- H. Contractor shall furnish all secondary service feeders complete as indicated on the Drawings.
- I. Termination of primary conduit at all termination points (point of service origin, switchgear, transformers and splice boxes) shall be as directed by the power company. Termination of secondary service conduit and wiring at transformers shall be as directed by the power company. Termination of secondary service conduit and wiring at distribution panelboards shall be as indicated on the Drawings and in these Specifications.
- J. Metering will be coordinated and provided in accordance with power company requirements. Provide C/T cabinets, meter cans and meter conduit with pullcords as indicated on the drawings and as required by AEP.

1.4 TEMPORARY POWER AND LIGHTING:

- A. Contractor shall provide all necessary wiring, service switches, ground fault protection equipment, etc., required for temporary power during construction. Temporary construction power may be derived from the existing and new power distribution system without cost of use charges during times when existing and new distribution systems are energized. The contractor shall be responsible for providing construction power during times when the distribution system is de-energized due to construction phasing and sequencing.

1.5 GROUNDING:

- A. The entire electrical system shall be grounded in accordance with Article 250 of the National Electrical Code, and as hereinafter specified.
- B. Each main service entrance ground shall be provided as indicated on Drawings.
- C. Driven ground rods shall be provided where required and/or where indicated on the Drawings. Ground rods shall be minimum 3/4" x 10'-0" Copper-weld or equal. All ground wiring shall have adequate mechanical protection, and be exothermically welded to rods.
- D. Grounding electrode and equipment conductors with a "green" colored insulated jacket shall be provided and installed in all raceways.
- E. All equipment and wiring devices shall have an effective equipment ground in accordance with the National Electrical Code.

1.6 CONDUIT AND TUBING:

- A. Conduit installed underground or in concrete slabs shall be Schedule 40 rigid polyvinyl chloride (PVC) conduit as manufactured by Allied or approved equal, installed in accordance with National Electrical Code, and as indicated on Drawings. All PVC conduit shall have Underwriters Laboratory, Inc. approval for direct burial underground without concrete encasement. All PVC conduit must be installed in accordance with manufacturer's recommendations and in strict accordance with the applicable sections of these Specifications.
- B. Conduit installed above grade in damp or wet locations shall be Schedule 80 rigid polyvinyl chloride (PVC) conduit as manufactured by Allied or an approved equal, installed in accordance with National Electrical Code, and as indicated on Drawings. All PVC conduit must be installed in accordance with manufacturer's recommendations and in strict accordance with the applicable sections of these Specifications.
- C. Liquid Tight Flexible Metal Conduit shall not be used for any purpose except as hereinafter specified and as specifically indicated on the Drawings. All flexible metal conduit shall be installed in strict accordance with Articles 348 and 350 of the National Electrical Code. Non-metallic flexible conduit will not be acceptable for any purpose.

1.7 INSTALLATION AND ROUTING OF CONDUITS:

- A. All conduit shall be run in the straightest possible path.
- B. Not more than three (3) 90 degree bends will be permitted in any one (1) conduit run and no run shall be longer than allowed by the National Electrical Code without the installation of pull boxes. There shall not be any pull boxes or junction boxes installed in inaccessible space.
- C. Exposed conduit shall be run in straight lines, at right angles to, or parallel with walls, beams, columns, or decks, and shall be supported at maximum of 6'-0" by 2-hole 316 stainless steel conduit straps (on building walls and at RV outlet center posts). Conduit shall be supported by 316 stainless steel strut straps at all switchgear racks.
- D. In no case shall conduit be fastened to other pipe or equipment or so installed as to prevent the ready removal of other pipes or equipment for repairs.
- E. All conduit runs shall be straight and true; elbows, offsets, and bends shall be uniform and symmetrical. All conduit after installation and prior to completion of project shall be capped to prevent entrance of moisture and foreign objects. Conduit shall be swabbed before installation of wire. PVC conduit joints shall be made in accordance with manufacturer's recommendations.
- F. Elbows in PVC conduit below grade shall be Schedule 80 PVC.
- G. Provision shall be made for expansion and contraction of all conduit as hereinafter specified.
- H. Underground schedule 40 PVC conduit shall not be extended above grade. Schedule 40 PVC shall be transitioned to Schedule 80 PVC conduit at the schedule 80 conduit elbow which turns vertical.
- I. Minimum burial depth from top of conduit to finished grade shall 24" for all conduit beyond the load side of panelboards. Refer to AEP details included on the drawings and AEP specifications available from AEP for minimum burial depth requirements for primary

conduit and secondary service conduit. Minimum burial depth of all conduit for AEP leased lighting shall be 36".

- J. Provide 4" wide yellow warning tape 1'-0" above all underground conduit.
- K. All conduit terminations at sides of all above grade enclosures shall be made with Meyers hubs. Terminations at the top of enclosures will not be permitted. Standard PVC terminal adapters are permitted for terminations only at the bottom of enclosures.
- L. All conduit which is stubbed and capped below grade for future services shall be terminated with PVC T/A and female threaded rigid galvanized steel cap so that stub may be located in the future with a metal detector.

1.8 CONCRETE:

- A. Concrete footings for switchgear racks and RV outlet center posts shall be readymix type transit mix and shall be continuously agitated until poured. Concrete shall be minimum 2,500-pound strength after 30 days. Refer to AEP details included on drawings for concrete requirements for foundations and pads to support AEP equipment.

1.9 HANGERS AND SUPPORTS:

- A. Contractor shall provide all hangers and supports for supporting all conduit, gutters, cabinets, and equipment of all types. All hangers and supports shall be secure and of a type appropriate in design, application, and dimensions for the particular application.
- B. All hangers and supports for exterior shall be 316 stainless-steel.
- C. Concrete anchors shall be 316 stainless steel. Selection of anchors, hangers and supports shall be made with a minimum safety factor of 100% over published load ratings.
- D. Perforated hanger strap and wire will not be acceptable for any supporting purpose.

1.10 CONDUCTORS:

- A. All wiring and cables shall be insulated soft-drawn annealed 98% conductivity copper and shall be new. Voltage rating of wire and cable shall be 600 volts A.C.
- B. All wire No. 12 AWG and smaller shall be solid and wire of larger size shall be stranded unless otherwise specified herein. Stranded wire will not be permitted for termination at wiring devices rated 20 amperes or less.
- C. Power feeder and branch circuit wire and cables shall have insulation Type THWN unless indicated otherwise on Drawings.
- D. **Wire sizes serving RV outlet centers are keyed and tabulated (by feeder schedule) on the Drawings. Tabulated wire sizes are based upon voltage drop calculations for the possible routing generally indicated on the Drawings. Actual installed routing paths are left to the discretion of the Contractor. Coordinate routing paths with existing conditions and new sanitary sewer pipe routing. A maximum allowable conductor length is included for each tabulated wire size. Where the Contractor selected routing path exceeds this maximum allowable conductor length, such conductor sizes must be adjusted upwards as required by the feeder schedule. Provide associated adjustments to conduit sizes as required.**

- E. All wire for special systems and special conditions shall be as specified and/or as indicated on the Drawings.

1.11 WIRE PULLING LUBRICANTS:

- A. Contractor shall use Ideal "CableEase" or approved equal wire pulling lubricants for all wire installation. Soaps or other substitute material having electrical conduction properties are not acceptable.

1.12 COLOR-CODING AND TAGGING:

- A. All wiring furnished shall be color-coded. Conductors No. 10 AWG and smaller shall have insulation colored as follows. Conductors larger than No. 10 AWG may be black with tape manufactured for this application and colored as follows. All such conductors shall be color-code taped at all junctions and terminations.
 1. 120/240 volt, single phase ungrounded conductors: Red and Black.
 2. Ground conductors: Green.
 3. Neutral conductors: White.
- B. Identification shall be accomplished by means of Brady "Quick-Labels" or approved equal attached permanently to all wire requiring identification in addition to the color-coding. Acceptable manufacturers: Thomas and Betts, Ideal.

1.13 INSULATION OF SPLICES AND WIRE TERMINATION:

- A. All connections for conductors No. 8 and larger must be made by means of a compression type connector UL listed and specifically approved for the purpose for which it is used. Such connectors shall be Polaris or equal insulated NSI type lug blocks. Wire No. 10 and smaller may be connected with U.L. listed wire nuts in lieu of compression connections.
- B. All conductor terminations at all lugs shall have the appropriate amount of non-grit oxide inhibitor (Ilsco DE-OX or equal) applied in lug barrels after conductors are inserted and prior to tightening of lugs.

1.14 OUTLET BOXES:

- A. All boxes and conduit fittings shall be cast aluminum, watertight, and have gasketed coverplates.

1.15 WIRING DEVICES:

- A. Wiring devices, or approved equal, as scheduled and/or indicated on the Drawings shall be furnished and installed. All receptacles shall be grounding type, and shall be polarized in accordance with the latest standards of the National Electrical Code.

1.16 COVERPLATES:

- A. Coverplates for receptacles shall be rain-tight while-in-use type die cast covers.

1.17 RV OUTLET CENTERS:

- A. RV Outlet centers shall be Midwest UO75CTL010 or approved equal. All standard features and functions of the Midwest UO75CTL010 are hereby adopted by reference as RV Outlet Center minimum requirements.

- B. All RV Outlet Centers shall be 120/240[V], 100[A] rated with 100[A] rated dual main lugs for loop feed. Dual main lugs (in general) shall be listed to accept #8 AWG thru #1/0 AWG conductor terminations. Where #2/0 feeders are required due to voltage drop, the contractor must field replace factory dual lugs with lugs listed to terminate #2/0 conductors.
- C. All Outlet Centers shall be furnished with neutral bar and ground bar with lugs required to terminate installed line side conductor sizes.
- D. Refer to Paragraph 1.13B for conductor termination requirements at all Outlet Center line side lugs.

1.18 CIRCUITING:

- A. Contractor shall connect all wires so as to provide the arrangement of circuits indicated on the Drawings.

1.19 IDENTIFICATION AND LABELING OF DISTRIBUTION GEAR:

- A. Contractor shall furnish white thermoplastic (1/8" thick) with black sunken letters (3/4" font) for all panelboards, distribution panelboards, and enclosed circuit breakers. Labels shall be permanently attached to service side of all such gear.
- B. Identification and labeling of individual branch circuit devices shall be provided as hereinafter specified.

1.20 SPACES AND SPARES:

- A. Where spaces are indicated on the Drawings for panelboards and distribution panelboards, all such spaces shall be completely equipped provisions such that future installation of overcurrent devices requires no accessory apparatus.
- B. Where spares are indicated on the Drawings for panelboards and distribution panelboards, all such spares shall be completely equipped and line side connected devices, such that future use of same requires load side connection only.

1.21 PANELBOARDS AND CABINETS:

- A. Contractor shall furnish all panelboards as indicated on Drawings, and riser diagrams. Panelboards shall be of dead-front type and shall be complete with lockable door and trim. Each door shall be equipped with spring latch and tumbler-lock. All locks shall be keyed alike and two keys shall be provided to the Owner for each lock. Cabinets shall be 20" wide Nema 4X code gauge 316 stainless steel. Each panel shall have main lugs and/or main breakers as indicated. Branch circuits shall be equipped with bolt-on type automatic circuit breakers for each circuit. Panelboards shall bear the Underwriter's Laboratories, Inc., seal of approval. All panelboards shall have tin plated copper bussing with capacity as indicated. Lugs shall be UL listed to accept solid or stranded copper and aluminum conductors.
- B. Panels shall be Square D Type NQ with QOB circuit breakers or equal for 120/240 volt use. Multi-pole breakers shall be one handle common trip.
- C. Panelboards shall have 100% rated copper neutral bus and copper ground bar.
- D. Branch circuits as indicated on the Drawings shall be connected to the corresponding breaker number of the panels insofar as possible. Each circuit bearing load shall be identified on a typewritten directory card inside the door of each panel. Spare circuit

breakers and spaces shall be hand written in pencil on directory card. Attention is directed that RV slip numbers indicated on the drawings are based upon the best information available at the time of design. The Owner reserves the right to provide modified/updated RV slip numbers in writing in the form of site plan mark-ups during construction prior to contractor compilation of panelboard directories. Panelboard directories shall be compiled in accordance such written instructions if provided by the Owner. The contractor must request such information at the appropriate time during construction.

- E. Series rating for circuit breakers in panels is not acceptable, all circuit breakers shall be fully rated.
- F. Panelboards by Eaton and Siemens will be acceptable.

1.22 DISTRIBUTION PANELS:

- A. Furnish and install distribution panelboards as indicated on the Drawings. Panelboards shall be dead-front, safety type equipped with thermal magnetic, molded case circuit breakers of frame and trip ratings as indicated on the Drawings.
- B. Panelboard bus structure and main lugs or main breaker shall have current ratings as indicated on the Drawings. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 50 degree C. rise above ambient. Heat rise tests shall be conducted in accordance with Underwriter's Laboratories Standards. Buss structure in all distribution panels shall be tin plated copper.
- C. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. Front faces of all circuit breakers shall be flush with each other. Each individual circuit breaker shall have circuit number identified by means of white thermoplastic labels (1/8" thick) with black sunken letter (3/4" stroke) permanently attached to panel cover near each respective circuit breaker, spare, and space. This circuit number shall correspond to number on typewritten directory card attached to inside panel door which indicates respective loads. Attention is directed that RV slip numbers indicated on the drawings are based upon the best information available at the time of design. The Owner reserves the right to provide modified/updated RV slip numbers in writing in the form of site plan mark-ups during construction prior to contractor compilation of panelboard directories. Panelboard directories shall be compiled in accordance such written instructions if provided by the Owner. The contractor must request such information at the appropriate time during construction.
- D. Each panelboard, as a complete unit, shall have a rating equal to or greater than the integrated equipment rating indicated on the Drawings. Such rating shall be established by test with the circuit breakers mounted on the panelboard. Short circuit tests on the circuit breaker and on the panelboard structure shall be made simultaneously by connecting the fault to each panelboard breaker with the panelboard connected to its rated voltage source.
- E. Cabinets shall be surface mounted and shall be equipped with spring latch and tumbler-lock. All locks shall be keyed alike and two keys shall be provided to the Owner for each lock. Doors over 48" long shall be equipped with three-point latch and vault lock. Panelboard enclosures shall be Nema 4X code gauge 316 stainless steel.
- F. Panelboard interior assembly shall be dead-front. Main lugs shall be front barriered. The end of the bus structure opposite the mains shall be barriered.

- G. Panelboards shall be listed by Underwriter's Laboratories and shall bear the UL label. Panelboards shall be suitable for use as service equipment where indicated on the Drawings. Distribution panelboards shall be Square D I-LINE, or approved equal.
- H. Panelboards shall have 100% rated copper neutral buss and copper ground bar.
- I. Series rating for circuit breakers in distribution panels is not acceptable, all circuit breakers shall be fully rated.
- J. Panelboards by Eaton and Siemens will be acceptable.

1.23 ACCESSORY CONSTRUCTION APPARATUS:

- A. It is the intention that these Specifications shall provide a complete installation, except as herein specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation or testing of the work shall be included. Omission of specific references to any part of the work necessary for such complete installation shall not be interpreted as relieving the contractor from furnishing such work.

1.24 TESTS/DEMONSTRATION:

- A. The entire system upon completion shall be "Meggered" for faults in accordance with methods approved by I.E.E.E. and National Electrical Code if so directed by the Engineer.
- B. A demonstration shall be performed in the presence of a representative of the Architect. Equipment installed and/or connected by the contractor shall be put through their normal operating paces and all such equipment shall be required to operate to the satisfaction of the Architect on completion of the job.

1.25 INSTRUCTIONS:

- A. Contractor shall provide for instructing an employee or employees of the Owner in the operation and maintenance of the systems. Duplicate sets of manufacturer's certified drawings, specifications, operating instructions, maintenance manuals, and maintenance instructions on all equipment furnished by contractor shall be furnished to the Owner.

1.26 WORKMANSHIP AND INSTALLATION:

- A. Contractor shall have his choice as to the location of conduits, pull boxes, etc., except for locations set by dimensions on Drawings, provided his choices do not interfere with piping, fixtures, and equipment installed by other contractors working on the same project, and do not interfere with the characteristic features of the building. In cases of such interference, the Architect will determine the locations of the interfering items.
- B. Contractor shall make such progress in his work that he will not delay the work of other trades unduly.
- C. Contractor shall provide service to all using connections.
- D. Cutting of any structural member, regardless of material, shall be kept at a minimum. Contractor shall pay for repairing damage to such members.
- E. All electrical fixtures and fittings of all types shall be properly supported to construction.

END OF SECTION 26 00 00

SECTION 26 00 05 - ELECTRICAL SPECIFICATIONS (GENERAL CONDITIONS)**1.1 GENERAL CONDITIONS:**

- A. Sections of the Specifications covering general and supplemental conditions and conditions of the construction contract are a part of the contract and Contractors shall observe all of the requirements thereof, insofar as they pertain and are applicable to their respective work. Reference to Contractor or Contractors shall imply the Electrical Contractor.
- B. Contractor shall examine all Drawings and Specifications, visit the site of the proposed renovation, become fully informed as to the extent and character of the work required, and make provisions for same in his bid. It will be assumed that the Contractor in submitting his bid has visited the premises and his bid covers all work necessary to properly install his work.
- C. If any requirements of the Drawings and the Specifications appear to be difficult to perform, or if there is a question regarding performance, Contractor shall report same to the Engineer during the bidding period. The right to make any reasonable change in the location of outlets, apparatus, and equipment up to the time of rough-in is reserved by the Engineer without involving any additional expense.
- D. If any discrepancies occur during construction between work being performed by the Contractor and work of other trades, it shall be the responsibility of the Contractor to notify the Engineer immediately. Under no circumstances shall the Contractor proceed with any work conflicting with other trades until such time as the discrepancies have been corrected. In cases where interference develops, the Engineer shall decide which work is to be relocated regardless of which was first installed.
- E. Contractor shall proceed with his work so as to conform to the progress of the work of other trades and not delay the project. Contractor shall complete all installations as soon as the conditions of the project will permit.

1.2 SCOPE OF WORK:

- A. Work to be done under this contract shall include the furnishing of all labor, materials, apparatus, and connections to complete, in finished operating condition, the work for Isla Blanca RV Park Renovation, South Padre Island, Texas.
- B. Renovation work by other trades includes complete replacement of the RV Park Sanitary Sewer System and substantial site paving modifications which will affect the existing park layout in certain areas. The Electrical Contractor must assist the General Contractor with coordination of the Electrical Construction and work by other trades. Conduit routing must be coordinated with new Sanitary Sewer pipe routing, Paving work, and with existing conditions. The phasing and sequencing of electrical construction must be closely coordinated with the work of other trades.
- C. Contractor shall take into account that deviations from routing and layout of new work indicated on the Drawings may be required to avoid interference with existing underground utilities and existing conditions. Contractor shall be responsible for rerouting of existing conduit, piping, etc., to avoid interference with new work if deviations in routing of new work cannot be made to avoid interference with existing conditions. Piping, cabling etc. which serves loads or areas to remain in use will be rerouted as required and as directed to preserve continuity of service.

- D. All items of labor, material, or equipment not required in detail by the Specifications or Drawings, but incidental to, or necessary for the complete installation and proper operation of all phases of work described herein, or reasonably implied in connection therewith, shall be furnished as if called for in detail by the Specifications or Drawings.
- E. Existing underground utilities are not indicated on the Drawings. The Contractor shall be responsible for jobsite locating and protecting all existing underground utilities prior to trenching, digging or drilling.

1.3 WORKMANSHIP:

- A. All labor shall be performed in the best and most workmanlike manner by mechanics skilled in their particular trades. All installations shall be complete in both effectiveness and appearance whether finally enclosed or left exposed. The Engineer reserves the right to direct the removal or replacement of any item which in his opinion shall not present a reasonable neat or workmanlike appearance, providing that same can be properly installed in an orderly way by usual method for such work. All specialties and appurtenances shall be installed to conform to the manufacturer's recommendations unless otherwise specified.

1.4 CODES, PERMITS, AND FEES:

- A. Entire installation shall be done in strict accordance with all local, state, and federal ordinances, codes, and regulations.
- B. In the event there is a conflict between the Drawings and Specifications and the applicable codes, ordinances, and regulations, the codes, ordinances, and regulations requirements shall govern. However, if the Contract Requirements are in excess of these requirements and do not conflict with the requirements, the contract provisions shall govern. If any work indicated on the Drawings is in conflict with codes, ordinances and regulations, Contractor shall advise Architect at least one (1) week prior to bid date so that discrepancies may be corrected by an addendum to the Drawings and Specifications. Failure by the Contractor to advise of any discrepancies shall leave the Contractor fully and completely responsible for compliance with all applicable codes and requirements.
- C. All work shall comply with Standards contained in applicable NFPA pamphlets, all as published by the NFPA (National Fire Protection Association).
- D. Contractor shall obtain all permits and pay all fees necessary in connection with his work.

1.5 SAFETY STANDARDS:

- A. It shall be Contractor's sole responsibility to initiate, maintain, and supervise all safety precautions required by local, state, and federal laws, including OSHA (Occupational Health and Safety Administration) and trench safety laws.

1.6 MATERIALS AND EQUIPMENT:

- A. All materials and equipment furnished under this contract shall be in strict accordance with these Specifications, and shall be new. Equipment shall be of the latest or current products available. When two (2) or more articles of the same materials or equipment are required, the articles of each kind shall be standard products of a single reputable manufacturer. Electrical materials and equipment shall bear the label of UL (Underwriters Laboratories, Inc.).

- B. All materials and equipment shall be clearly marked, stamped, or labeled for identification. Identification marks or labels shall be plainly visible for inspection and shall not be obscured or obliterated in any manner. Painting or covering shall not be done until so ordered by the Engineer.
- C. Contractor shall furnish to the Engineer, within a reasonable time after award of contract, and prior to commencing any work, complete brochures of all materials and equipment which the Contractor proposes to furnish on the project. Data shall include descriptive literature, performance data, diagrams, capacity information, etc., to substantiate that proposed equipment physical size and capacity will meet all of the requirements of the Drawings and Specifications.
- D. All data must be checked and any required changes indicated thereon by the Contractor, signed, and dated prior to furnishing same to the Engineer for approval. Contractor's attention is directed that it is mandatory that he thoroughly review data prior to furnishing same to assure that equipment is in accordance with Drawings and Specifications and to assure prompt return of the data.
- E. Each brochure shall be neatly organized into a single binder or electronic PDF file. In each brochure provide cover sheet identifying project name and location, Engineer, General Contractor, and Mechanical, Electrical, or Plumbing Contractor. Include Contractor's addresses and phone numbers. Provide adequate space for Engineer's stamps. Provide quantity of submittal copies required by other sections of the Specifications.
- F. If above information is not provided complete as specified above and within the allocated time, all equipment shall be furnished exactly as specified without any substitutions.
- G. In furnishing data of proposed equipment and materials, Contractor must, in writing, specifically call to the attention of the Engineer every deviation from the Contract Drawings and Specifications.
- H. Review of data, drawings, etc., shall not be construed as releasing the Contractor from further responsibility, but rather as a means to coordinate the work and to aid in the proper selection and installation of the equipment. All material and equipment shall be subject to final acceptance by the Engineer at the completion of the project.

1.7 WARRANTY:

- A. Any defects from defective or improper materials or faults arising from improper workmanship which may appear within a period of twelve (12) months from the date of final acceptance of the building shall be amended and made good by the Contractor at his own cost. Architect shall furnish to the Contractor a letter indicating the date of final acceptance.
- B. Where such defective work results in damage to the work installed under other sections of the Specifications, all such work shall be restored to its original condition at the expense of the Contractor by parties skilled in the particular work required.

1.8 DRAWINGS:

- A. These Specifications are accompanied by Drawings indicating typical layouts, conduit sizes, outlet center and equipment locations, etc. Drawings and these Specifications are complementary each to the other and what is called for by one shall be as binding as if called for by both. Outlet Center locations indicated on the Drawings are schematic. Exact location of each outlet shall be based upon existing conditions, jobsite coordination and approval of the Owner and/or Engineer.

- B. Drawings as prepared are in general diagrammatic. Contractor shall carefully lay out his work at the site to conform to existing conditions, to avoid all obstructions and to conform to details of installation as indicated on the Drawings and supplied by the manufacturers of the equipment to be installed and thereby to provide an integrated, satisfactorily operating installation. All necessary offsets in conduit, fittings, etc., required to avoid interferences between new conduit, existing conditions and new sanitary sewer piping, shall be furnished and installed by the Contractor without additional expense to the Owner or Architect.
- C. Routing paths for all power feeders, and branch circuits are not indicated on the Drawings. Routing paths which are indicated are schematic and are not accompanied by dimensional data or detailed for every required offset. Contractor shall have his choice of routing paths for such raceways provided that this routing does not interfere with existing conditions and does not violate the requirements of the Owner. In cases where inference develops or in cases where proposed routing is not in accordance with the requirements of the Owner, a representative of the Owner will direct the required path of routing. All trenching, tunneling, piping, conductors, conduit, boxes, fittings and supports required to install piping and raceways indicated on the power riser diagram, and electrical site plans are hereby included in the project requirements and shall be included in the proposal submitted by the Contractor.
- D. These Specifications and Drawings accompanying same are intended to cover systems which will not interfere with existing conditions, which will fit into the available spaces, and which will ensure complete and satisfactory systems. Contractor shall, therefore, carefully examine the Drawings and the site and shall be responsible for the proper fitting of his material and apparatus to satisfy new conditions.
- E. Contractor's attention is directed that all equipment he proposes to furnish must fit into the space allocated for same on the Drawings. It shall be the Contractor's responsibility to furnish data to evident that sufficient space can be provided for the installation of proposed equipment and that adequate access will exist for service and maintenance of equipment. Should changes become necessary during construction, the Contractor shall make such necessary changes at his (the Contractor's) own expense.

1.9 CHANGES:

- A. Any changes from the Drawings necessary to make the installation conform to building construction, to make this work fit the work of other trades, or to make this work conform to the rules of the city and municipal bodies having jurisdiction shall be made by the Contractor at his (the Contractor's) own expense.

1.10 PROTECTION:

- A. All work, equipment, and materials shall be protected at all times to prevent damage or breakage either in transit, storage, installation, or testing. All openings shall be closed with caps or plugs during installation. All material and equipment shall be covered and protected against dirt, water, chemicals, or mechanical injury. Failure on the part of the Contractor to provide adequate protection will be cause for rejection of the unprotected equipment and materials.

1.11 EXCAVATION AND BACKFILL:

- A. The Contractor shall provide all necessary excavation and backfilling required for his work. Excavation shall be backfilled with materials removed from trenches tamped and puddled compactly in place to a density required to leave surface of ground at original level without settlement.

- B. Attention is directed that the ground water level is relatively near the surface at the site of renovation. All de-watering of trenches, drilled footings and drilled piers which is required to install conduit at specified depths, and all de-watering of drilled holes to pour concrete to the depths required is hereby included as a contractual requirement of the contractor.

1.12 CERTIFICATION OF INSTALLATION BY EQUIPMENT MANUFACTURER'S REPRESENTATIVE:

- A. In order to place responsibility for the furnishing of the proper equipment and to see that it is installed as intended by the manufacturer, the Contractor, during construction, shall request supervisory assistance from the equipment manufacturer's representatives so that the material installation will be properly installed. After installation, the Contractor shall again request the representatives to inspect and certify that the equipment is in proper working order.
- B. Before final payment is issued, the representatives shall submit to the Architect, through the Contractor, a signed statement certifying to their inspection and that the equipment is properly installed and ready for operation.

1.13 ELECTRICAL DEMOLITION AND EXISTING CONDITIONS:

- A. The existing electrical distribution system is to be removed and replaced with new. Electrical demolition drawings are not provided. Where certain existing electrical items are to remain and be re-connected to the new electrical distribution system, these existing items to remain for reconnection are noted on the drawings. Electrical demolition requirements must be surveyed by the contractor prior to submittal of proposal.
- B. In the preparation of these documents, effort has been made to show the approximate locations of, and connections to the existing electrical apparatus to be reconnected to the new distribution system. However, the Contractor shall be responsible for verifying existing conditions which are associated with new work. Contractor shall visit the site to inspect the facilities and related areas. Contractor shall inspect and verify all details and requirements of all the contract documents, prior to submittal of proposal. All discrepancies between the contract documents and existing conditions shall be reported to the Engineer during the bidding period.
- C. Piping, cabling and other existing apparatus which is to remain but which is disturbed by the remodeling work, shall be reconnected in such a manner as to leave all such apparatus and facilities in proper operating condition.

1.14 REMOVED MATERIALS, FIXTURES, AND EQUIPMENT:

- A. Certain existing materials, switchgear and RV outlet centers are to be removed. Switchgear and Outlet Centers which are selected by the Owner shall remain the property of the Owner. Such switchgear and Outlet Centers shall be delivered by the Contractor to a designated location within two miles of the site of renovation. Switchgear and outlet centers which are not selected by the Owner shall become the property of the Contractor. Such switchgear and outlet centers shall be removed from the premises by the Contractor. Contractor shall exercise extreme care in removing any switchgear and outlet centers to be retained by the Owner.
- B. All removed electrical materials shall become the property of the Contractor. Such materials shall be removed from the site of construction and properly disposed of.

1.15 CLEANING:

- A. Contractor shall thoroughly clean all equipment, materials, and devices furnished and set by him. Contractor shall remove all of his debris that may have accumulated during the job. After the Architect inspects the equipment, any discrepancies shall be amended as directed.

1.16 USE OF ENGINEERS ELECTRONIC DRAWINGS:

- A. The Contractor may request the use of electronic copies of the Engineers Drawings for preparation of Contractor shop drawings. All such requests must be presented to the prime design firm. Upon receipt by the Engineer of the executed Engineer's standard Waiver of Indemnification, the Engineer will forward requested Drawings (with Engineering seal removed) through the prime design firm for use by the Contractor.

1.17 OWNER TRAINING:

- A. Owner training is required by other sections of these Specifications. The Contractor must include evidence of completed Owner training with (bound within) the Operation and Maintenance manuals. Such evidence of completed Owner training shall include the following:
 - 1. Owner training log to include:
 - a. Typewritten names with job titles and signatures for each person in attendance.
 - b. The time, date, and duration of each training session.
 - c. A comprehensive list of all training topics covered.
 - d. A comprehensive list of all demonstrations and/or hands-on training for items such as maintenance requirements, etc.

END OF SECTION 26 00 05