

*Addison!*

**SPECIFICATIONS AND CONTRACT DOCUMENTS**

**FOR**

**PARK & STREETScape  
IMPROVEMENTS**

**TO BE KNOWN AS**

**VITRUVIAN PARK  
PUBLIC INFRASTRUCTURE - PHASE 1C**

**TOWN OF ADDISON, TEXAS**

**PUBLIC WORKS # 2009-04**

**Bid Number 10-01**

**November 3, 2009**

**PREPARED BY:**

**icon** Consulting Engineers, Inc.  
Civil Engineers - Designers - Planners  
Engineering Firm Registration Number F-9007

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**TOWN OF ADDISON, TEXAS**

**MAYOR**

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**CITY SECRETARY**

**Lea Dunn**



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**SECTION AB**

**ADVERTISEMENT FOR BIDS**

## ADVERTISEMENT FOR BIDS

1. Sealed bids addressed to the Town of Addison, Texas, for **Park & Streetscape Improvements to be known as Vitruvian Park Public Infrastructure – Phase 1C** in the Town of Addison, Texas, hereinafter called “City” or “Owner” in accordance with specifications and contract documents prepared by **Icon Consulting Engineers, Inc.** will be received at the office of Matt McCombs, Management Analyst, Finance Building, 5350 Belt Line Road, Addison, Texas until **2:00 p.m. on Tuesday, November 24, 2009**. Bids received by the appointed time will be opened and read aloud. Any bids received after closing time will be returned unopened.
2. The Contractor shall identify his bid on the outside of the envelope by writing the words **PUBLIC WORKS # 2009-04, VITRUVIAN PARK PUBLIC INFRASTRUCTURE – PHASE 1C**.
3. Bids shall be accompanied by a cashier’s check or certified check upon a national or state bank in an amount not less than five percent (5%) of the total maximum bid price payable without recourse to the Town of Addison, or a bid bond in the same amount from a reliable surety company licensed by the State of Texas to act as a Surety and be listed on the current U.S. Treasury Listing of Approved Sureties, or a Binder of Insurance executed by a surety company licensed by the State of Texas to act as a surety or its authorized agent as a guarantee that the bidder will enter into a contract and execute a Performance Bond within ten (10) days after notice of award of contract to him. All bonds must be signed original documents to be valid; copies of bonds are not acceptable.
4. Plans, specifications and bidding documents may be secured from Clay Barnett P.E., Town Engineer, 16801 Westgrove Drive, Addison, Texas. A fee of \$250 is required for obtaining a hard copy of this bid package. Plans, specifications and bid documents will be available on CD for no cost.
5. The right is reserved by the Mayor and the City Council as the interests of the City may require to reject any or all bids and to waive any informality in bids received.
6. The Bidder (Proposer) must supply all the information required by the Proposal Form.
7. A Performance Bond, and a Labor and Material Payment Bond, will be required by the Owner, with each Bond in the amount of 100% of the total contract amount. A Maintenance Bond in the amount of 10% of the total contract amount will also be required for a period of two (2) years. All bonds shall be issued by a surety company licensed by the State of Texas to act as a Surety and be listed on the current U.S. Treasury Listing of Approved Sureties.
8. For information on bidding, to secure bid documents, or for information on the work to be performed, call Clay Barnett, P.E., Town of Addison, (972) 450-2857 or Bruce F. Dunne, P.E., Icon Consulting Engineers, Inc., (817) 552-6210.
9. The project consists of installing park and streetscape improvements in accordance with the plans and specifications.
11. **Pre-Bid Conference** will be held at **2:00 p.m., on Tuesday, November 10, 2009** in the Conference Room of the Town of Addison’s Service Center, 16801 Westgrove Dr., Addison, Texas 75001.

**TOWN OF ADDISON, TEXAS**

**SECTION IB**

**INSTRUCTIONS TO BIDDERS**

## INSTRUCTIONS TO BIDDERS

- A. PROJECT:** VITRUVIAN PARK PUBLIC INFRASTRUCTURE – PHASE 1C, in the Town of Addison.

The bids will be evaluated as stated in Section "O" of the instructions to Bidders.

- B. PROJECT DESCRIPTION:** This project consists of constructing park and streetscape improvements in accordance with the plans and specifications.

- C. PROPOSALS:** Proposals must be in accordance with these instructions in order to receive consideration.

- D. DOCUMENTS:** Documents include the Bidding Requirements, including the Advertisement for Bids, these Instructions to Bidders, Proposal Forms, Contract Agreement, Performance Bond, Payment Bond, Maintenance Bond, Contractor's Affidavit of Bills Paid, General Provisions, Special Provisions, Technical Specifications, Waiver of Lien, Drawings, and Addenda which may be issued by the Town of Addison during the bidding period. Bidding Documents may be viewed and/or obtained under the terms and conditions set forth in the Advertisement for Bids, Section AB of this Project Manual.

- E. EXAMINATION OF DOCUMENTS AND SITE:** Bidders shall carefully examine the Bidding Documents and the construction site to obtain first-hand knowledge of the scope and the conditions of the Work. Each Contractor, Subcontractor and Sub-subcontractor, by submitting a proposal to perform any portion of the Work, represents and warrants that he has examined the Drawings, Specifications (Project Manual) and the site of the Work, and from his own investigation has satisfied himself as to the scope, accessibility, nature and location of the Work; the character of the equipment and other facilities needed for the performance of the Work; the character and extent of other work to be performed; the local conditions; labor availability, practices and jurisdictions and other circumstances that may affect the performance of the Work. No additional compensation will be allowed by the Owner for the failure of such Contractor, Subcontractor or Sub-subcontractor to inform himself as to conditions affecting the Work. **A non-mandatory Pre-Bid Meeting will be held at 2:00 P.M. on Tuesday, the 10<sup>th</sup> day of November, 2009** at the Addison Service Center, 16801 Westgrove Drive, Addison, Texas 75001, 972-450-2871.

- F. INTERPRETATION OF DOCUMENTS:** If any person contemplating submitting a bid for the proposed Contract is in doubt as to the meaning of any part of the Drawings, Specifications (Project Manual) or other proposed Contract Documents, he may submit to the Town of Addison, not later than seven (7) calendar days prior to the date set for opening bids, a written request for an interpretation or clarification. Bidders should act promptly and allow sufficient time for a reply to reach them before preparing their bids. Any interpretation or clarification will be in the form of an Addendum duly issued. No alleged verbal interpretation or ruling will be held binding upon the Owner.

- G. SUBSTITUTIONS:** Conditions governing the submission of substitutions for specific materials, products, equipment and processes are in the Special Provisions. Requests for substitutions must be received by the Town of Addison seven (7) calendar days prior to the established bid date.



- H. ADDENDA:** Interpretations, clarifications, additions, deletions and modifications to the Documents during the bidding period will be issued in the form of Addenda and a copy of such Addenda will be emailed, faxed or delivered to each person who has been issued a set of the Bidding Documents. Addenda will be a part of the Bidding Documents and the Contract Documents, and receipt of them shall be acknowledged in the Bid Form. All such interpretations and supplemental instructions will be in the form of written addenda to the contract documents which, if issued, will be sent by telegram, certified or registered mail, facsimile, email or hand delivered to all prospective bidders (at the respective addresses furnished for such purposes) not later than three (3) calendar days prior to the date fixed for the opening of bids. If any bidder fails to acknowledge the receipt of such addenda in the space provided in the bid form, his bid will nevertheless be construed as though the receipt of such addenda had been acknowledged.
- I. COMPLETION TIME:** The completion time of the project will be set through the bidding technique used in the Proposal Form. A more detailed explanation of the bidding technique is given in the Special Provisions.
- J. PREPARATION OF BIDS:** Prices quoted shall include all items of cost, expense, taxes, fees and charges incurred by, or arising out of, the performance of the work to be performed under the Contract. Bids shall be submitted in duplicate and shall be signed in ink. Any bid on other than the required form will be considered informal and may be rejected. Erasures or other changes in a bid must be explained or noted over the initials of the bidder. Bids containing any conditions, omissions, unexplained erasures and alterations, or irregularities of any kind may be rejected as informal. The prices should be expressed in words and figures or they may be deemed informal and may be rejected. In case of discrepancy between the prices written in the bid and those given in the figures, the price in writing will be considered as the bid. In the case of a discrepancy between a unit price and its extension, the unit price will govern. Failure to submit all requested information will make a bid irregular and subject to rejection. Bids shall be signed with name typed or printed below signature, and, if a partnership, give full name of all partners. Where bidder is a corporation, bids must be signed with the legal name of the corporation followed by the name of the state of incorporation and the legal signature of an officer authorized to bind the corporation to a contract.

NOTE: A COMPUTER GENERATED PROPOSAL FORM MAY BE USED IN LIEU OF THE ENCLOSED FORMS. THE FORM SHALL BE 8 1/2" X 11" IN SIZE, AND WILL BE ATTACHED TO THE PROPOSAL IN THE PROPER SECTION, AND WILL BE MADE PART OF THE PROPOSAL AND CONTRACT DOCUMENTS.

NOTE: SPREADSHEET OPTION IS FOR THE CONVENIENCE OF THE BIDDER, NO WORDING IN THE SPREADSHEET SHALL MODIFY OR AMEND THE WORDING IN THE BID PROPOSAL OR PLANS.

THE UNIT PRICE ON THE FORM SHALL BE THE PRICE OF THE ITEM, AND ERRORS THAT MAY BE PRESENT IN THE PRINTOUT WILL NOT BE RECOGNIZED AS AN OPPORTUNITY TO REVISE THE PROPOSAL. THE SUMMARY SHEET INCLUDED IN THIS BID DOCUMENT SHALL BE UTILIZED FOR SUMMARIZING THE BID.

THE SPREAD SHEET SHALL PRESENT EACH ITEM IN THE ORDER AND NUMBER AS SHOWN IN THE CITY'S PROPOSAL AND BID SCHEDULE FOR THIS PROJECT. THE SPREAD SHEET SHALL BE IN A COLUMN FORMAT WITH THE FOLLOWING COLUMNS:

1. ITEM NUMBER
2. DESCRIPTION
3. UNIT OF MEASURE
4. UNIT PRICE
2. ESTIMATED QUANTITY
3. AMOUNT BID

**K. SUBMITTAL OF BIDS:** Sealed proposals will be received at the time, date and place stated in the Advertisement for Bids. Proposals shall be made on unaltered Proposal Forms furnished by the Town of Addison. Submit proposal in an opaque, sealed envelope addressed to the Owner and plainly mark on the outside of the envelope the project name, and the name and address of the bidder. The envelopes shall be marked with the following project names:

**PUBLIC WORKS # 2009-04**  
**VITRUVIAN PARK PUBLIC INFRASTRUCTURE – PHASE 1C**

The Bid Bond must be completed and signed by each bidder and submitted with the bid. A separate bid must be submitted for each discipline that a contractor wishes to be awarded. Submit Bids by mail or in person prior to the time for receiving bids set forth in the Advertisement for Bids issued by the Town. All bonds must be signed original documents to be valid; copies of bonds are not acceptable.

**L. MODIFICATION AND WITHDRAWAL OF BIDS:** Prior to the time set for bid opening, bids may be withdrawn or modified. Bids may be modified only on the official bid form and must be signed by a person legally empowered to bind the bidder. No bidder shall modify, withdraw or cancel his bid or any part thereof for sixty (60) calendar days after the time agreed upon for the receipt of bids.

**M. DISQUALIFICATION:** The Owner reserves the right to disqualify proposals, before or after the opening, upon evidence of collusion with intent to defraud or other illegal practices relating to this proposal upon the part of the bidder.

**N. SUBMISSION OF POST-BID INFORMATION:** Upon notification of acceptance, the selected bidder shall, within five (5) calendar days, submit the following:

1. A designation of the portions of the Work proposed to be performed by the bidder with his own force.
2. A list of names of the subcontractors or other persons or organizations, including those who are to furnish materials and equipment fabricated to a special design proposed for such portions of the Work as may be designated in the Bidding Documents or as may be requested by the Town of Addison. The bidder will be required to establish to the satisfaction of the Owner the reliability and responsibility of the proposed Subcontractors and suppliers to furnish and perform the Work.

**O. AWARD:** The Owner reserves the right to accept any or to reject any bids without compensation to bidders and to waive irregularities and informalities. The Town of Addison Public Works Department, in making its recommendation, will consider the following elements:

1. Whether the bidder is a contractor with experience in the type of work involved.
2. Whether the bidder has adequate plant, equipment and personnel to perform the work properly and expeditiously.
3. Whether the bidder has a suitable financial status and reputation for meeting obligations incident to work of the kind specified.
4. Whether the bidder has complied with the terms and conditions of the A+B bidding.

Alternate items may or may not be awarded. Addition or deletion of other items or schedules will be governed by NCTCOG, 4th Edition, Item 1.37 "Change or Modification of Contract".

**P. EXECUTION OF THE CONTRACT:** The successful bidder will be required to enter into a contract with the Owner within ten (10) days of notice by the Owner that his bid has been accepted. Failure to enter into a contract within the established time limit shall be considered grounds for forfeiture of the bid bond.

**Q. CONSTRUCTION SCHEDULE:** It is the Owner's desire to have the project completed and operational in as short a time as possible. The number of calendar days for completion of the project will begin with the date specified in the Notice to Proceed. The Notice to Proceed will be issued in a manner to facilitate a smooth construction of the project. The Contractor shall begin construction within ten (10) calendar days of the issuance of the Notice to Proceed.

**R. COST PLUS TIME BIDDING:** The time of completion is of the essence for this contract. A special bidding procedure will be used to determine the successful bidder for this project. This procedure takes into account the price offerings from the bidder and the time the bidder intends to complete the work. Details of this procedure are located in the Special Provisions.

**S. FORM OF CONTRACT:** The contract for the construction of the project will be drawn up by the Owner. A sample form of agreement is included in the Contract Agreement Section.

**T. BONDS:** A Performance Bond, a Labor and Material Payment Bond and a Maintenance Bond will be required by the Owner. The performance and payment bonds shall name the Town of Addison, and others as directed by the Town, as joint obligees. Sample forms have been included in the Performance Bond, Payment Bond and Maintenance Bond sections. (Contractor shall confirm the legal names of obligees prior to execution of Bonds.)

**U. BID SECURITY:** Bids shall be accompanied by a cashier's check or certified check drawn upon a national or state bank in an amount not less than five percent (5%) of the total maximum bid price payable without recourse to the Town of Addison, or a bid bond in the same amount from a surety company licensed to do business in the State of Texas as a guarantee that the bidder will enter into a contract and execute a Performance Bond and Payment Bond within ten (10) calendar days after notice of award of contract to him. Such checks or bid bonds will be returned to all bidders after the Owner has made an award of contract, or, if no award has been made within thirty (30) calendar days after the date of the

opening of bids, upon demand of the bidder at any time thereafter, so long as he has not been notified of the acceptance of his bid.

**V. RESOLUTIONS:** If the bidder is a corporation, a copy of the resolution empowering the person submitting the bid to bind the bidder must be included with the bid.

**W. CONSTRUCTION STAKING:** Construction staking and re-staking will not be provided by the Owner. Benchmarks and Horizontal Control are shown on the plans. There is no separate bid item for staking, therefore, the contractor must include value for staking in the various bid items as subsidiary to the contract. Any staking or re-staking that is required shall be the responsibility of the Contractor and shall be at no cost to the Owner.

**X. FINAL PAYMENT:** The general provisions for Final Payment shall be as stated in Item 1.51.4 of the North Central Texas Standard Specifications for Public Works Construction (4th Edition) including all Amendments and Additions. Prior to final payment the Contractor shall provide the Owner with the following items:

1. A Contractor's Affidavit of Bills Paid in accordance with Section BP.
2. A Consent of Surety Company to Final Payment.
3. A complete set of record plans which indicate all construction variations from the original construction documents in accordance with Item 5 of the Special Provisions.
4. A two (2) year Maintenance Bond in accordance with Section MB.

**Y. PREVAILING WAGE RATES:** Wage rates paid on this project shall not be less than specified in the schedule of general prevailing rates of per diem wages as attached in the Special Provisions.

**Z. PRIORITY OF CONTRACT DOCUMENTS:** In case of conflict between contract documents, priority of interpretation shall be in the following order: signed agreement, performance and payment bonds, proposal, special provisions (or conditions), technical specifications, general provisions, advertisement for bids, project drawings, Standard Specifications for Public Works Construction – North Central Texas(4th Edition); Standard Drawings. This priority list shall take precedence over item 1.19 of the NCTCOG standard specifications.

SECTION PF

**PROPOSAL FORM**

**PROPOSAL FORM**

\_\_\_\_\_, 2009

TO: The Honorable Mayor and Town Council  
Town of Addison, Texas

Gentlemen:

The undersigned bidder, having examined the plans, specifications and contract documents, and the location of the proposed work, and being fully advised as to the extent and character of the work, proposes to furnish all equipment and to perform labor and work necessary for completion of the work described by and in accordance with the Plans, Specifications and Contract for the following prices, to wit:

Signed by: \_\_\_\_\_

ACKNOWLEDGMENT OF ADDENDA:

The Bidder acknowledges receipt of the following addenda:

Addendum No. 1 \_\_\_\_\_

Addendum No. 2 \_\_\_\_\_

Addendum No. 3 \_\_\_\_\_

**VITRUVIAN PARK IMPROVEMENTS - PHASE 1C  
PARK AND STREETScape IMPROVEMENTS**

**Base Bid**

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
1	1	L.S.	<b>For Mobilization (not to exceed 5% of total bid amount)</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Lump Sum		
2	1	EA.	<b>For Furnishing and Installing Project Sign in Accordance with Sign Plan</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Each		
3	1	L.S.	<b>For Compliance with Storm Water Pollution Prevention Plan Including Maintenance of Erosion Control Devices</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Lump Sum		
4	1	EA.	<b>For Furnishing and Installing Construction Entrance</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Each		
5	1	L.S.	<b>For Installation and Maintenance of Traffic Control Measures</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Lump Sum		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
6	3,227	L.F.	<p><b>For Furnishing and Installing Silt Fence Sediment Barrier</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
7	1,250	L.F.	<p><b>For Furnishing and Installation of Tree Protection Fencing of Existing Trees to Remain</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
8	12,351	S.Y.	<p><b>For Installing Erosion Control Blanket (Curlex 2 or Approved Equal, Neutral Color)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Yard</p>		
9	1	L.S.	<p><b>For Maintaining Existing Silt Fence</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
10	1	EA.	<p><b>For Maintaining Existing Construction Entrance</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
11	1,720	S.Y.	<p><b>For Removal and Disposal of Existing Erosion Control Blanket</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Yard</p>		



## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
12	5,976	L.F.	<b>For Removal &amp; Disposal of Existing Silt Fence</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
13	1	EA.	<b>For Removal and Disposal of Existing Construction Entrance</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Each		
14	2	EA.	<b>For Removal and Disposal of Existing Inlet Protection</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Each		
15	950	L.F.	<b>For Removal &amp; Recycling of Existing Concrete Curb and Gutter</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
16	1	L.S.	<b>For Removal &amp; Recycling of Existing Rock Walls, Concrete Stairs, Weir &amp; Slope Reinforcement (Ref. Sheet C102)</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Lump Sum		
17	8,026	S.Y.	<b>For Removal &amp; Recycling of Existing Asphalt Street Pavement</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Square Yard		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
18	475	L.F.	<p><b>For Removal and Disposal of Existing 66" CMP Storm Drain Line</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
19	40	L.F.	<p><b>For Removal and Disposal of Existing 24" RCP Storm Drain Line</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
20	8	L.F.	<p><b>For Removal and Disposal of Existing 15" RCP Storm Drain Line</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
21	1	EA.	<p><b>For Removal and Disposal of Existing 15" Storm Drain Headwall</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
22	415	L.F.	<p><b>For Removal and Disposal of Existing 10" Sanitary Sewer Line</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
23	310	L.F.	<p><b>For Removal and Disposal of Existing 8" Sanitary Sewer Line</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
24	85	L.F.	<b>For Removal and Disposal of Existing 8" Water Line</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
25	1	EA.	<b>For Removal and Salvaging of Existing Fire Hydrant Assembly</b> complete in _____ _____ Dollars and _____ Cents per Each		
26	280	L.F.	<b>For Removal and Disposal of Existing Underground Electric Cable</b> complete in _____ _____ Dollars and _____ Cents per Linear Foot		
27	1,700	S.Y.	<b>For Removal and Stockpiling of Existing Rock Rip Rap</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Square Yard		
28	25	EA.	<b>For Removal and Disposal of Existing Trees</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Each		
29	1	L.S.	<b>For Tree Pruning of Existing Trees along Creek Banks, from Ponte Bridge to South End of Creek, to Raise Canopies to a Minimum Height of 12'</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Lump Sum		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
30	83	L.F.	<p><b>For Removal and Disposal of Existing Wood Fence and Posts</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
31	1	L.S.	<p><b>For Temporary Creek Diversions including De-watering, Pumps, Rock Check Dams, Sedimentation Ponds, By-pass Piping, etc. for Upper and Lower Basins (Reference Special Provision 110)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
32	1	L.S.	<p><b>For Clearing and Grubbing of Site</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
33	132,222	C.Y.	<p><b>For Unclassified Excavation and Controlled Density Placement of Embankment Materials (Reference Special Provision 73)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Cubic Yard</p>		
34	5,695	C.Y.	<p><b>For Controlled Density Placement of High PI Clay Material (PI greater than 35) for Liner along Lake &amp; Channel Bottom to a Depth of One (1) Foot</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Cubic Yard</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
35	3,615	C.Y.	<p><b>For Import and Placement of Topsoil to a Depth of 4" over all Landscape Areas within Limits of the Park Property</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per   Cubic Yard</p>		
36	28,385	S.Y.	<p><b>For Fine Grading and Soil Preparation of Park Area Property including All Landscape Areas (<math>\pm</math> 0.3') and Areas to be Paved (<math>\pm</math> 0.1'); Lake Area Not Included</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per   Square Yard</p>		
37	665	S.Y.	<p><b>For Power Raking of Soil Areas Beneath Existing Trees to be Preserved</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per   Square Yard</p>		
38	3,631	S.Y.	<p><b>For 6" Reinforced Concrete Park Path Pavement (4200 psi) with Rock Salt Finish</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per   Square Yard</p>		
39	319	S.Y.	<p><b>For 6" Reinforced Concrete Sidewalk Pavement (4200 psi) with Saw Cut Pattered Finish</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per   Square Yard</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
40	567	S.Y.	<p><b>For 6" Reinforced Concrete Pavement in front of Grotto Structure (4200 psi) with Broom Finish</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Yard _____</p>		
41	120	S.Y.	<p><b>For 4" Reinforced Concrete Pavement for Miscellaneous Walks, Flatwork, Flumes, Island Approaches and Splash Blocks</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Yard _____</p>		
42	3,218	L.F.	<p><b>For Reinforced Concrete Lake Edge Wall and Monolithic Concrete Cap with Medium Sand Blast Finish (3' AFG) - Ref. Special Provision 83</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		
43	657	L.F.	<p><b>For Reinforced Concrete Lake Edge Wall and Monolithic Concrete Cap with Medium Sand Blast Finish (4' AFG) - Ref. Special Provision 83</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		
44	342	L.F.	<p><b>For Reinforced Concrete Site Retaining Walls on upside of Park Path with Medium Sand Blast Finish (0' to 2.5' AFG) - Ref. Special Provision 84</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
45	60	L.F.	<p><b>For Reinforced Concrete Site Retaining Wall on downside of Park Path with Medium Sand Blast Finish (0' to 2' AFG) - Ref. Special Provision 84</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
46	15,150	S.F.	<p><b>For Furnishing and Installing Enkamat 7020 TRM Slope Reinforcement (Ref. Sheet SP 500)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
47	400	S.Y.	<p><b>For Furnishing and Placing 3' Diameter Cut Limestone Rock Slope Reinforcement on Embankments immediately Downstream of Ponte Bridge Between Trail and Lake Edge (Ref. Special Provision 92)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Yard</p>		
48	9	C.Y.	<p><b>For Furnishing and Placing of Rock Rip-Rap - 12" Depth, THD Item 432.4, Type "A" Dry Rip Rap, with Filter Fabric</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Cubic Yard</p>		
49	1	EA.	<p><b>For Connecting Proposed Pipe to Existing 6' x 5' Storm Drain Pipe</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
50	1	EA.	<b>For Connecting Proposed Pipe to Existing 5' x 5' Storm Drain Pipe</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
51	1	EA.	<b>For Connecting Proposed Pipe to Existing 15" Storm Drain Pipe</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
52	19	EA.	<b>For Connecting Proposed Area Drains to Storm Drain Pipe</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
53	7	EA.	<b>For Connecting Proposed Tree Drain Line to Storm Drain Pipe</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
54	1	EA.	<b>For Constructing Standard 2' Square Storm Drain Junction Box</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
55	2	EA.	<b>For Constructing Standard 13" x 13" Storm Drain Catch Basin</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		



## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
56	2	EA.	<b>For Constructing Standard Storm Drain Cleanout</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Each		
57	71	L.F.	<b>For Furnishing and Installing 36" Reinforced Concrete Pipe (Class III)</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
58	63	L.F.	<b>For Furnishing and Installing 30" Reinforced Concrete Pipe (Class III)</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
59	243	L.F.	<b>For Furnishing and Installing 18" Reinforced Concrete Pipe (Class III)</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
60	328	L.F.	<b>For Furnishing and Installing 15" Reinforced Concrete Pipe (Class III)</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
61	48	L.F.	<b>For Furnishing and Installing 12" PVC (SDR-35)</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
62	100	L.F.	<p><b>For Furnishing and Installing 10" PVC (SDR-35)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
63	98	L.F.	<p><b>For Furnishing and Installing 8" PVC (SDR-35)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
64	513	L.F.	<p><b>For Furnishing and Installing 6" PVC (SDR-35)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
65	297	L.F.	<p><b>For Furnishing and Installing 4" PVC (SDR-35)</b></p> <p><b>Tree Drain Piping</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
66	1	EA.	<p><b>For Furnishing and Constructing 36" Reinforced Concrete Headwall</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
67	1	EA.	<p><b>For Furnishing and Constructing 30" Reinforced Concrete Headwall</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
68	2	EA.	<b>For Furnishing and Constructing 18" Reinforced Concrete Headwall</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
69	5	EA.	<b>For Furnishing and Constructing 15" Reinforced Concrete Headwall</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
70	7	EA.	<b>For Furnishing and Installing 6" Drain Grate, Round, Model NDS, Part No. 90 B, Brass</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
71	15	EA.	<b>For Furnishing and Installing 6" Drain Grate, Round, Model NDS, Part No. 918 B, Brass</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
72	2,191	L.F.	<b>For TV Inspection of Storm Drain System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Linear Foot		
73	1	L.S.	<b>For Preparing, Furnishing, Implementing and Maintaining Trench Safety System for Storm Drain Improvements</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Lump Sum		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
74	1	EA.	<b>For Connecting Proposed Pipe to Existing 8" Water Line</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
75	1	EA.	<b>For Connecting Proposed Pipe to Existing 2" Water Line</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
76	6	EA.	<b>For Connecting Proposed Pipe to Existing 1 1/2" Water Line</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
77	110	L.F.	<b>For Furnishing and Installing 16" Steel Encasement Pipe by Open Cut</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Linear Foot		
78	928	L.F.	<b>For Furnishing and Installing 12" PVC Water Recirculation Pipe by Open Cut with Embedment</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Linear Foot		
79	422	L.F.	<b>For Furnishing and Installing 10" PVC Water Recirculation Pipe by Open Cut with Embedment</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Linear Foot		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
80	812	L.F.	<p><b>For Furnishing and Installing 6" PVC Water Recirculation Pipe by Open Cut with Embedment</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
81	228	L.F.	<p><b>For Furnishing and Installing 4" PVC Water Recirculation Pipe by Open Cut with Embedment</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
82	229	L.F.	<p><b>For Furnishing and Installing 2" Water Pipe by Open Cut</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
83	103	L.F.	<p><b>For Furnishing and Installing 1 1/2" Water Pipe by Open Cut</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
84	100	L.F.	<p><b>For Furnishing and Installing 1" Water Pipe by Open Cut</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
85	375	L.F.	<p><b>For Furnishing and Installing 3/4" Water Pipe by Open Cut</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
86	233	L.F.	<p><b>For Furnishing and Installing 1/2" Water Pipe by Open Cut</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
87	1	EA.	<p><b>For Furnishing and Installing 12" Gate Valve Complete w/ C.I. Valve Box</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
88	2	EA.	<p><b>For Furnishing and Installing 10" Gate Valve Complete w/ C.I. Valve Box</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
89	2	EA.	<p><b>For Furnishing and Installing 6" Gate Valve Complete w/ C.I. Valve Box</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
90	2	EA.	<p><b>For Furnishing and Installing 4" Gate Valve Complete w/ C.I. Valve Box</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
91	8	EA.	<p><b>For Furnishing and Installing 2" Valve and Box (Ref. Sheet M109/03)</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
92	3.6	Tons	<b>For Furnishing and Installing Cast Iron Fittings for Water Pipe</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Ton		
93	9	EA.	<b>For Furnishing and Installing 2" Water Service Tap</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
94	3	EA.	<b>For Furnishing and Installing 1 1/2" Irrigation Meter and Box with Backflow Preventer &amp; Box</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
95	4	EA.	<b>For Furnishing and Installing 1 1/2" Irrigation Meter in Existing Box</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
96	1	EA.	<b>For Furnishing and Installing 2" Backflow Preventer and Box</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
97	7	EA.	<b>For Furnishing and Installing 1 1/2" Backflow Preventer and Box</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
98	8	EA.	<b>For Furnishing and Installing Non-Freeze Wall Hydrant, Watts HY-725 or Equal</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
99	1	EA.	<b>For Furnishing and Installing 12" Wall Penetration (Ref. Sheet M109)</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
100	1	EA.	<b>For Furnishing and Installing 10" Wall Penetration (Ref. Sheet M109/05)</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
101	3	EA.	<b>For Furnishing and Installing 6" Wall Penetration (Ref. Sheet M109/02)</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
102	2	EA.	<b>For Furnishing and Installing 4" Wall Penetration (Ref. M109/04)</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
103	8	EA.	<b>For Furnishing and Installing 2" Wall Penetration (Ref. M109/03)</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		



## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
104	6	EA.	<b>For Final Adjustment of Existing Water Valves to Final Grade</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
105	1	L.S.	<b>For Preparing, Furnishing, Installing and Maintaining Trench Safety System for Water Line Improvements</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Lump Sum		
106	11	L.F.	<b>For Furnishing and Installing 8" PVC Sanitary Sewer Pipe (0' to 10' Depth) by Open Cut w/ Embedment</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Linear Foot		
107	54	L.F.	<b>For Furnishing and Installing 4' PVC Sanitary Sewer Pipe (0' to 10' Depth) by Open Cut w/ Embedment</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Linear Foot		
108	3	EA.	<b>For Connecting Proposed Pipe to Existing Sanitary Sewer</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
109	2	EA.	<b>For Installing 4" Service Tap</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Each		
110	65	L.F.	<b>For TV Inspection of Sanitary Sewer System</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
111	1	L.S.	<b>For Preparing, Furnishing, Installing and Maintaining Trench Safety System for Sewer Line Improvements</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Lump Sum		
112	697	L.F.	<b>For Furnishing and Installing of 1-6" and 1-2" Schedule 40 PVC Irrigation Conduits</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
113	1,940	L.F.	<b>For Furnishing and Installing 1/2" Schedule 40 PVC Conduit</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		
114	3,570	L.F.	<b>For Furnishing and Installing 3/4" Schedule 40 PVC Conduit</b> complete in place, the sum of _____ _____ Dollars and _____ Cents per Linear Foot		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
115	2,650	L.F.	<p><b>For Furnishing and Installing 1" Schedule 40 PVC Conduit</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
116	2,740	L.F.	<p><b>For Furnishing and Installing 1 1/4" Schedule 40 PVC Conduit</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
117	2,490	L.F.	<p><b>For Furnishing and Installing 2" Schedule 40 PVC Conduit</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
118	1,690	L.F.	<p><b>For Furnishing and Installing 2 1/2" Schedule 40 PVC Conduit</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
119	100	L.F.	<p><b>For Furnishing and Installing 3" Schedule 40 PVC Conduit</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
120	2,840	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 250 MCM cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
121	890	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 000 cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		
122	3,660	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 0 cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		
123	10,240	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 2 cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		
124	2,140	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 4 cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		
125	8,500	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 6 cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		
126	4,290	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 8 cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot _____</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
127	10,910	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 10 cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
128	6,620	L.F.	<p><b>For Furnishing and Installing Electric Conductor (No. 12 cu) XHHW-2 Insulated</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
129	168	L.F.	<p><b>For Furnishing and Installing Electric Service to 200A Company Switch, 4 No. 0000 cu XHHW-2 in 3" Schedule 40 PVC Conduit, Complete</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
130	168	L.F.	<p><b>For Furnishing and Installing Electric Service to 100A Company Switch, 4 No. 0 cu XHHW-2 in 2" Schedule 40 PVC Conduit, Complete</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
131	169	L.F.	<p><b>For Furnishing and Installing Electric Service to Panel GA, 4 No. 0000 cu XHHW-2 in 3" Schedule 40 PVC Conduit, Complete</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
132	18	EA.	<p><b>For Furnishing and Installing Ground Box Type "A"</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
133	4	EA.	<p><b>For Furnishing and Installing Ground Box Type "C"</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
134	21	EA.	<p><b>For Furnishing and Installing Light Fixture Type SA1, Triple 70W, 240V MH Luminare, (2) Med &amp; (1) Wide Distribution, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
135	4	EA.	<p><b>For Furnishing and Installing Light Fixture Type SA2, Double 70W, 240V MH Luminare, (2) Wide Distribution, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
136	10	EA.	<p><b>For Furnishing and Installing Light Fixture Type SA3, Triple 70W, 240V MH Luminare, (1) Med &amp; (2) Wide Distribution, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
137	11	EA.	<p><b>For Furnishing and Installing Light Fixture Type SA4, Quad 70W, 240V MH Luminare, (2) Med &amp; (2) Wide Distribution, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
138	3	EA.	<p><b>For Furnishing and Installing Light Fixture Type SA5, Quad 70W, 240V MH Luminare, (1) Med &amp; (3) Wide Distribution, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
139	1	EA.	<p><b>For Furnishing and Installing Light Fixture Type SA6, Triple 70W, 240V MH Luminare, (3) Wide Distribution, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
140	1	EA.	<p><b>For Furnishing and Installing Light Fixture Type SA7, Double 70W, 240V MH Luminare, (2) Med Distribution, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
141	2	EA.	<p><b>For Furnishing and Installing Light Fixture Type SA8, Double 70W, 240V MH Luminare, (1) Med &amp; (1) Wide Distribution, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
142	4	EA.	<p><b>For Furnishing and Installing Light Fixture Type SB, Single 70W, 240V MH Luminare on Pedestrian Pole, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
143	32	EA.	<p><b>For Furnishing and Installing Light Fixture Type SC, Single POULSEN AHW-MIN-1/20 CHMT4-240V-ANOD ALU-CLEAR-OUTDOOR-CG, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
144	560	L.F.	<p><b>For Furnishing and Installing Light Fixture Type SE, Suspended Strand Luminaires, 3W, 24V on 3' Centers, Cord Color Black, Globe Color Clear, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
145	30	EA.	<p><b>For Furnishing and Installing Light Fixture Type SE-1, Suspended Strand Luminaires, 0.90W, 24V on 12" Centers, Clear Lens Cap, 40' per Strand, W/ 500V Amp Transformer &amp; Circuit Breakers, 240V/24V, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		



## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
146	8	EA.	<p><b>For Furnishing and Installing Light Fixture Transformer Type SE-T, for Suspended Strand Luminaires, 150W, 240V / 24V, Color Black, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
147	28	EA.	<p><b>For Furnishing and Installing Light Fixture Type SK1, Single Downlight, 20W, 120V / 24V Halogen Luminaire, Color Aluminum, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
148	30	EA.	<p><b>For Furnishing and Installing Light Fixture Type SK2, Single Downlight, 50W, 120V Halogen Luminaire, Color Aluminum, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
149	6	EA.	<p><b>For Furnishing and Installing Light Fixture Type L4, Single 70W, 240V MH Luminaire with Integral Ballast on Pedestrian Pole, Color Silver, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
150	4	EA.	<p><b>For Furnishing and Installing Light Fixture Type L5, Single VAPORTITE, CFL Fixture, 120 V, Surface Mount, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
151	7	EA.	<p><b>For Furnishing and Installing Light Fixture Type 1, 24'-7" Concrete Tapered Round Pole with Quadtriple Side Mount Inserts, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
152	31	EA.	<p><b>For Furnishing and Installing Light Fixture Type 2, 24'-7" Concrete Tapered Round Pole with Triple Side Mount Inserts, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
153	14	EA.	<p><b>For Furnishing and Installing Light Fixture Type 3, 24'-7" Concrete Tapered Round Pole with Quadtriple Side Mount Inserts, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
154	6	EA.	<p><b>For Furnishing and Installing Light Fixture Type 4, 9'-8" Aluminum Tapered Round Pole with Hinged Base, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
155	4	EA.	<p><b>For Furnishing and Installing Light Fixture Type 5, 7'-8" Aluminum Tapered Round Pole with Hinged Base, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
156	48	EA.	<p><b>For Concrete Drilled Shaft Foundation Embedded Pole, Type 1, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
157	4	EA.	<p><b>For Concrete Drilled Shaft Foundation Embedded Pole, Type 2, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
158	17	EA.	<p><b>For Furnishing and Installing Electric Outlet Enclosure, Color Gray, PEDOC 142C-HTG, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
159	17	EA.	<p><b>For Furnishing and Installing Duplex 20A GFCI Receptacle, Color White, Hubbell GFR53625GW or Equal, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
160	12	EA.	<p><b>For Furnishing and Installing Quad (2) Circuit 20A GFCI Receptacle, Color White, (2) Hubbell GFR53625GW or Equal, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
161	10	EA.	<p><b>For Furnishing and Installing Simplex 30A 120/240V 4 Wire L14-30 Locking Receptacle, Hubbell or Equal, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
162	4	EA.	<p><b>For Furnishing and Installing Electric J Box, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
163	3	EA.	<p><b>For Furnishing and Installing Electric J Box Set in Concrete, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
164	123	L.F.	<p><b>For Furnishing and Installing 6"W x 8"D Cable Trough in Concrete Encasement, Armorcast A6001301, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
165	56	L.F.	<p><b>For Furnishing and Installing 6"W x 8"D Cable Trough in Concrete Pavement, Armorcast A6001301, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
166	132	L.F.	<p><b>For Furnishing and Installing Concrete Encasement for Electric conduit, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Linear Foot</p>		
167	1	EA.	<p><b>For Furnishing and Installing VPE Electric Service Pedestal Type PS Electric Service, Type D Milbank CP3B A-Size or Approved Equal, 320 Amp Cont., 400 Amp Max Meter Base with Load Side Double Lugs, Lighting Contactor, Photo Electric Control, Mechanical 24 Hour Time Clock &amp; HOA Switch, Reference Details, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Each</p>		
168	1	EA.	<p><b>For Furnishing and Installing VPW Electric Service Pedestal Type PS Electric Service, Type D Milbank CP 3B E-Size or Approved Equal, Reference Details, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Each</p>		
169	4	EA.	<p><b>For Furnishing and Installing 200A Fused Disconnect, Square D H324NRB or Approved Equal, Reference Details, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
170	1	EA.	<p><b>For Furnishing and Installing 200A NEMA 1 Company Switch with Cam-Lok Devices, Lex Products "PowerGate" CS-200F-C5DS1 or Approved Equal, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
171	1	EA.	<p><b>For Furnishing and Installing 100A NEMA 1 Company Switch with Cam-Lok Devices, Lex Products "PowerGate" CS-100F-C5DS1 or Approved Equal, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
172	1	EA.	<p><b>For Furnishing and Installing Panel GA, 120/208V, 3 Phase, 400A, Main Breaker, 42 Space NEMA 1 Enclosure, Square D NQ or Approved Equal, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
173	1	EA.	<p><b>For Furnishing and Installing Panel GAL, 240V, 1 Phase, 100A NEMA 1 Enclosure, 100A Contactor Main, Square D NQ or Approved Equal, Remote Photo Electric Control, Mechanical 24 Hour Time Clock and HOA Switch, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
174	1	EA.	<p><b>For Furnishing and Installing Concrete Transformer Pad for Three Phase, 112 KVA Transformer per Oncor Electric Delivery Requirements</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
175	19	EA.	<p><b>For Furnishing and Installing Park Bench: Landscape Forms - Stay Bench Embedded - Powder Coat Finish</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
176	2	EA.	<p><b>For Furnishing and Installing Park Bench: Landscape Forms - Bench w/ Paver Extension Mounting - Powder Coat Silver Finish</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
177	12	EA.	<p><b>For Furnishing and Installing Bike Rack - Landscape Forms: Ring Bike Rack, Stainless Steel Finish</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
178	5	EA.	<p><b>For Furnishing and Installing Pedestal Drinking Fountain: Haws Corporation Model 3500D Color Silver - Anchored, including connection to Water Supply Line and Sump Drain</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
179	9	EA.	<p><b>For Furnishing and Installing Litter Receptacle: Hess - Punto - 11.8 Gallon Standard Finish - Embedded</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
180	7	EA.	<p><b>For Furnishing and Installing Pet Waste Disposal System: Mutt Mitt Kit Dispenser - Green w/ Single Ply Mitts - Custom Signage 22 - Gallon Waste Receptacle - Black</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
181	23	EA.	<p><b>For Furnishing and Installing Table: Landscape Forms - Parc Centre, Freestanding, 30" Diameter, Color - Silver</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
182	92	EA.	<p><b>For Furnishing and Installing Chair: Landscape Forms - Parc Centre, Color - Silver</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
183	615	S.F.	<p><b>For Furnishing and Installing Pavestone Concrete Paver "A" - City Stone 1, Size 11-3/4" L x 5-13/16" W x 2-3/8" H, Travertine Blend</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		



## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
184	436	S.F.	<p><b>For Furnishing and Installing Pavestone Concrete Paver "D" - ADA Paver Size 7-13/16" L x 3-7/8" W x 2-3/8" H, Antique Pewter</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
185	998	S.F.	<p><b>For Furnishing and Installing Pavestone Concrete Paver "E" - Holland Stone Size 7-13/16" L x 3-7/8" W x 2-3/8" H, Antique Pewter, Running Bond</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
186	23	EA.	<p><b>For Furnishing and Installing 20" Dia. x 32" Tall Granite Bollards with Stainless Steel Cap, Dakota Mahogany, Flame Finish</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
187	10	EA.	<p><b>For Furnishing and Installing 6' x 6' Paver Grate - Ironsmith Model 6224</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
188	44,100	S.F.	<p><b>For Preparation of Planting Bed Areas including Topsoil, Soil Amendment Materials and Mulch</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
189	130	EA.	<p><b>For Furnishing and Installing Live Oak, 4" Caliper, Single Trunk, Container Matched</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
190	28	EA.	<p><b>For Furnishing and Installing Red Oak, 4" Caliper, Container Matched</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
191	29	EA.	<p><b>For Furnishing and Installing Shumard Oak, 4" Caliper, Container Matched</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
192	85	EA.	<p><b>For Furnishing and Installing Bald Cypress, 4" Caliper, Container Matched</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
193	67	EA.	<p><b>For Furnishing and Installing Pond Cypress, 4" Caliper, Container Matched</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
194	1	EA.	<p><b>For Furnishing and Installing Texas Ash, 4" Caliper, Container Grown</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
195	44	EA.	<p><b>For Furnishing and Installing River Birch, 12' - 14' Height, 3-5 Canes Each, Container Grown</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		
196	42	EA.	<p><b>For Furnishing and Installing Natchez Crape Myrtle, 12'-14' Height, Multi Trunk, 3-5 Canes, Container Grown for Height</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		
197	48	EA.	<p><b>For Furnishing and Installing Oklahoma Redbud, 3'-3-1/2" Diameter, 8' Ht., Container Grown</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		
198	21	EA.	<p><b>For Furnishing and Installing Vitex, 65 Gallon, 10' Height, Container Grown for Height</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		
199	36,566	S.F.	<p><b>For Furnishing and Installing Asian Jasmine, 1 Gallon, Planted 18" On Center</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot _____</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
200	1,998	S.F.	<p><b>For Furnishing and Installing Horsetail Reed, 1 Gallon, Planted 18" On Center</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
201	15	Acres	<p><b>For Furnishing and Installing Hydromulch Seeding (NCTCOG Item 3.10. "Seeding") of Disturbed Areas Outside the Limits of the Park Property including Fill Areas and Construction Staging Area (Ref. Special Provision 74)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Acre</p>		
202	73,647	S.F.	<p><b>For Furnishing and Installing Hydromulch Grass Mix consisting of Sideoats Grama, Inland Sea Oats, Prairie Wild Rye, Purple Top, Virginia Wild Rye &amp; Plains Bristlegrass (Within Park Property where shown on Plans)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
203	181,816	S.F.	<p><b>For Furnishing and Installing Midiron Bermuda Sod (Pinned on Slopes Greater than 6:1)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
204	112	S.F.	<p><b>For Furnishing and Installing Harbor Dwarf Nandina, 15 Gallon, 3' Height, Planted 36" On Center</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
205	112	S.F.	<p><b>For Furnishing and Installing Dwarf Chinese Holly, 15 Gallon, 3' Height, Planted 36" On Center</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
206	676	S.F.	<p><b>For Furnishing and Installing Creeping Fig, 1 Gallon, Plant Staggered 18"-24" On Center</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
207	95	EA.	<p><b>For Furnishing and Installing Live Oak, "High Rise", 4" Caliper, Single Trunk, Container Matched</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
208	624	S.F.	<p><b>For Furnishing and Installing Mondo Grass, 4" Pot, Max. 8" O.C., Diamond Pattern</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
209	10	EA.	<p><b>For Relocating and Installing Preserved Live Oaks (Ref. Sheets L11-03, L11-04, L11-05 &amp; L11-08)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
210	3	EA.	<p><b>For Pruning of Trees including Removal of Deadwood and Raising the Canopies to a 12' Height, Aeration and Fertilization of Preserved Oak Trees (Ref. Sheets L11-06)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
211	1	L.S.	<p><b>For Implementation of Landscape Maintenance Program for a Period of One (1) Year From Date of Final Acceptance (Ref. Special Provision 118)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
212	1,800	L.F.	<p><b>For Furnishing and Installing 2 1/2" Mainline PVC Pipe and Fittings for Streetscape Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
213	4,000	L.F.	<p><b>For Furnishing and Installing 1/2" to 2 1/2" Lateral PVC Pipe and Fittings for Streetscape Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
214	30,000	L.F.	<p><b>For Furnishing and Installing Dripperline Pipe and Fittings for Streetscape Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
215	33	EA.	<p><b>For Furnishing and Installing 2" Ball Valve with Box for Streetscape Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
216	45	EA.	<p><b>For Furnishing and Installing 1" Drip Remote Control Valve with Box for Streetscape Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
217	4	EA.	<p><b>For Furnishing and Installing 1" Remote Control Valve with Box for Streetscape Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
218	14	EA.	<p><b>For Furnishing and Installing Quick Coupling Valve with Swing Joint Connection and Box for Streetscape Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
219	2	EA.	<p><b>For Furnishing and Installing 1 1/2" Meter and Box for Streetscape Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
220	2	EA.	<b>For Furnishing and Installing 2" Isolation Valve and Box for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
221	2	EA.	<b>For Furnishing and Installing 2" Wye Strainer and Box for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
222	2	EA.	<b>For Furnishing and Installing 2" Double Check Assembly and Box for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
223	2	EA.	<b>For Furnishing and Installing Rainmaster Controller and Equipment for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
224	30,000	L.F.	<b>For Furnishing and Installing Wire with Splices and Box for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Linear Foot		
225	2	EA.	<b>For Furnishing and Installing 2" Flow Meter for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		



## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
226	2	EA.	<b>For Furnishing and Installing 2" Master Valve for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
227	2	EA.	<b>For Furnishing and Installing Rain/Freeze Sensor for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
228	100	L.F.	<b>For Furnishing and Installing Communication Cable for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Linear Foot		
229	111	EA.	<b>For Furnishing and Installing 4" Spray Heads with Bubbler Nozzles with Sch. 80 Connection for Streetscape Irrigation System</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Each		
230	4,500	L.F.	<b>For Furnishing and Installing 4" Mainline PVC Pipe and Fittings for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars and _____ Cents per Linear Foot		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
231	1,800	L.F.	<p><b>For Furnishing and Installing 3" and Smaller Mainline PVC Pipe and Fittings for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
232	30,000	L.F.	<p><b>For Furnishing and Installing 1/2" to 2 1/2" Lateral PVC Pipe and Fittings for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
233	9,000	L.F.	<p><b>For Furnishing and Installing Dripperline Pipe and Fittings for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
234	100	EA.	<p><b>For Furnishing and Installing 2" Ball Valve with Box for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
235	22	EA.	<p><b>For Furnishing and Installing 4" Gate Valve with Box for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
236	10	EA.	<b>For Furnishing and Installing 2 1/2" Gate Valve with Box for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
237	35	EA.	<b>For Furnishing and Installing 2" Remote Control Valve with Box for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
238	18	EA.	<b>For Furnishing and Installing 1 1/2" Remote Control Valve with Box for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
239	17	EA.	<b>For Furnishing and Installing 1" Remote Control Valve with Box for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
240	18	EA.	<b>For Furnishing and Installing 3/4" Drip Remote Control Valve with Box for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
241	30	EA.	<p><b>For Furnishing and Installing Quick Coupling Valve with Swing Joint Connection and Box for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
242	3	EA.	<p><b>For Furnishing and Installing 1 1/2" Meter and Box for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
243	3	EA.	<p><b>For Furnishing and Installing 2" Isolation Valve and Box for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
244	3	EA.	<p><b>For Furnishing and Installing 2" Wye Strainer and Box for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
245	3	EA.	<p><b>For Furnishing and Installing 2" Double Check Assembly and Box for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
246	3	EA.	<b>For Furnishing and Installing Rainmaster Controller and Equipment for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
247	1	L.S.	<b>For Furnishing and Installing Wire with Splices and Box for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Lump Sum		
248	3	EA.	<b>For Furnishing and Installing 2" Flow Meter for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
249	3	EA.	<b>For Furnishing and Installing 2" Master Valve for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		
250	3	EA.	<b>For Furnishing and Installing Rain/Freeze Sensor for Park Irrigation System</b>  complete in place, the sum of _____  _____ Dollars  and _____ Cents per Each		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
251	150	L.F.	<p><b>For Furnishing and Installing Communication Cable for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
252	29	EA.	<p><b>For Furnishing and Installing 12" Spray Heads with Schedule 80 Connection for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
253	221	EA.	<p><b>For Furnishing and Installing 4" Spray Heads with Schedule 80 Connection</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
254	102	EA.	<p><b>For Furnishing and Installing 12" Rotary Heads with Swing Joint Connection for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
255	285	EA.	<p><b>For Furnishing and Installing 4" Rotary Heads with Swing Joint Connection for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
256	415	EA.	<p><b>For Furnishing and Installing Bubbler Heads with Flex Pipe Connection for Park Irrigation System</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
257	2	EA.	<p><b>For Furnishing and Installing Park Rules Sign including Structural Foundation, Base Plate, Post, Sign Face and Finial, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
258	2	EA.	<p><b>For Furnishing and Installing Area Identification Sign including Structural Foundation, Base Plate, Post, Sign Face and Finial, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
259	3	EA.	<p><b>For Furnishing and Installing Primary Wayfinding Sign including Structural Foundation, Base Plate, Post, Sign Face and Finial, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
260	2	EA.	<p><b>For Furnishing and Installing Park Exhibition Sign including Structural Foundation, Posts and Sign Face, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
261	3	EA.	<p><b>For Furnishing and Installing Surface Parking Identification including, Base, Cubes, and Lighting, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
262	3	EA.	<p><b>For Furnishing and Installing Park Map Sign including Structural Foundation, Base Plate, Post, Sign Face and Finial, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
263	1	EA.	<p><b>For Furnishing and Secondary Wayfinding Sign including Structural Foundation, Base Plate, Post, and Sign Panel, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
264	8	EA.	<p><b>For Furnishing and Installing Designated Parking Sign including Structural Foundation, Base Plate, Post and Sign Face, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
265	1	EA.	<p><b>For Furnishing and Installing Regulatory Stop Sign including Structural Foundation, Base Plate, Post, Sign Face and Street Name Plate, complete in place.</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
266	240	L.F.	<p><b>For Constructing 8' High Masonry Fence (Ref. Special Provision 85)</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		



## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
267	476	L.F.	<p><b>For Constructing 8' High Masonry Fence with Retaining Wall (Ref. Special Provision 86)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Linear Foot</p>		
268	8,475	S.F.	<p><b>For Furnishing and Installing 2" Rock Rip Rap complete with Filter Fabric</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Square Foot</p>		
269	15	L.F.	<p><b>For Furnishing and Installing South Park Metal Fence with Gate, Hot Dipped Galvanized, (Reference Sheet L3-04)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Linear Foot</p>		
270	1	L.S.	<p><b>For Construction of South Pedestrian Bridge Landing (West Side) including Structural Concrete for Pier and Wall Construction, and Sawcut Patterned Concrete Pavement w/ Elephant Grey Medium Float Finish, Complete in Place (Ref. Spec. Prov. 87)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Lump Sum</p>		
271	1	L.S.	<p><b>For Construction of South Pedestrian Bridge Landing (East Side) including Structural Concrete for Pier and Wall Construction, and Sawcut Patterned Concrete Pavement w/ Elephant Grey Medium Float Finish, Complete in Place (Ref. Spec. Prov. 87)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per    Lump Sum</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
272	1	L.S.	<p><b>For Construction of Weir Structure Beneath Ponte Ave. Bridge including Structural Concrete for Weir and Downstream Splash and Energy Dissipation Pad, with Grouted Beach Pebble Lining, Complete in Place (Ref. Special Provision 88)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
273	1	EA.	<p><b>For Furnishing and Installing Lower Recirculation and False Weir Pump (7.5 HP) &amp; Vault, with Level Controls, Complete in Place per Sheets M109, M110, M111 and E103</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
274	1	EA.	<p><b>For Furnishing and Installing Grotto Recirculation Skid N Pumps (2-20 HP Submersible Pumps with Cage &amp; Skid), Including Electrical &amp; Mechanical Connections from Wall Penetration to Skid N Pump, and Level Controls, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
275	1	EA.	<p><b>For Furnishing and Installing Irrigation Skid N Pumps (2-10 HP Submersible Pumps with Cage &amp; Skid), Including Electrical &amp; Mechanical Connections from Wall Penetration to Skid N Pump, and Level Controls, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
276	1	EA.	<p><b>For Construction of 10' x 10' (6" Thick) Concrete Recirculation Pump Pad, w/ 24" Deep Perimeter Toe Wall, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		
277	1	EA.	<p><b>For Construction of 5' x 5' (6" Thick) Concrete Recirculation Pump Pad, w/ 24" Deep Perimeter Toe Wall, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		
278	1	EA.	<p><b>For Furnishing and Installing Free Standing Recircualtion &amp; Irrigation Equipment Control Panel, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		
279	1	EA.	<p><b>For Furnishing and Installing Alluminum Control Cabinet and Base for Free Standing Recircualtion &amp; Irrigation Equipment Control Panel Cabinet, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		
280	1	EA.	<p><b>For Furnishing and Installing Concrete Pad for Free Standing Recircualtion &amp; Irrigation Equipment Control Panel Cabinet, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each _____</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
281	1	EA.	<p><b>For Furnishing and Installing Piping, Manifold, Nozzles and Level Control for False Weir Structure, Complete in Place as Shown on Sheet M11</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
282	1	EA.	<p><b>For Furnishing and Installing Irrigation Bladder Tank, 5' Square Concrete Pad and Control Piping, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
283	48	L.F.	<p><b>For Concrete Retaining Wall, 0' to 10' AFG - Ref. Sheets SP317 and SP320)</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
284	1	EA.	<p><b>For Construction of Concrete Handicap Accessible Ramps (West Side of Creek) including Structural Walls and Concrete Ramps, Handrails and Appurtances, Complete in Place (Ref. Special Provision 89)</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
285	1	EA.	<p><b>For Construction of Concrete Handicap Accessible Ramps (East Side of Creek) including Structural Walls and Concrete Ramps, Handrails and Appurtances, Complete in Place (Ref. Special Provision 89)</b></p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
286	2	EA.	<p><b>For Construction of Ponte Ave. Bridge Staircase (West Side) including Structural Concrete, Handrails &amp; Appurtanances, Complete in Place (Ref. Special Provision 90)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
287	2	EA.	<p><b>For Construction of Ponte Ave. Bridge Staircase (East Side) including Structural Concrete, Handrails &amp; Appurtanances, Complete in Place (Ref. Special Provision 90)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
288	5,040	S.F.	<p><b>For Placement of Stone Veneer Finish on Existing Ponte Ave. Bridge Abutment Walls (Structure by Others), Complete in Place (Ref. Special Provision 91)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
289	150	S.F.	<p><b>For Placement of Stone Veneer Finish on Existing Belle Lane Bridge Abutment Walls (Structure by Others), Complete in Place (Ref. Special Provision 91)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
290	2	EA.	<p><b>For Structured Stair Slope Treatment under Ponte Ave. Bridge Structure including Stone Veneer Finish, Complete in Place (Ref. Special Provision 93)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
291	1	L.S.	<p><b>For Construction of Tree Preservation Wall including Structural Wall and Footing, 13" x 13" Catch Basin, 6" Perforated Drain Pipe, Backfill Material and Filter Fabric, and Stone Veneer Finish, Complete in Place (Ref. Special Provision 94)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
292	1	EA.	<p><b>For Construction of Ford Structure for Small Pedestrian Island, including Structural Concrete for Abutments, Piers and Bridge Slab, Metal Hand Rail &amp; Guard Rail, and Trex Deck Surface Treatment, Complete in Place (Ref. Special Provision 95)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per EA.</p>		
293	2	EA.	<p><b>For Construction of Ford Structures for Large Pedestrian Island, including Structural Concrete for Abutments, Piers and Bridge Slab, Metal Hand Rail &amp; Guard Rail and Trex Deck Surface Treatment, Complete in Place (Ref. Special Provision 95)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
294	2	EA.	<p><b>For Construction of Concrete Weir Structure w/ Grouted Beach Pebbles from Upper Pond Area to Lower Pond Area at Large Pedestrian Island Fords, Complete in Place (Ref. Special Provision 96)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
295	175	L.F.	<p><b>For Reinforced Concrete Site Retaining Wall (0' to 2' AFG) on upside of Esplanade Area including integral Light Pole Bases (6), Complete with Medium Sand Blast Finish - Ref. Detail SP307/02</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
296	4,679	S.Y.	<p><b>For Construction of 6" Reinforced Concrete Pavement (4200 psi) with Rock Salt Finish at Esplanade Area</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Yard</p>		
297	224	L.F.	<p><b>For Furnishing and Installing Hot Dipped Galvanized Metal Guard Rail in Lake Edge Wall at Esplanade Area (Ref. Sheet L9-05)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
298	200	L.F.	<p><b>For Construction of Upper Concrete Seating Wall at Amphitheatre with Medium Sand Blast Finish (Ref. Sheet SP 305/01)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
299	95	L.F.	<p><b>For Construction of Lower Concrete Seating Wall at Amphitheatre with Medium Sand Blast Finish (Ref. Sheet SP 305/04)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
300	62	L.F.	<p><b>For Construction of Concrete End Retaining Walls (Approx. 1' AFG) at Amphitheatre with Medium Sand Blast Finish</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
301	1,556	S.F.	<p><b>For Construction of 6" Reinforced Concrete Pavement (4200 psi) with Medium Float Finish in Performance Area of Amphitheatre</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
302	252	S.F.	<p><b>For Construction of 6" Reinforced Concrete Pavement (4200 psi) w/ Broom Finish at Front of House Handicap Seating Area at Amphitheatre</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
303	998	S.F.	<p><b>For Furnishing and Installing Pavestone Concrete Paver "E" in Amphitheatre - Holland Stone, Size 7-13/16" L x 3-7/8" W x 2-3/8" H, Antique Pewter, Running Bond, in Performance Area of Amphitheatre</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
304	4	EA.	<p><b>For Construction of 2' x 2' Square Reinforced Concrete Lighting Foundations at Amphitheatre</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		



## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
305	450	L.F.	<p><b>For Furnishing and Installing 4" Perf. PVC Subsurface Drainage System at Amphitheatre including Gravel Backfill, Filter Fabric and Outfall to Lake Edge</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
306	1	EA.	<p><b>For Construction of Concrete Flume Outfall at Amphitheatre (Ref. Sheet L8-34)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
307	1	EA.	<p><b>For Upper Amphitheatre Staircase including Concrete Stair Structure with Hot Dipped Galvanized Metal Guard Rail and Hand Rail, Complete in Place</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
308	1	L.S.	<p><b>For Structural Foundation Construction at Grotto Structure including Piers, Walls, Foundation, Water Fall Beams and Columns, Backfill and Subsoil Dainage System, Complete in Place (Ref. Sheet SP 308)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
309	2	EA.	<p><b>For Construction of Grotto Staircases including Structural Concrete, Metal Guard Rail and Handrail, Concrete Landing Areas to Door Panels &amp; all Appurtenances necessary, Complete in Place (Ref. Special Provision 97)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
310	1	L.S.	<p><b>For Construction of Metal Pergola Columns, Metal Trellis, Clevis and Rod Assembly at Upper Grotto Area, Complete in Place (Ref. Sheets L9-11, 12 &amp; 14 and SP 308)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
311	1	L.S.	<p><b>For Construction of Grotto Water Fall Pool including Water Proofing and Topping Slab, Fully Grouted Beach Pebbles, Weir Plate Assembly, Foutain Nozzles (15), Piping, Manifolds and Valving, Complete in Place (Ref. Sheets L9-15 and M 105)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
312	225	L.F.	<p><b>For Furnishing and Installing Metal Guard Rail (Hot Dipped Galvanized) for Upper Grotto Area</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
313	350	S.Y.	<p><b>For Construction of 6" Reinforced Concrete Pavement (4200 psi) w/ Broom Finish at Upper Grotto Area</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Yard</p>		
314	3,148	S.F.	<p><b>For Furnishing and Installing Stone Veneer Finish - Custom Cut Thermal Finished Blue/Green Chinese Stone, Complete in Place (Ref. Special Provision 109)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
315	8	EA.	<p><b>For Furnishing and Installing Hollow Metal Door and Frame at Grotto Structure, 30"x80" (Galvanized Grey), Complete with Hardware</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
315	1	EA.	<p><b>For Construction of Grotto Ford Structure, including Structural Concrete for Piers, Pilasters and Walls, Slabs, and Turndowns, Metal Hand Rail &amp; Guard Rail, and Trex Deck Surface Treatment, Complete in Place (Ref. Special Provision 98)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		

## Base Bid

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
316	1	L.S.	<p><b>For Construction of the Street Fountain including all Structural, Electrical, Mechanical &amp; Plumbing, Subsurface Vault, Controls and Miscellaneous Appurtances, Complete in Place (Ref. Sheets I101, S201, M101-104, E101 &amp; 103, &amp; D101-104)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
317	5,125	L.F.	<p><b>For Furnishing and Installing Root Barrier Protection, Continuous along All Walkways</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		
318	5	EA.	<p><b>For Construction of 10' Long by 4' Wide Concrete Furniture Pad - 6" Reinforced Concrete Pavement (4200 psi)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
319	250	V.F.	<p><b>For 24" Diameter Pier Casing (If Required)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Vertical Foot</p>		
320	250	V.F.	<p><b>For 18" Diameter Pier Casing (If Required)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Vertical Foot</p>		
321	250	V.F.	<p><b>For 18" Diameter Pier Casing (If Required)</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Vertical Foot</p>		

## ADDITIVE ALTERNATES

The following Additive Alternates will be added to the bid at the option of the Town of Addison

### ADDITIVE ALTERNATE 1 WILDLIFE OBSERVATION DECK

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
322	1	L.S.	<p>For Structural Foundation Construction of Wildlife Observation Deck including Structural Piers, Walls, Concrete Cap and Structural Steel, #57 stone backfill material, filter fabric, backfilling and grading and all structural appurtanances within Footprint of Structure, Complete in Place (Ref. Special Provision 100)</p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
323	4,301	S.F.	<p>For Furnishing and Installing Composite Decking - Trex Deck (Brasalia) with Concealed Fasteners - color Espresso, Complete in Place</p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		
324	1	EA.	<p>For Furnishing and Installing Access Hatch with Steel Ladder, Complete in Place</p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Each</p>		
325	225	L.F.	<p>For Furnishing and Installing Metal Railing (Hot Dipped Galvanized), Complete in Place</p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per Linear Foot</p>		

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
326	1,480	S.F.	<p>For Furnishing and Installing Stone Veneer Finish - Custom Cut Thermal Finished Blue/Green Chinese Stone, Complete in Place (Ref. Special Provision 109)</p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		

<b>TOTAL AMOUNT OF ADDITIVE ALTERNATE 1</b>	
---------------------------------------------	--

**ADDITIVE ALTERNATE 2**

**BELVEDERE**

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
327	1	L.S.	<p>For Structural Foundation Construction of Belvedere including structural piers, pilasters, concrete walls, upturned concrete benches, concrete cap, #57 stone backfill material, filter fabric, water proof membrane, MDO form board and wall ties, backfilling and grading, and all structural appurtances within Footprint of Structure, Complete in Place (Ref. Special Provisions)</p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Lump Sum</p>		
328	572	S.F.	<p>For Furnishing and Installing 8" Reinforced Concrete Pavement (4200 psi) with Rock Salt Finish , Complete in Place</p> <p>complete in place, the sum of _____</p> <p>_____ Dollars</p> <p>and _____</p> <p>Cents per Square Foot</p>		

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
329	392	S.F.	For Furnishing and Installing 8" Reinforced Concrete Pavement (4200 psi) with Broom Finish , Complete in Place complete in place, the sum of _____		
			_____ Dollars		
			and _____ Cents per Square Foot		
330	1,112	S.F.	For Furnishing and Installing Stone Veneer Finish - Custom Cut Thermal Finished Blue/Green Chinese Stone, Complete in Place (Ref. Special Provision 109) complete in place, the sum of _____		
			_____ Dollars		
			and _____ Cents per Square Foot		
<b>TOTAL AMOUNT OF ADDITIVE ALTERNATE 2</b>					

**ADDITIVE ALTERNATE 3  
INTERACTIVE FOUNTAIN**

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
331	1	L.S.	For Construction of the Interactive Fountain including all Structural, Electrical, Mechanical & Plumbing, Subsurface Vaults, Controls and Miscellaneous Appurtances, Complete in Place (Ref. Sheets I101, S201, M112-118, E101 & D101-104) complete in place, the sum of _____		
			_____ Dollars		
			and _____ Cents per Lump Sum		
<b>TOTAL AMOUNT OF ADDITIVE ALTERNATE 3</b>					

**ADDITIVE ALTERNATE 4**  
**Restroom / Concessions Building**

ITEM NO.	APPROX. QUANT.	UNIT	DESCRIPTION OF ITEMS BID PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
332	1	L.S.	<p><b>For Construction of Restroom/Concessions Building including Structural, Mechanical, Electrical, Plumbing &amp; Fire Protection, Chemical Injection for Foundation, Electric Service Conduit and Conductor, and all Miscellaneous Appurtances within Footprint of Structure, Complete in Place as Shown on the Drawings</b></p> <p>complete in place, the sum of _____</p> <p style="text-align: right;">_____ Dollars</p> <p>and _____</p> <p>Cents per <u> Lump Sum</u></p>		
<b>TOTAL AMOUNT OF ADDITIVE ALTERNATE 4</b>					



**VITRUVIAN PARK PUBLIC INFRASTRUCTURE - PHASE 1C**  
**PARK & STREETScape IMPROVEMENTS**  
**BID SCHEDULE SUMMARY**

Bid Schedule & Description	Total Amount Materials & Services
----------------------------	-----------------------------------

**BASE BID:**

= TOTAL AMOUNT OF BASE BID (Items 1 Through 321) (A): \_\_\_\_\_

Written In Words: \_\_\_\_\_  
 \_\_\_\_\_

TOTAL OF TIME BID:		_____ (Calendar Days)
TOTAL OF CALENDAR DAYS x \$2,500	(B):	\$ _____ -
<b>BASIS FOR COMPARISON OF BIDS:</b>		
(A) + (B) = TOTAL BID:		\$ _____ -

Written In Words: \_\_\_\_\_  
 \_\_\_\_\_

Bid Schedule & Description	Total Amount Materials & Services
----------------------------	-----------------------------------

**ADD ALTERNATE 1:**

= TOTAL AMOUNT OF ADD ALTERNATE 1 (Items 322 Through 326) (A): \_\_\_\_\_

Written In Words: \_\_\_\_\_  
 \_\_\_\_\_

TOTAL OF TIME BID:		_____ (Calendar Days)
TOTAL OF CALENDAR DAYS x \$2,500	(B):	\$ _____ -
<b>BASIS FOR COMPARISON OF BIDS:</b>		
(A) + (B) = TOTAL BID:		\$ _____ -

Written In Words: \_\_\_\_\_  
 \_\_\_\_\_

**Bid Schedule & Description**

**Total Amount Materials & Services**

**ADD ALTERNATE 2:**

= TOTAL AMOUNT OF ADD ALTERNATE 1 (Items 327 Through 330 ) (A): \_\_\_\_\_

Written In Words: \_\_\_\_\_

TOTAL OF TIME BID: \_\_\_\_\_ (Calendar Days)  
TOTAL OF CALENDAR DAYS x \$2,500 (B): \$ \_\_\_\_\_ -

**BASIS FOR COMPARISON OF BIDS:**

(A) + (B) = TOTAL BID: \$ \_\_\_\_\_ -

Written In Words: \_\_\_\_\_

**Bid Schedule & Description**

**Total Amount Materials & Services**

**ADD ALTERNATE 3:**

= TOTAL AMOUNT OF ADD ALTERNATE 1 (Item 331) (A): \_\_\_\_\_

Written In Words: \_\_\_\_\_

TOTAL OF TIME BID: \_\_\_\_\_ (Calendar Days)  
TOTAL OF CALENDAR DAYS x \$2,500 (B): \$ \_\_\_\_\_ -

**BASIS FOR COMPARISON OF BIDS:**

(A) + (B) = TOTAL BID: \$ \_\_\_\_\_ -

Written In Words: \_\_\_\_\_

**Bid Schedule & Description**

**Total Amount Materials & Services**

**ADD ALTERNATE 4:**

= TOTAL AMOUNT OF ADD ALTERNATE 1 (Item 332)

(A): \_\_\_\_\_

Written In Words: \_\_\_\_\_

TOTAL OF TIME BID: \_\_\_\_\_ (Calendar Days)

TOTAL OF CALENDAR DAYS x \$2,500

(B): \$ \_\_\_\_\_ -

**BASIS FOR COMPARISON OF BIDS:**

(A) + (B) = TOTAL BID:

\$ \_\_\_\_\_ -

Written In Words: \_\_\_\_\_

**NOTES:** All items, labor, materials, equipment, facilities, incidentals, and work required for construction of the

1. Prices must be shown in words and figures for each item listed in this proposal. In the event of
2. It is understood that the Bid Security shall be collected and retained by the Owner as liquidated
3. One contract will be awarded based on the total value of Item 1 in section, (A) plus (B).
- 4.

Bidder's Tax I.D. No. or Employer No. \_\_\_\_\_

- NOTES:
1. All items, labor, materials, equipment, facilities, incidentals and work required for construction of the project are to be provided and installed by the Contractor as part of the project and payment for the cost of such shall be included in the price bid for the construction of the project.
  2. Prices must be shown in words and figures for each item listed in the Proposal. In the event of discrepancy, the words shall control.
  3. Materials, which are “tax exempt”, are those items which are physically incorporated into the facilities constructed for the Town of Addison, as set forth in the Special Provisions. Materials include, but are not limited to purchased items such as water pipe, sanitary sewer pipe, storm drain pipe, etc.

Services, which are “not tax exempt”, are those items which are used by the Contractor but are not physically incorporated into the Town of Addison’s facility and/or items which are consumed by construction, as set forth in the Special Provisions. Services include, but are not limited to, items such as supplies, tools, skill and labor, the purchase, rental or lease of equipment, etc.

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Name of Person Signing Bid

---

Signature of Person Signing Bid

---

Address

---

Telephone No.

Fax No.

---

T.I.N. (Tax Identification or Employer’s Number)

If BIDDER is:

**AN INDIVIDUAL**

By \_\_\_\_\_ (Seal)  
(Individual's Name)

doing business as \_\_\_\_\_

Business address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_

---

**A PARTNERSHIP**

By \_\_\_\_\_ (Seal)  
(Firm Name)

\_\_\_\_\_ (General Partner)

doing business as \_\_\_\_\_

Business address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_

**A CORPORATION**

By \_\_\_\_\_  
(Corporation Name)

\_\_\_\_\_  
(State of Incorporation)

By \_\_\_\_\_  
(Name of Person Authorized to Sign)

\_\_\_\_\_  
(Title)

(Corporate Seal)

Attest \_\_\_\_\_  
(Secretary)

Business address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_

---

**A JOINT VENTURE**

By \_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Address)

By \_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Address)

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above.)

SECTION CA

**CONTRACT AGREEMENT**

**CONTRACT AGREEMENT**

STATE OF TEXAS

COUNTY OF DALLAS

THIS AGREEMENT is made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2009, by and between the Town of Addison, of the County of Dallas and State of Texas, acting through its City Manager, thereunto duly authorized so to do, Party of the First Part, hereinafter termed the OWNER, and \_\_\_\_\_, of the City of \_\_\_\_\_, County of \_\_\_\_\_, State of \_\_\_\_\_, Party of the Second Part, hereinafter termed CONTRACTOR.

WITNESSETH: That for and in consideration of the payment and agreement hereinafter mentioned, to be made and performed by the OWNER, the said CONTRACTOR hereby agrees with the said OWNER to commence and complete construction of certain improvements as follows:

**PARK & STREETSCAPE IMPROVEMENTS**

to be known as

**VITRUVIAN PARK PUBLIC INFRASTRUCTURE – PHASE 1C**

and all extra work in connection therewith, under the terms as stated in the General and Specific Conditions of the AGREEMENT; and at his own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance and other accessories and services necessary to complete the said construction, in accordance with the conditions and prices stated in the Proposal attached hereto and in accordance with the Advertisement for Bids, Instructions to Bidders, General Provisions, Special Provisions, Plans, and other drawings and printed or written explanatory matter thereof, and the Technical Specifications and Addenda thereto, as prepared by the OWNER, each of which has been identified by the endorsement of the CONTRACTOR and the OWNER thereon, together with the CONTRACTOR’s written Proposal and the General Provisions, all of which are made a part hereof and collectively evidence and constitute the entire AGREEMENT.

The CONTRACTOR hereby agrees to commence work within ten (10) calendar days after the date of written notice to do so shall have been given to him, to complete the work within \_\_\_\_\_ (\_\_\_\_\_) calendar days, after he commences work, subject to such extensions of time as are provided by the General Provisions.

The OWNER agrees to pay the CONTRACTOR \_\_\_\_\_ Dollars (\$\_\_\_\_\_) in current funds for the performance of the Contract in accordance with the Proposal submitted thereof, subject to additions and deductions, as provided in the General Provisions, and to make payments of account thereof as provided therein.



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

**TOWN OF ADDISON, TEXAS (OWNER)**

**ATTEST:**

By: \_\_\_\_\_  
Ron Whitehead, City Manager

By: \_\_\_\_\_  
Mario Canizares, City Secretary

(CONTRACTOR)

ATTEST:

By: \_\_\_\_\_

By: \_\_\_\_\_

The following to be executed if the CONTRACTOR is a corporation:

I, \_\_\_\_\_ certify that I am the secretary of the corporation named as CONTRACTOR herein; that \_\_\_\_\_, who signed this Contract on behalf of the CONTRACTOR is the \_\_\_\_\_ (official title) of said corporation; that said Contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

Signed: \_\_\_\_\_

Corporate Seal

**SECTION PrB**

**PERFORMANCE BOND**

**STATUTORY PERFORMANCE BOND PURSUANT TO CHAPTER 2253  
OF THE TEXAS GOVERNMENT CODE  
(PUBLIC WORKS)**

**(Penalty of this Bond must be 100% of Contract Amount)**

KNOW ALL MEN BY THESE PRESENTS, That \_\_\_\_\_  
(hereinafter called the Principal), as Principal, and \_\_\_\_\_  
(hereinafter called the Surety), as Surety are held and firmly bound unto the **Town of Addison** (hereinafter called the Obligee), in the amount of \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_ ) for the  
payment whereof the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2009 to

**PARK & STREETSCAPE IMPROVEMENTS  
to be known as  
VITRUVIAN PARK PUBLIC INFRASTRUCTURE – PHASE 1C**

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

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

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Chapter 2253 of the Texas Government Code and all liabilities on this bond shall be determined in accordance with the provisions, conditions and limitations of said Chapter to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed this instrument this \_\_\_\_\_ day of \_\_\_\_\_, 2009.

\_\_\_\_\_  
(Principal)  
By: \_\_\_\_\_  
\_\_\_\_\_  
(Surety)  
By: \_\_\_\_\_  
(Attorney-in-Fact)

**SECTION PyB**

**PAYMENT BOND**

**STATUTORY PAYMENT BOND PURSUANT TO CHAPTER 2253  
OF THE TEXAS GOVERNMENT CODE  
(PUBLIC WORKS)**

**(Penalty of this Bond must be 100% of Contract Amount)**

KNOW ALL MEN BY THESE PRESENTS, That \_\_\_\_\_  
(hereinafter called the Principal), as Principal, and \_\_\_\_\_  
(hereinafter called the Surety), as Surety are held and firmly bound unto the **Town of Addison** (hereinafter  
called the Obligee), in the amount of \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_ ) for the  
payment whereof the said Principal and Surety bind themselves and their heirs, administrators, executors,  
successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the  
\_\_\_\_\_ day of \_\_\_\_\_, 2009 to

**PARK & STREETSCAPE IMPROVEMENTS  
to be known as  
VITRUVIAN PARK PUBLIC INFRASTRUCTURE – PHASE 1C**

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

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

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Chapter 2253 of  
the Texas Government Code and all liabilities on this bond shall be determined in accordance with the  
provisions, conditions and limitations of said Chapter to the same extent as if it were copied at length  
herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed this instrument this \_\_\_\_\_  
day of \_\_\_\_\_, 2009.

\_\_\_\_\_  
(Principal)  
By: \_\_\_\_\_  
\_\_\_\_\_  
(Surety)  
By: \_\_\_\_\_  
(Attorney-in-Fact)

**SECTION MB**

**MAINTENANCE BOND**

**MAINTENANCE BOND**

STATE OF TEXAS

COUNTY OF DALLAS

That \_\_\_\_\_ as principal and \_\_\_\_\_  
\_\_\_\_\_, a corporation organized under the laws of \_\_\_\_\_  
and \_\_\_\_\_ as sureties, said sureties being authorized to do business in the  
State of Texas, do hereby expressly acknowledge themselves to be held and bound to pay unto the Town of  
Addison, a municipal corporation, chartered by virtue of a Special Act of Legislature of the State of Texas, as  
Addison, Dallas County, Texas, the sum of

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(\$\_\_\_\_\_) for the payment of which sum will and truly to be made unto said Town of Addison and its  
successors, said principal and sureties do hereby bind themselves, their assigns and successors, jointly and severally.

This obligation is conditioned, however, that whereas said

\_\_\_\_\_

has this day entered into a written contract with the said Town of Addison to build and construct the

**PARK & STREETSCAPE IMPROVEMENTS**

\_\_\_\_\_

**to be known as**

\_\_\_\_\_

**VITRUVIAN PARK PUBLIC INFRASTRUCTURE – PHASE 1C**

\_\_\_\_\_

\_\_\_\_\_

which contract and the Plans and Specifications therein mentioned adopted by the Town of Addison, are hereby expressly made a part hereof as though the same were written and embodied herein.

WHEREAS, under the Plans, Specifications and Contract it is provided that the Contractor will maintain and keep in good repair the work herein contracted to be done and performed for a period of two (2) years from the date of startup, and to do all necessary backfilling that may arise on account of sunken conditions in ditches, or otherwise, and to do and perform all necessary work and repair any defective condition growing out of or arising from the improper joining of the same, or on account of any breaking of the same caused by the said Contractor in laying or building the same, or on account of any defect arising in any of said part of said work laid or constructed by the said Contractor, or on account of improper excavation or backfilling; it being understood that the purpose of this section is to cover all defective conditions arising by reason of defective materials, work or labor performed by the said Contractor; and in case the said Contractor shall fail to do, it is agreed that the City may do said work and supply such materials, and charge the same against the said Contractor and sureties on this obligation, and the said Contractor and sureties hereon shall be subject to the liquidated damages mentioned in said contract for each day's failure on its part to comply with the terms of the said provisions of said contract;

NOW THEREFORE, if the said Contractor shall keep and perform its said agreement to maintain said work and keep the same in repair for the said maintenance period of two (2) years, as provided, then these presents shall be null and void and have no further effect; but if default shall be made by the said Contractor in the performance of its contract to so maintain and repair said work, then these presents shall have full force and effect, and said Town of Addison shall have and recover from the Contractor and its sureties damages in the premises, as provided, and it is further understood and agreed that this obligation shall be a continuing one against the principal and sureties hereon and that successive recoveries may be had hereon for successive branches until the full amount shall have been exhausted; and it is further understood that the obligation herein to maintain said work shall continue throughout said maintenance period, and the same shall not be changed, diminished, or in any manner affected from any cause during said time.



IN WITNESS WHEREOF, the said \_\_\_\_\_ has caused these presents to be executed by \_\_\_\_\_ and the said \_\_\_\_\_ has hereunto set his hand this the \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_

SURETY

PRINCIPAL

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
By: \_\_\_\_\_

By: \_\_\_\_\_  
Attorney in Fact

ATTEST

By: \_\_\_\_\_  
Surety

\_\_\_\_\_  
Secretary

\_\_\_\_\_  
\_\_\_\_\_  
Agency and Address

NOTE: Date of Maintenance Bond must be same as date of City acceptance.

**SECTION BP**

**CONTRACTOR'S AFFIDAVIT OF BILLS PAID**

**CONTRACTOR'S AFFIDAVIT OF BILLS PAID**

STATE OF TEXAS

COUNTY OF DALLAS

Personally, before me the undersigned authority, on this day appeared \_\_\_\_\_ who, being  
duly sworn, on oath, says that he is a legal representative of \_\_\_\_\_  
(full name of Contractor as in contract)

and that the contract for the construction of the project, designated as

**PARK & STREETScape IMPROVEMENTS**

to be known as

**VITRUVIAN PARK PUBLIC INFRASTRUCTURE – PHASE 1C**

**Public Works # 2009-04**

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has been satisfactorily completed and that all bills for materials, apparatus, fixtures, machinery and labor used in connection with the construction of this project have, to the best of my knowledge and belief, been fully paid.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 2009.

\_\_\_\_\_  
Notary Public in and for

\_\_\_\_\_ County, Texas

**Instructions:**

If the contractor is an individual, he shall sign the affidavit. If the contractor is a partnership, any partner may sign the affidavit. If the contractor is a corporation, a person authorized by the by-laws or by the Board of Directors shall sign the affidavit. If the Contractor is a joint-venture of individuals, any of the individuals may sign the affidavit. If the Contractor is a joint-venture of partnerships, or of individuals and partnerships, the affidavit may be signed by the individual or any partner of any partnership. If the contractor is a joint-venture in which a corporation is a party, separate affidavits must be executed in the name of the joint-venture: one by each corporation and one by each individual or partnership. Signatures for corporations should be by a duly authorized officer. If signature is by another, a showing of authority to sign must accompany the affidavit.

**SECTION GP**

**GENERAL PROVISIONS**

## **GENERAL PROVISIONS**

The General Provisions of the Contract shall be as stated in the Standard Specifications for Public Works Construction, North Central Texas Council of Governments 4th Edition, under Part I, "General Provisions," Items 1.0 through 1.63 inclusive, as amended or supplemented and except as modified by the Special Provisions.

SECTION SP  
**SPECIAL PROVISIONS**

# SPECIAL PROVISIONS

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## **SPECIAL PROVISIONS**

1. **SCOPE OF WORK:** The work to be performed under the provisions of these Contract Documents shall consist of furnishing all materials, labor, equipment, supplies and appurtenances; providing all construction, plant, equipment and tools; performing all necessary labor and supervision; and the construction complete, including all work appurtenant thereto, the proposed improvements for **Park and Streetscape Improvements** to be known as **Vitruvian Park Public Infrastructure – Phase 1C**.
  
2. **GENERAL:** This work shall conform to the requirements of the specifications and the details as shown on the Drawings. These Contract Documents are intended to be complementary. Requirements of any of the Contract Documents are as binding as if called for by all. In the event of conflict between the Drawings and the Specifications, the Contractor will be deemed to have assumed the more expensive way of doing the work unless, before submitting a bid, the Contractor shall have asked for and obtained (by addendum) a written decision as to which method or material is intended.

In cases of discrepancies, calculated dimensions shall govern over scaled dimensions; special provisions and special specifications shall govern over both general and standard specifications; and quantities shown on plans shall govern over those shown in the proposal.

3. **EXAMINATION OF SITE:** The Contractor acknowledges that he has investigated and satisfied himself as to the conditions affecting the work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, or similar physical conditions at the site, conditions of the ground, the character of equipment and facilities needed preliminary to and during prosecution of the work. The Contractor acknowledges that he has inspected the site of the work and is familiar with the soil conditions to be encountered. Any failure by the Contractor to acquaint himself with the available information will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Town of Addison assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available by the Town and the Engineer.
  
4. **SPECIFICATIONS:** Construction improvements shall be governed by the following published specifications and details (except as modified by these Special Provisions):

Standard Specifications for Public Works Construction, North Central Texas - North Central Texas Council of Governments (latest edition);

Town of Addison Standard Specifications and Construction Details;

2006 Edition of the International Building Code, International Electrical Code, International Mechanical Code, International Plumbing Code and International Fire Code.

Building Code Requirements for Reinforced Concrete (ACI 318-05);

Specifications for Structural Concrete for Buildings (ACI 301-05);

Steel Construction Manual (AISC, Thirteenth Edition);

National Design Specifications for Wood Construction (2005 Supplement);

National Electrical Code (2005);

The Contractor shall keep copies of applicable specifications on the project site at all times. Where reference is made to specifications compiled by other agencies, organizations or departments, such specifications referred to are hereby made a part of the project specifications.

5. **SUBSURFACE INVESTIGATION:** Subsurface exploration to ascertain the nature of soils, including the amount of rock, if any, is the responsibility of any and all prospective bidders. It shall be the responsibility of the bidders to make such subsurface investigations as he deems necessary to determine the nature of the material to be encountered. Some preliminary subsurface exploration has been performed by the Town of Addison and the Engineer, and is provided to the Contractor in these documents. This information is provided only as preliminary and all bids shall be based on information obtained by the Contractor. The Town of Addison and the Engineer disclaim any responsibility for the accuracy, true location and extent of the soils information that has been prepared by others. They further disclaim responsibility for interpretation of that data by bidders, as in projecting soil bearing values, rock profiles, soils stability and the presence, level and extent of underground water.
6. **COMPLIANCE WITH LAWS:** The Contractor shall familiarize himself with the nature and extent of the specifications, site conditions, traffic and safety requirements, and shall fully comply with all local, state and federal laws, including all codes, ordinances, rules and regulations applicable to this contract and the work to be done hereunder, which exist or which may be enacted later by governmental bodies having jurisdiction or authority for such enactment. The Contractor shall comply with all federal, state and local laws, rules and regulations of every kind and nature applicable to the performance of its Work hereunder, and shall hold the Town of Addison and the Engineer harmless therefrom.
7. **PERMITS, LICENSES. AND REGULATIONS:** Permits and licenses for the prosecution of the Work shall be secured by the Contractor. Note that the Town of Addison will waive any City permit fees required on this project. Any required State permit fees will still be paid by the Contractor. Wherever the work under this contract requires the obtaining of permits from the Town of Addison or other public authorities, duplicate copies of such permits shall be furnished to the Engineer by the Contractor hereunder before the work covered thereby is started. **NO WORK WILL BE ALLOWED TO PROCEED BEFORE SUCH PERMITS ARE OBTAINED.** Note that the Town of Addison will waive any City permit fees required on this project. Any required State permit fees will still be paid by the Contractor.
8. **RIGHTS-OF-WAY AND EASEMENTS:** Rights-of-way and permanent easements, dedicated to the Town of Addison, have been secured for this project and made a part of

thereto. The Contractor shall obtain a right-of-way permit from the Town of Addison prior to beginning work. When working within the public rights-of-way and easements, the Contractor shall at all times observe and comply with all Federal and State Laws, and Town of Addison ordinances and regulations which in any way affect the conduct of the work or his operations, and shall observe and comply with all orders, laws, ordinances and regulations which exist or which may be enacted later by bodies having jurisdiction or authority for such enactment. No plea of misunderstanding or ignorance thereof will be considered. The Contractor and his Sureties shall indemnify and save harmless the Town of Addison, the Engineer and all of their officers, agents, and employees against any and all claims or liability arising from or based on the violation of any such law, ordinance, regulation, or order, whether it be by himself or his employees.

It shall be the responsibility of the Contractor, prior to the initiation of construction on easements through private property, to inform the property owner of his intent to begin construction. Before beginning construction in areas of public dedication, the Contractor shall inform the agency having jurisdiction in the area forty-eight (48) hours prior to initiation of the Work. All easements shall be cleaned up after use and restored to their original conditions or better.

9. **RESTRICTED WORK HOURS:** Per the Town of Addison Building Regulations, "It shall be unlawful for a person, firm or corporation to excavate, erect, build, construct, alter, repair or demolish any building or structure which has been issued or which is required to be issued a building permit by the Town of Addison between the hours of 7:00 p.m. and 7:00 a.m. Monday through Friday, and between the hours of 7:00 p.m. and 8:00 a.m. on Saturday and Sunday, if such activity is performed within a residential, apartment, or townhouse zoned area, or within three hundred (300) feet of an occupied residence, except in cases of urgent necessity or in the interest of public safety and convenience, and then only by permit of the City Manager."
10. **COMPLIANCE WITH IMMIGRATION LAWS:** Contractor shall take all steps necessary to ensure that all of the Contractor's employees are authorized to work in the United States as required by the Immigration Reform and Control Act of 1986.
11. **NON-DISCRIMINATION POLICY:** It is the policy of the Town of Addison to afford all people an equal opportunity to bid on any contract being let by the Town. The Town of Addison has a policy that prohibits discrimination against any person because of race, color, sex, or national origin, in the award or performance of any contract. The Town of Addison will require its employees, agents, and contractors to adhere to this policy.
12. **ANTITRUST LAWS:** The Contractor hereby assigns to the Town of Addison any all claims for overcharges associated with this contract which arise under the antitrust laws of the United States 15 U.S.C.A. Sec. 1, et seq. (1973).
13. **ABANDONMENT:** The Town of Addison reserves the right to abandon, without obligation to the Contractor, any part of the project, or the entire project, at any time before the Contractor begins any construction work authorized by the Town of Addison. In case of total

abandonment of the project, the contract becomes void. The Town of Addison may abandon portions of the project at any time during the project duration. In case of such partial abandonment, the Contractor shall not be due any payment for lost or unrealized profits on the abandoned portions of the project.

14. **DISCREPANCIES:** If the Contractor, in the course of the Work, finds any discrepancy between the Contract Documents and the physical conditions of the locality, or any errors or omissions in drawings or in the layout as given by survey points and instructions, or if it appears that any Plan, Specification or other Contract Document is or may not be in compliance with any building code or other requirement of any governmental body, he shall immediately inform the Town of Addison and the Engineer/Architect in writing, and the Town of Addison and the Engineer/Architect shall promptly verify the same. Any Work done after such discovery, until authorized, will be done at the Contractor's risk.
15. **PREVAILING WAGE RATES:** Wage rates paid on this project shall not be less than specified in the schedule of general prevailing rates of per diem wages as attached hereto.
16. **ADDENDA:** Bidders desiring further information, or interpretation of the Plans and Specifications, must make written request for such information to the Engineer/Architect (not later than three (3) calendar days prior to the date set for the Bid opening). Answers to all such requests will be emailed, faxed or mailed to all Bidders in addendum form and all addenda will be bound with and made a part of the Contract Documents. No other explanation or interpretation will be considered official or binding. Should a Bidder find discrepancies in, or omissions from, the Plans, Specifications or Contract Documents, or should he be in doubt as to their meaning, he shall at once notify the Engineer/Architect in writing in order that a written addendum may be sent to all Bidders.
17. **PAY ITEMS:** Pay items provided are intended to be all-inclusive of the work required on this project. Work required by the plans or specifications but not provided with a specific pay item shall be considered incidental to other items of work. Final payment to the construction Contractor shall not be made until all Work has been finally completed and verified in accordance with the construction contract, plans and specifications and have been finally accepted by the Town of Addison.
18. **INCREASE OR DECREASE IN QUANTITIES:** The quantities shown in the proposal are approximate. Final payment will be based on quantities determined by measurement methods described for each work item. When the quantity of work to be done or materials to be furnished under any major pay item of the contract is more than 125% of the quantity stated in the contract, whether stated by Town of Addison or by Contractor, then either party to the contract, upon demand, shall be entitled to negotiate for revised consideration on the portion of work above 125% of the quantity stated in the contract. When the quantity of the work to be done or materials to be furnished under any major pay item of the contract is less than 75% of the quantity stated in the contract, whether stated by Town of Addison or by Contractor, then either party to the contract, upon demand, shall be entitled to negotiate for revised consideration on the portion of work below 75% of the quantity stated in the contract. This paragraph shall not apply in the event Town of Addison deletes a pay item in its entirety from this contract.

19. **SUBSIDIARY WORK:** Any and all work specifically governed by documentary requirements for the project, such as conditions imposed by the Plans or these Special Provisions, in which no specific item for bid has been provided for in the Proposal, shall be considered as a subsidiary item of work, the cost of which shall be included in the various bid items in the Proposal. Costs of permits, inspection fees, traffic control, construction staking, surface restoration and cleanup are general items of work which fall in the category of subsidiary work.
20. **QUALIFICATION OF BIDS:** The Town of Addison reserves the right to reject any and all Bids, to waive any and all informalities not involving price, time or changes in the Work, and the right to disregard all nonconforming, non-responsive, unbalanced, or conditional Bids. The Town reserves the right to reject the Bid of any Bidder if the Town believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Town. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolve in favor of the correct sum.
21. **AWARD AND EXECUTION OF CONTRACT:** For the purpose of award, each bid submitted shall consist of two parts whereby:

**Standard Bid (A)** = The correct summation of the products of the estimated quantities shown in the proposal, multiplied by their bid unit prices

**Time Bid (B)** = (CD x Daily Value) = the product of the number of calendar days (CD) provided by the Contractor and the Daily Value established by the Town.

For purposes of this Contract, the Daily Value is \$1,000.00 with a maximum of \$50,000. The lowest evaluated bid (Total Bid) will be determined by the Town as the lowest sum of Standard Bid (A) plus Time Bid (B) according to the following formula:

$$\text{Total Bid} = \text{Standard Bid (A)} + \text{Time Bid (B)}$$

Time Bid (B) from the preceding formula will not be used to determine final payment to the Contractor. All payments will be based on actual quantities and bid unit prices. The Town desires to expedite construction on this contract to minimize the inconvenience to the traveling public and to reduce the time of construction. In order to achieve this, an incentive - disincentive provision is established for the contract.

22. **EXPLANATION OF CONTRACT TIME:** In the event the Contractor completes the contract prior to the expiration of the Original Contract Time, the Town will pay the Contractor an incentive payment of the Daily Value amount specified in Special Provision 21 for each calendar day the actual completion date precedes the Original Contract Time and subject to the conditions set forth below. The term "Original Contract Time" as used in this Provision will mean the number of calendar days established by the Contractor for



completion of the work of the Contract on the date the Contract was executed. The term "calendar day" as used in this Article will mean every day shown on the calendar. Calendar days will be consecutively counted from commencement of Contract Time regardless of weather, weekends, holidays, suspensions of Contractor's operations, delays or other events as described herein. For purposes of the calculation and the determination of entitlement to the incentive payment stated above, the Original Contract Time will not be adjusted for any reason, cause or circumstance whatsoever, regardless of fault, save and except in the instance of a catastrophic event (i.e., war, invasion, riot, declared state of emergency, national strike, or other situations as declared by the Town of Addison). The parties anticipate that delays may be caused by or arise from any number of events during the course of the Contract, including, but not limited to, work performed, disruptions, permitting issues, actions of suppliers, subcontractors or other contractors, actions by third parties, weather, weekends, holidays, or other such events, forces or factors sometimes experienced in construction work. Such delays or events and their potential impacts on performance by the Contractor are specifically contemplated and acknowledged by the parties in entering into this Contract, and shall not extend the Original Contract Time for purposes of calculation of the incentive payment set forth above. Further, any and all costs or impacts whatsoever incurred by the Contractor in accelerating the Contractor's work to overcome or absorb such delays or events in an effort to complete the Contract prior to expiration of the Original Contract Time, regardless of whether the Contractor successfully does so or not, shall be the sole responsibility of the Contractor in every instance. In the event the project is altered by work deleted, change orders, supplemental agreements, utility conflicts, design changes or defects, extra work, right of way issues, or other situations which are not the fault of or a direct result of contractor negligence which may impact the critical path of the project construction schedule, the Town may choose to negotiate the extension or reduction of the Original Contract Time with the Contractor.

In the event of a catastrophic event (i.e., war, invasion, riot, declared state of emergency, national strike, or other situations as declared by the Town of Addison) directly and substantially affecting the Contractor's operations on the Contract, the Contractor and the Town shall agree as to the number of calendar days to extend the Original Contract Time so that such extended Original Contract Time will be used in calculation of any incentive payment. In the event the Contractor and Town are unable to agree to the number of calendar days to extend the Original Contract Time, the Town shall unilaterally determine the number of calendar days to extend the Original Contract Time reasonably necessary and due solely to such catastrophic event and the Contractor shall have no right whatsoever to contest such determination, save and except that the Contractor establishes that the number of calendar days determined by the Town were arbitrary or without any reasonable basis. The Contractor shall have no rights under the Contract to make any claim arising out of this incentive payment provision except as is expressly set forth in this Provision. As conditions precedent to the Contractor's entitlement to any incentive the Contractor must:

- (1) Actually complete all Contract requirements, including the completion of all punch list work, and obtain final acceptance by the Town prior to expiration of the Original Contract Time.

(2) The Contractor shall notify the Town in writing, within 30 days after final acceptance of the Contract by the Town, that the Contractor elects to be paid the incentive payment which the Contractor is eligible to be paid based on the actual final acceptance date, and such written notice shall constitute a full and complete waiver, release and acknowledgment of satisfaction by the Contractor of any and all claims, causes of action, issues, demands, disputes, matters or controversies, of any nature or kind whatsoever, known or unknown, against the Town, its employees, officers, agents, representatives, consultants, and their respective employees, officers and representatives, the Contractor has or may have, including, but not limited to, work performed, work deleted, change orders, supplemental agreements, delays, disruptions, differing site conditions, utility conflicts, design changes or defects, time extensions, extra work, right of way issues, permitting issues, actions of suppliers or subcontractors or other contractors, actions by third parties, shop drawing approval process delays, expansion of the physical limits of the project to make it functional, weather, weekends, holidays, suspensions of Contractor's operations, extended or unabsorbed home office or job site overhead, lump sum maintenance of traffic adjustments, lost profits, prime mark-up on subcontractor work, acceleration costs, any and all direct and indirect costs, any other adverse impacts, events, conditions, circumstances or potential damages, on or pertaining to, or as to or arising out of the Contract. This waiver, release and acknowledgment of satisfaction shall be all inclusive and absolute, save and except any routine Town final estimating quantity adjustments.

Should the Contractor fail to actually complete the Contract and obtain final acceptance by the Town prior to expiration of the Original Contract Time, or should the Contractor, having timely completed the Contract and obtained final acceptance by the Town prior to expiration of the Original Contract Time but having failed to timely request the incentive payment for any reason, and including but not limited to the Contractor choosing not to fully waive, release and acknowledge satisfaction as set forth in (2) above, the Contractor shall have no right to any payment whatsoever under this Article. Notwithstanding the Contractor's election or non-election of the incentive under this provision, the disincentive provision applies to all circumstances where the work in the Contract is not finally accepted by the Allowable Contract Time.

Should the Contractor fail to complete the Contract on or before expiration of the Allowable Contract Time, as adjusted in accordance with the provisions above, the Town shall deduct from the moneys due the Contractor the Daily Value as shown in provision 29 for each calendar day completion exceeds the Allowable Contract Time. The term "Allowable Contract Time" as used in this Article shall mean the Original Contract Time plus adjustments pursuant to the statements above. This deduction shall be the disincentive for the Contractor's failing to timely complete the Contract. **This shall be strictly enforced.** In the event the Contractor elects to exercise this incentive payment provision, should this provision conflict with any other provision of the Contract; the Contract shall be interpreted in accordance with this provision.

23. **COPIES OF PLANS FURNISHED:** Three (3) sets of 22" x 34" Plans shall be furnished to the Contractor, at no charge, for construction purposes. Additional copies may be obtained at cost of \$300 per set upon request.

24. **PRE-CONSTRUCTION CONFERENCE:** The successful Contractor, Engineer, Architect and Town of Addison shall meet for a preconstruction conference before any of the work begins on this project. At this time, details of sequencing of the work, contact individuals for each party, testing requirements, submittals, and pay requests will be covered. Prior to the meeting, the Contractor shall prepare schedules showing the sequencing and progress of their work and its effect on others. A final composite schedule will be prepared during this conference to allow an orderly sequence of project construction.
25. **MOBILIZATION:** The work specified in this item consists of the preparatory work and operations in mobilizing for beginning work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site, and for the establishment of temporary offices, utilities, and other facilities, if necessary, for the construction of proposed improvements.
26. **GENERAL SEQUENCE OF CONSTRUCTION:** Prior to the start of work, the Contractor shall develop a detailed construction and sequence of construction schedule using the critical path method, to be submitted to the Town of Addison for approval, that shall cause minimum interference with traffic along, across and adjacent to the project during construction. If the schedule or sequence becomes unworkable or unsatisfactory as work proceeds, adjustments shall be made. During all phases of construction, access to all existing residences and businesses must be maintained at all times unless otherwise authorized in writing by the Town of Addison. Erosion control devices must be properly installed and maintained during all stages of construction.
27. **PROJECT REPRESENTATIVE:** The Town of Addison, the Engineer, the Architect, the Contractor(s), and any applicable public utilities shall designate a single individual within their organization to act as liaison for the project. This individual shall be aware of the day to day activities on the project, have authority to make decisions binding on the party, and serve as single point for coordination of activities with the other team members.
28. **COORDINATION WITH OTHERS:** In the event that other Contractors are doing work in the area simultaneously with this project, the Contractor shall coordinate his proposed construction with that of the other Contractors. The Town of Addison and/or the Engineer/Architect shall mediate any disputes, and the Contractors shall comply with their decisions.
29. **INSURANCE:** Each insurance policy that the Contractor must furnish in accordance with these contract documents shall name the Town of Addison and the Engineers as additional insured. Contractor shall include in their bid package, a copy of their certificate of insurance showing compliance to the limits established by the Town of Addison.

1.0 The Contractor shall agree to furnish and maintain continuously during the period of this agreement, any renewals or extension, insurance coverage meeting all of the following requirements:

1.1 Commercial General Liability Insurance at minimum combined single limits of \$1,000,000 per occurrence and \$2,000,000 general aggregate for Bodily Injury and Property Damage, which coverage shall include Products/Completed Operations, and XCU Hazards. Coverage for product/completed operations must be maintained for at least two (2) years after the construction work has been completed. Coverage must be amended to provide for an each-project aggregate limit of insurance. Contractual Liability must be included.

1.2 Workers Compensation Insurance at statutory limits, including employer's liability coverage at minimum limits of \$1,000,000 each occurrence-each accident, \$1,000,000 by disease-each occurrence, and \$1,000,000 by disease aggregate (see attachment on Workers Compensation Commission rules).

1.3 Commercial Automobile Liability Insurance at minimum combined single limits of \$1,000,000 per occurrence for bodily injury and property damage, including owned, non-owned, and hired car coverage.

1.4 Umbrella Liability at minimum limits of \$1,000,000 each-occurrence \$4,000,000 aggregate with respect to primary commercial general liability, automobile liability and employer's liability policies.

1.5 Any Subcontractor(s) hired by the Contractor shall maintain insurance coverage equal to that required by the Contractor. It is the responsibility of the Contractor to assure compliance with this provision. The Town accepts no responsibility arising from the conduct, or lack of conduct, of the Subcontractor.

1.6 A comprehensive general liability insurance form may be used in lieu of a commercial general liability form. In this event, coverage must be written on an occurrence basis, at limits of \$1,000,000 each-occurrence, combined single limit and coverage must include a broad form comprehensive general liability endorsement, products/completed operations, XCU hazards and contractual liability.

2.0 With reference to the foregoing insurance requirements, Contractor shall specifically endorse applicable insurance policies as follows:

2.1 The Town shall be named as an additional insured with respect to general liability and automobile liability.

2.2 All liability policies shall contain no cross liability exclusions or insured versus insured restrictions.

2.3 A waiver of subrogation in favor of the Town of Addison shall be contained in the workers compensation and all liability policies.

2.4 All insurance policies shall be endorsed to require the insured to immediately notify the Town of Addison of any material changes in the insurance coverage.

2.5 All insurance policies shall be endorsed to the effect that the Town will receive at least thirty (30) days notice prior to cancellation or non-renewal of the insurance.

2.6 All certificates shall be mailed to Town of Addison, Purchasing Dept., P.O. Box 9010, Addison, Texas 75001.

2.7 All insurance policies, which name the Town as an additional insured, must be endorsed to read as primary coverage regardless of the application of other insurance.

2.8 Required limits may be satisfied by any combination of primary and umbrella liability insurances.

2.9 Contractor may maintain reasonable and customary deductibles, subject to approval by the Town.

3.0 All insurance shall be purchased from an insurance company who meets the following requirements:

3.1 Must be issued by a carrier, which is rated "A-" or better by A.M. Best's Key Rating Guide.

3.2 Licensed and admitted to do business in the State of Texas and is a subscriber to the Texas Guaranty Fund.

4.0 All insurance must be written on forms filed with and approved by the Texas State Board of Insurance. Certificates of insurance shall be prepared and executed by the insurance company or its authorized agent and shall contain provisions representing and warranting the following:

4.1 Set forth all endorsements and insurance coverages according to requirements and instruction contained herein.

4.2 Shall specifically set forth the notice-of-cancellation or termination provisions to the Town.

5.0 Upon request, Contractor shall furnish the Town of Addison with certified copies of all insurance policies.

**30. WORKERS' COMPENSATION INSURANCE COVERAGE:**

A. Definitions.

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

**Duration of the Project** - includes the time from the beginning of the work on the project until the Contractor's/person's work on the project has been completed and accepted by the governmental entity.

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

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

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

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

E. The Contractor shall obtain from each person providing services on the project, and provide to the Town of Addison:

(1) a certificate of coverage, prior to that person beginning work on the project, so that the Town of Addison will have on file certificates of coverage showing coverage for all persons providing services on the project; and,

(2) no later than seven days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

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

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

H. The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the TWCC, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify current coverage and report failure to provide coverage.

I. The Contractor shall contractually require each person with whom it contracts to provide Services on a project to:

(1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Codes 401.011 (44) for all its employees providing services on the project, for the duration of the project;

(2) provide to the Contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;

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

(4) obtain from each person with whom it contracts, and provide to the Contractor;

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

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

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

(6) notify the Town of Addison in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

(7) contractually require each other person with whom it contracts to perform as required by paragraphs (1) - (7) with the certificate of coverage to be provided to the person for whom they are providing services.

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

Contractor to administrative penalties, criminal penalties, civil penalties or other civil actions.

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

The following is the form of notice of workers' compensation coverage prescribed by the TWCC. Pursuant to Section 110.110 (d) (7), this notice must be printed with a title in at least 30-point bold type, and text in at least 19-point nominal type, and shall be in both English and Spanish and any other language common to the worker population.

### **REQUIRED WORKERS' COMPENSATION COVERAGE**

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

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

31. **CLEAN AIR ACT AND CLEAN WATER ACT:** Include in all construction contracts exceeding \$100,000, the following requirement: "Contractor is responsible for compliance with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act, Section 505 of the Clean Water Act, Executive Order 11738, and Environmental Protection Agency regulations."
32. **RESOLUTION OF DISPUTES:** The parties hereby covenant and agree that in the event of any controversy, dispute, or claim, of whatever nature arising out of, in connection with or in relation to the interpretation, performance or breach of this agreement, including but not limited to any claims based on contract, tort or statute, before filing a lawsuit, the parties agree to submit the matter to Alternative Dispute Resolution pursuant to the laws of the State of Texas. The parties shall select a third party arbitrator or mediator from the current list of neutrals on file with the Alternative Dispute Resolution Administrator of the Dallas County District Courts. All forms of Alternative Dispute Resolution may be used except binding arbitration. The proceedings shall be conducted in accordance with the laws of the State of Texas.
33. **SHOP DRAWINGS:** The Contractor shall provide, review, approve and submit all shop drawings, product data and samples required by the Town of Addison, the Engineer, the Architect and the Contract Documents in accordance with Item 1.28 of the Standard Specifications for Public Works Construction, North Central Texas Council of Governments.



The Contractor shall furnish six (6) copies of shop drawings for review by the Engineers and Architect, who will review, approve and forward to the Town of Addison for acceptance. Approved submittals will be returned as follows:

- Two (1) – Town of Addison
- One (1) – Contractor
- One (1) – Icon Consulting Engineers, Inc.
- One (1) – Kevin Sloan Studio
- One (1) – Viewtech, Inc.
- One (1) – UDR

Maximum size of submittals shall be 11 x 17 inch. No fax copies are acceptable. Shop drawings shall include all items to be installed in the project, including:

- Concrete Mix Designs
- Storm Sewer Pipe
- Hydrants
- Trench Safety Plan
- Steel Casing Pipe
- Traffic Control Plan
- Sanitary Sewer Pipe
- Fittings
- Flex Base
- Embedment Materials
- Water Main Pipe
- Valves
- Gradation
- Asphalt
- Backfill Materials

34. **PROJECT VIDEO:** Prior to the start of construction, Contractor shall video the construction area and property adjacent to construction in the presence of the City Inspector. The format shall be DVD. The video shall be narrated. The Contractor shall furnish the Town of Addison a copy of the video in DVD format prior to commencement of project. This shall be subsidiary to project.

35. **TESTING REQUIREMENTS:** The Town of Addison shall designate and pay an independent testing laboratory to furnish testing for this project. Random testing will be provided by the independent lab as necessary for compliance with the specifications. The Contractor shall coordinate construction with the testing lab and the Town of Addison, and shall provide assistance to the testing labs by providing excavation, access, trench safety, materials for testing and any other work required to insure all testing requirements are met. Work performed to accommodate testing will be a subsidiary item and no extra payment will be authorized. All costs for the field quality control testing shall be paid for by the Town of Addison, except for any and all re-testing, which shall be paid by the Contractor and such cost shall be deducted from monthly pay requests. As a general guide, the Town of Addison shall provide the following tests:

- (1) Density and associated tests on embedment and backfill.
- (2) Air test on ALL pipe joints.
- (3) Compressive strength tests on concrete.
- (4) Gradation soil tests on backfill as may be required.

The Contractor shall be responsible for providing the following tests:

- (1) Pressure test on potable water systems.
- (2) Bacteriological test on potable water systems.

- (3) Mandrel test on wastewater systems.
- (4) Vacuum test on wastewater manholes.
- (5) Providing test results from manufacturer of all materials.
- (6) Providing gradation results on embedment materials.

All samples and tests shall be performed in accordance with the Standard Specifications for Public Works Construction, North Central Texas Council of Governments (Latest Edition) as amended or supplemented.

36. **INSPECTION:** The Town of Addison and the Engineers reserve the right to inspect, test, measure or verify the construction work for this project as they deem necessary to ascertain that the Work is being accomplished in accordance with the standards and requirements set forth in the Contract Documents. Notwithstanding such reviews, the Contractor will be held responsible for the finished Work, and any acceptance of the Work by the Town or governmental agencies will not relieve the Contractor from responsibility for the Work. The Town reserves the right to place full-time construction inspectors at the site of the Work. Costs for inspection services will be paid by the Town of Addison. The Contractor shall provide assistance to the Town of Addison and the Engineers by providing excavation, trench safety, or other work necessary to facilitate inspection activities, and shall give sufficient notice well in advance of pending construction activities for scheduling of inspection services.

If the Specifications, the Town's instructions, laws, ordinances, or any public authority require any Work to be specially tested, the Contractor shall give the Town timely notice of its readiness for testing, and if the testing is by an authority other than the Town, of the date fixed for such testing. Tests by the Town shall be made promptly, and where practicable at the source of supply.

37. **ACCESS ROUTES, STAGING AREAS AND STORAGE AREAS:** All haul roads and access routes and the location of job site trailers, staging areas, and storage areas shall be subject to the approval of the Town and the Engineer. The Contractor shall be responsible for maintaining and repairing all roads and other facilities used during construction. Upon completion of the project all existing roads and other disturbed areas shall be left in a condition equal to that at the time the Contractor commences work on this project.
38. **PROPERTY ACCESS:** Access to adjacent properties shall be maintained at all times unless otherwise directed by the Engineers and/or Town of Addison. Contractor shall block no more than one half of a driveway at any time. Contractor shall also maintain sufficient sidewalk access throughout the project limits to the existing apartment buildings during construction operations.
39. **PLANT, PROCEDURE, METHODS AND EQUIPMENT:** The Contractor shall determine the methods to be employed, the procedures to be followed, and equipment to be used on the work under this contract, subject to the requirements of these specifications and approval of the Engineers and Town of Addison. Only adequate and safe procedures, methods and equipment shall be used. The Contractor shall so arrange his work and provide

such plant and equipment as is necessary in order to meet the progress requirements of the approved time schedule and to complete the work within the period of time as specified in the Construction Agreement. Only such materials and equipment as are necessary for the construction of the work under this contract shall be placed, stored or allowed to occupy any space at the site of the work.

It is expressly agreed that the acceptance or approval of any order of procedure, methods or equipment submitted or employed by the Contractor shall not in any manner relieve the Contractor of responsibility for the safety, maintenance and repairs of any work, or for the construction maintenance and safety of the work hereunder, or from any liability whatsoever on account of any procedure or method employed by the Contractor. Where the work under this contract requires permits from the Town of Addison, the State of Texas, or other public authorities, duplicate copies of such permits shall be furnished to the Engineers by the Contractor before the work covered thereby is started. **NO WORK WILL BE ALLOWED TO PROCEED BEFORE REQUIRED PERMITS ARE OBTAINED AND DISTRIBUTED**

40. **PARKING OF CONSTRUCTION EQUIPMENT:** At night and during all other periods of time when equipment is not being actively used on the construction work, the Contractor shall park the equipment at locations which are approved by the Town of Addison or the Engineers. The Contractor shall provide adequate barricades, markers and lights to protect the Town of Addison, the Engineers, the public and other work. All barricades, lights, and markers must meet the requirements of the Town of Addison, State and Federal regulations.
41. **ZONING REQUIREMENTS:** During the construction of this project, the Contractor shall comply with the present zoning requirements of the Town of Addison in the use of vacant property for storage purposes.
42. **CONSTRUCTION IN PUBLIC ROADS AND PRIVATE DRIVES:** No public road shall be entirely closed. It shall be the responsibility of the Contractor to build and maintain all weather bypasses and detours, if necessary, and to properly light, barricade and mark all bypasses and detours that might be required on and across the roads involved in the work included in this contract. No interference with traffic flow on city streets shall be permitted during hours of 6:30 a.m. to 9:30 a.m. and 3:30 p.m. to 7:30 p.m., Monday through Friday.

The Contractor shall make every effort to complete construction and allow immediate access to adjacent property at driveway entrances located along the roadways. Towns or tenants of improvements where access and/or entrance drives are located shall be notified at least twenty-four (24) hours prior to the time the construction will be started at their driveways or entrances and informed as to the length of time driveways will be closed. Contractor shall at all times maintain at least one point of access into all properties, unless obtaining written permission from property Town to do otherwise with such written permission being provided to the Town's inspector.

The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of same for a period of two years from the date of such reconstruction. In the event the repairs and maintenance are not made immediately to the satisfaction of the Town, and it becomes necessary for the Town to make such repairs, the Contractor shall reimburse

the Town for the cost of such repairs.

The Contractor shall, at all times, keep a sufficient width of the roadway clear of dirt and other material to allow the free flow of traffic. The Contractor shall assume any and all responsibility for damage, personal or otherwise, that may be caused by the construction along roads and private drives.

43. **HAULING ON TOWN OF ADDISON STREETS:** The Contractor shall receive approval of his haul routes and type of equipment to be used prior to beginning construction. The Contractor shall be responsible for maintaining the cleanliness of existing paved roadways and shall provide equipment and manpower for that purpose.
44. **EXISTING POWER POLES & GUY WIRES:** The Contractor shall have the responsibility of coordinating with the proper authorities for the bracing, replacing or relocating of all utility poles and guy wires which interfere with the construction of this project prior to beginning his construction operations. The Contractor will also be responsible for all damage to poles, guy wires, etc. that are damaged or destroyed by Contractor's operations.
45. **SAFETY RESTRICTIONS - WORK NEAR HIGH VOLTAGE LINES:** The following procedures shall be followed for work near high voltage lines on this contract:
  - A. A warning sign not less than five (5) inches by seven (7) inches, painted yellow with black letters that are legible at twelve (12) feet shall be placed inside and outside vehicles such as cranes, derricks, power shovels, drilling rigs, pile driver, hoisting equipment or similar apparatus. The warning sign shall read as follows: "Warning - Unlawful to Operate This Equipment Within Six Feet of High Voltage Lines."
  - B. Equipment that may be operated within ten (10) feet of high voltage lines shall have an insulating cage guard protecting the boom or arm, except backhoes or dippers, and insulator links on lift hook connections.
  - C. When necessary to work within six (6) feet of high voltage electric lines, notify the power company who will erect temporary mechanical barriers, de-energize the line, or raise or lower the line. All such work done by the power company shall be at the expense of the Contractor. The Contractor shall maintain an accurate log of all such calls to the power company.
  - D. The Contractor is required to make arrangements with the power company for the temporary relocation or raising of high voltage lines at the Contractor's sole expense.
  - E. No person shall work within six (6) feet of high voltage lines without protection measures having been taken as outlined in Paragraph c.
46. **PROTECTION OF EXISTING UTILITIES AND STRUCTURES:** The location and dimensions shown on the plans relative to existing utilities and subsurface structures are based on the best records and/or field information available and are not guaranteed by the Town of Addison or the Engineer to be accurate as to location and depth. It shall be the Contractor's responsibility to verify locations of adjacent and conflicting utilities sufficiently

in advance of his activities in order that he may negotiate such restrictive locations with the Town of Addison of the conflicting utility and/or make local adjustments to provide adequate clearances. The Contractor shall take all necessary precautions in order to protect all utilities and services encountered, whether or not they are indicated on the plans. All damage to utilities resulting from Contractor's operations shall be restored at his expense. The Town of Addison and the Engineers assume no responsibility for failure to show any or all of these utilities or structures on the plans, or to show them in their exact locations. It is mutually agreed that such failure shall not be considered sufficient basis for claims for additional compensation for extra work or for increasing the pay quantities in any manner whatsoever, unless the obstruction encountered is such as to necessitate changes in the lines or grades, or requires the building of special work, provisions for which are not made in the plans, in which case, provisions in these specifications for extra work shall apply.

47. **PUBLIC UTILITIES AND OTHER PROPERTY TO BE CHANGED:** In case it is necessary to change or move the property of a public utility, such property shall not be moved or interfered with until authorized by the Town of Addison or the Engineer. The right is reserved for the Owner of public utilities to enter upon the limits of the project for the purpose of making such changes or repairs of their property that may be made necessary by performance of the Contract. The Contractor shall be responsible for coordination with the Town of Addison and the Engineers, and all utility companies whose utility lines or streets may be affected by the proposed improvements. The Contractor shall observe the following:
- A. Prior to any excavation, the Contractor shall determine the locations of all existing water, gas, sewer, electric, telephone, telegraph, television, pipelines and other underground utilities and structures.
  - B. After commencing work, the Contractor shall use every precaution to avoid interference with existing underground and surface utilities and structures, and protect them from damage.
  - C. Where the locations of existing underground and surface utilities and structures are indicated, these locations are generally approximate, and all items which may be encountered during the work are not necessarily indicated. The Contractor shall determine the exact locations of all items indicated, and the existence and locations of all items not indicated.
  - D. The Contractor shall repair or pay for all damage caused by his operations to all existing utility lines, public property, and private property, whether it is below ground or above ground, and he shall settle in total the cost of all damage suites which may arise as a result of his operations.
  - E. To avoid unnecessary interferences or delays, the Contractor shall coordinate all utility removals, replacements and construction with the appropriate utility company, and then request written authorization from the Town of Addison or the Engineer. The Town of Addison and the Engineer will not be liable for damages due to delay as a result of the above.

48. **MAINTENANCE AND REPAIRS:** The Contractor shall maintain and keep in good repair all work contemplated under these plans, specifications, and drawings which shall include the maintenance and repair of all existing streets, storm sewer crossings, utility crossings, temporary crossings for access to adjacent property, barricades, lights, and danger signals, and all work which is necessary for the well being of the general public. In the event the Contractor fails in his obligations to properly maintain the work, the Town of Addison shall make such repairs as are necessary and the cost of such repairs shall be deducted from payment due the Contractor.
49. **PROTECTION OF WORK:** During performance and up to date of final acceptance, the Contractor shall be under the absolute obligation to protect the finished work against damage, loss or injury. In the event of damage, loss or injury, the Contractor shall promptly replace or repair such work, whichever the Town of Addison shall determine to be preferable. The obligation to deliver finished work in strict accordance with the contract prior to final acceptance shall be absolute and shall not be affected by the Town of Addison's approval of or failure to prohibit means and methods of construction used by the Contractor. All risk of loss or damage to the work shall be borne solely by the Contractor until final acceptance of all work by the Town of Addison, as evidenced by the Town of Addison's issuance of a certificate of acceptance.
50. **PUBLIC CONVENIENCE AND SAFETY:** In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal work hours.

Materials stored about the work site shall be so placed, and the work shall at all times be so conducted, as to cause no greater obstruction to the traveling public than is considered necessary by the Town of Addison. The materials excavated shall be placed so as not to endanger the work or prevent free access to all fire hydrants, water valves, gas valves, manholes (telephone, telegraph or electrical conduits, and sanitary sewers) and fire alarm or police call boxes in the vicinity.

The Town of Addison reserves the right to remedy any neglect on the part of the Contractor as regards to the public convenience and safety which may come to the Town of Addison's attention, after 24 hours notice in writing to the Contractor, save in cases of emergency, when the Town of Addison shall have the right to remedy any neglect without notice; and, in either case, the cost of such work done by the Town of Addison shall be deducted from the monies due or to become due the Contractor. The Contractor shall notify the Town of Addison and the Engineers when any street is to be closed or obstructed. The Contractor shall provide for emergency vehicle access at all times.

Where the work passes over or through private property, the Town of Addison shall provide such right-of-way. The Contractor shall notify the proper representatives of any public utility, corporation, company or individual, not less than 48 hours in advance of work which might damage or interfere with the operation of their property along or adjacent to the work. The Contractor shall be responsible for all damage or injury to property of any character

(except such as may be required by the provisions of the Contract Documents, or caused by agents or employees or the Town of Addison) by reason of any negligent act or omission on the part of the Contractor, his employees, agents or subcontractors, or at any time due to defective work or materials, or due to his failure to reasonably or properly prosecute the work, and said responsibility shall not be released by the fact that the work shall have been completed and accepted.

When and where any such damage or injury is done to public or private property on the part of the Contractor, he shall restore or have restored at his own cost and expense such property to a condition similar or equal to that existing before such damage was done, by repairing, rebuilding or otherwise restoring as he may be directed, or he shall make good such damage or injury in a manner acceptable to the property Town of Addison and the Engineers. In case of failure on the part of the Contractor to restore such property or make good such damage or injury, the Town of Addison may, upon 48 hour written notice under ordinary circumstances, and without notice when a nuisance or hazardous condition results, proceed to repair, rebuild or otherwise restore such property as may be determined necessary, and the cost thereof shall be deducted from any monies due or to become due to the Contractor under this contract; or where sufficient contract funds are unavailable for this purpose, the Contractor or his surety shall reimburse the Town of Addison for all such costs.

- 51. PROTECTION OF PERSONS AND PROPERTY:** The Contractor shall have the responsibility to provide and maintain all warning devices and take all precautionary measures required by law or otherwise necessary to protect persons and property while said persons or property are approaching, leaving or within the work site or any area adjacent to said work site. No separate compensation shall be paid to the Contractor for the installation or maintenance of any warning devices, barricades, lights, signs, or any other precautionary measures required by law or otherwise necessary for the protection of persons or property.

The Contractor shall assume all responsibilities to the general public in connection with the general public's immediate approach to and travel through the work site and the area adjacent to said work site.

Where the work is in or adjacent to any street, alley, sidewalk, public right-of-way or public place, the Contractor shall at his own cost and expense provide such flagmen and watchmen and furnish, erect and maintain such warning devices, barricades, lights, signs, and other precautionary measures for the protection of persons or property as may be prudent or necessary, or as required by law. The Contractor's responsibility for providing and maintaining flagmen, watchmen, warning devices, barricades, signs and lights and other precautionary measures shall not cease until the project shall have been completed and accepted by the Town of Addison, and shall cease when the Town of Addison notifies the Contractor in writing of final project acceptance.

If the Town of Addison discovers that the Contractor has failed to comply with applicable federal or state laws (by failing to furnish the necessary flagmen, warning devices, barricades, lights, signs or other precautionary measures for the protection of persons or property), the Town of Addison may order the Contractor to take such additional precautionary measures as required by law to protect persons and property. In addition, the Contractor shall be held responsible for all damages to the work and other public or private

property due to the failure of warning devices, barricades, signs, lights or other precautionary measures in protecting said property; and whenever evidence is found of such damage, the Town of Addison may order the damaged portion immediately removed and replaced by and at the cost and expense of the Contractor.

52. **TRAFFIC CONTROL:** It shall be the responsibility of the Contractor to provide traffic control during the construction as required by the State of Texas, the Town of Addison, and in accordance with the following additional requirements:

- A. The Contractor shall be required to furnish barricades, flares, flagmen, etc., for the protection of the public, employees and the work.
- B. The Contractor shall prosecute his work in such a manner as to create a minimum of interruption to traffic along adjacent roadways.
- C. The unit price bid under the appropriate bid item of the proposal shall cover all cost for providing signage, markings, lighting, barricades, flagmen and other devices and personnel required for traffic control during construction of the project.
- D. The Contractor shall not remove any regulatory sign, instructional sign, warning sign, street name sign or any other sign or signal which currently exists.

53. **BARRICADES, WARNING SIGNS, DETOURS AND SEQUENCE OF WORK:** Throughout the construction operations, streets and intersections will remain open to traffic by constructing the work in stages. All streets, driveways, adjacent business and alleys shall remain open to traffic as far as is practicable.

A. General Construction: The Contractor shall plan his work sequence in a manner that will cause minimum interference with traffic during construction operations. Before beginning work on this project, the Contractor shall submit, for approval by the Town of Addison, a plan of construction operations outlining in detail a sequence of work to be followed; setting out the method of handling traffic on streets, roads and driveways along, across and adjacent to the work. If at any time during the construction, the Contractor's proposed plan of operation for handling traffic does not provide for safe comfortable movement, the Contractor shall immediately change his operations to correct the unsatisfactory conditions.

Ditches across the traffic lanes will be kept covered with a portable traffic-bearing surface at all times unless work in the ditch is in progress. Only one lane of traffic may be closed at a time when work is in progress in a ditch.

B. Safety: The Contractor shall provide, construct and maintain barricades and signs at locations set out in the plans and in the Special Provisions in accordance with the Texas Manual on "Uniform Traffic Control Devices for Streets and Highways". In addition, he shall provide and maintain such other barricades and signs as deemed necessary by the Town or the Engineers, and provide and maintain, between sunset and sunrise, a sufficient number of lights at barricades and points of danger for the protection of vehicular and pedestrian traffic.



Barricades shall be placed in such a manner as not to interfere with the sight distance of drivers entering the street from side streets.

The Contractor shall keep traveled surfaces used in his hauling operation clear and free of dirt or other material.

The Contractor shall provide and maintain qualified flagmen at such points and for such periods of time as may be required to provide for the safety and convenience of public travel and Contractor's personnel.

**54. EXCAVATION SAFETY SYSTEMS**

The work performed under this section of the specifications consists of providing trench safety systems consisting of shoring, sheeting, trench shield, and/or laid back slopes to meet the trench safety requirements of the Occupational Safety and Health Administration (O.S.H.A.), as required for this project and specified herein.

A. General: Trench safety systems shall be provided by the Contractor as provided in Subpart P - Excavation, Trenching and Shoring, Part 1926 of the Code of Federal Regulations which describes safety and health regulations as administered by the U.S. Department of Labor Occupational Safety and Health Administration (O.S.H.A.). The standards specified by the O.S.H.A. Regulations shall be the minimum allowed on this project. It shall be the responsibility of the Contractor to design and install adequate trench safety systems for all trenches excavated on this project.

The Contractor shall furnish to the Town for review, prior to beginning construction activity, a Trench Safety Plan for the entire project. The trench safety plan must be prepared and sealed by a Professional Engineer registered in the State of Texas. In addition, all trench safety systems utilized in this project must be designed by a Professional Engineer registered in the State of Texas. The Contractor shall be totally responsible for the safety of all persons involved in the construction of this project.

B. Core Borings: Any core borings and soil data furnished by the Town are for the convenience of the Contractor. The Contractor shall be responsible for any additional soil or geotechnical information required. The Contractor shall be responsible for properly designed trench safety systems to be utilized for any type of subsurface condition found on this project. The furnishing of soil information by the Town of Addison in no way relieves the Contractor of this obligation. If no core borings or soil data are furnished by the Town, it shall be the Contractor's responsibility to obtain whatever geotechnical information required for preparation of trench safety systems.

C. Inspections: In addition to the inspections of the trench and trench safety systems required of the Contractor by the O.S.H.A. Regulations, the Town may further inspect the work. The Town shall have the right to reject any trench safety systems which he finds to be inadequate, and the Contractor shall immediately improve the system to comply with this specification.

D. Measurement and Payment: Measurement and payment of Trench Safety Systems shall be based on the actual linear footage of the pipe installed on the project. The payment shall be full compensation for all planning, engineering, materials, equipment, fabrications, installation, recovery and all incidental work required. All excavation and backfill in addition to that specified elsewhere in these specifications shall be considered subsidiary to this bid item.

55. **TRENCH EXCAVATION, BACKFILL AND COMPACTION**: Trench excavation, backfill and compaction of storm drain and utility trenches shall be in accordance with Town of Addison Standards and with details shown on the Construction Drawings.
- A. Trench Excavation: If the stated maximum trench widths are exceeded, either through accident or otherwise, and if the Engineer determines that the design loadings of the pipe will be exceeded, the Contractor will be required to support the pipe with an improved trench bottom. The expense of such remedial measures shall be entirely the Contractor's own. All trenching operations shall be confined to the width of permanent rights-of-way, permanent easements and any temporary construction easements. All excavation shall be in strict compliance with the Trench Safety Systems Special Condition of this document.
- B. Trench Backfill: Trenches shall be backfilled above the top of the embedment material with approved backfill material per Town of Addison Standards for the appropriate pipe size, pipe material, depth and soil condition.
- C. Compaction: All trenches under proposed or existing pavement shall be compacted to within a range of 98% to 100% Standard Proctor Density. Trenches which lie outside limits of pavement shall be compacted to a minimum of 95% Standard Proctor Density (ASTM D-698).
56. **TRENCH WALLS**: The Contractor shall use shoring or a drag box in those areas where it is required to protect existing improvements. This shall be subsidiary to the various bid items and not a separate pay item.
57. **PROPERTY LINES AND MONUMENTS**: The Contractor shall protect all property corner markers, and when any such markers or monuments are in danger of being disturbed, they shall be properly referenced and if disturbed shall be reset at expense of the Contractor.
58. **CONSTRUCTION STAKING**: Construction staking will not be provided by the Town of Addison or Engineer. This item will be performed by the Contractor and shall be subsidiary to other bid items. The Contractor will also be responsible for maintaining stakes. If re-staking is required for any reason, it will be the Contractor's responsibility, including associated costs.

All construction staking shall be done under the supervision of a Registered Professional Land Surveyor registered in the State of Texas. The Contractor shall submit copies of cut sheets and field books for the construction of all paving, water, wastewater, and stormwater

improvements to the Town of Addison for review prior to construction of the improvements. The information on the cut sheets and field books shall include but not be limited to the following:

- A. Heading to include date, contract number, project name, surveying firm, Contractor, and construction plan sheet number.
  - B. Location, description of item being staked, number, letter, etc. designation.
  - C. Benchmark Data: Location, description, and elevation.
  - D. Offset description.
  - E. Cut/Fill to subgrade, pavement, top of curb, top of pier or utility being staked.
  - F. Clarifying remarks such as top of curb, gutter, pavement, subgrade, pier, abutment etc.
  - G. Cut sheets shall be signed by a Texas Registered Professional Land Surveyor.
59. **VENDOR'S CERTIFICATION:** All materials used in construction shall have a vendor's certified test report. Test reports shall be delivered to the Engineer/Architect before permission will be granted for use of the material. All vendors' test reports shall be subject to review by the Engineer/Architect, and shall be subject to verification by testing of samples of materials as received for use on the project. In the event additional tests are required, they shall be performed by an approved independent testing laboratory and shall be paid for by the Contractor.
60. **POTABLE WATER DISTRIBUTION PIPE:** All potable water distribution pipe, four (4") through twelve-inch (12") diameter shall be ANSI / AWWA C-900 PVC pressure pipe and fabricated fittings, blue in color, with integral bell and spigot joints, and cast-iron-pipe-equivalent outside diameter dimensions. When pipes penetrate any concrete walls or structures, the pipe shall be class 51 ductile iron pipe, polyethylene wrapped. Pipe joints shall be rubber ring and integral thickened bell, assembled with a factory supplied lubricant. Water mains shall have a minimum class rating of 150-psi for domestic use and a minimum class rating of 200-psi for fire line applications.
61. **WATER RECIRCULATION PIPING:** All piping for the water recirculation system shall be ANSI / AWWA C-900 pressure pipe and fabricated fittings, purple in color, with integral bell and spigot joints, and cast-iron-pipe-equivalent outside diameter dimensions. When pipes penetrate any concrete walls or structures, the pipe shall be class 51 ductile iron pipe, polyethylene wrapped. Pipe joints shall be rubber ring and integral thickened bell, assembled with a factory supplied lubricant. Water mains shall have a minimum class rating of 150-psi for water recirculation piping applications.
62. **WASTEWATER PIPE:** All wastewater main piping shall meet the extra strength

requirements of ASTM specification D3034 (SDR-35). Pipe shall have the bell and spigot type joints, consisting of integral wall section with factory installed compression rubber ring gasket, securely locked in bell groove to provide positive seal under all installation conditions. Pipe shall be laid with the bell end on the upstream side.

- 63. **STORM DRAINAGE PIPE:** All pipe for storm drainage improvements eighteen (18”) through thirty-six (36”) shall be reinforced concrete pipe (RCP), Class III. Reinforced concrete pipe joints shall be sealed with Ramneck or approved equal. All pipe for storm drainage improvements four (4”) through fifteen (15”) shall be Polyvinyl Chloride Pipe (PVC), SDR-35 unless noted otherwise.
- 64. **POLYETHYLENE WRAPPING:** All valves, ductile iron pipe, cast iron fittings, and specials, shall be polyethylene wrapped. Payment for the polyethylene wrapping for these components shall be subsidiary to the various items bid for the furnishing and installing pipe complete in place. Polyethylene wrap shall precede blocking.
- 65. **PIPE EMBEDMENT:** All storm drain and utility construction shall be installed with embedment per the details shown on the plans for the appropriate pipe size, pipe material, depth and soil condition unless otherwise directed by the Town of Addison or the Engineer.
- 66. **CEMENT STABILIZED BACKFILL:** Two (2) sack cement stabilized backfill shall be provided in wastewater pipe trenches at locations of crossings with water lines where shown on the plans and in conformance with Texas Dept. of Health Rules & Regulations for Public Water Systems. Payment for such work including all labor, tools, equipment and material necessary to complete the work shall be subsidiary to the various items bid for the furnishing and installing pipe, complete in place.
- 67. **NON-METALLIC WATER PIPE DETECTION:** Detectable underground utility warning tapes, which can be located from the surface by a pipe detector, shall be installed directly above non-metallic pipe. The detectable tape shall be “Detect Tape” as manufactured by Allen Systems, Inc. or an approved equal, and shall consist of a minimum thickness of 0.35-mil. solid aluminum foil encased in a protective inert plastic jacket that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil. The minimum overall thickness of the tape shall be 5.5-mils. And the width shall not be less than two-inch with a medium unit weight of 2 ½ pounds per inch x 1,000 feet. The tape shall be color coded and imprinted with the messages as follow:

<u>Type of Utility</u>	<u>Color Coded</u>	<u>Legend</u>
Potable Water	Safety Blue	CAUTION BURIED WATER LINE BELOW
Non-potable Water	Safety Purple	CAUTION BURIED NON-POTABLE WATER LINE BELOW
Sanitary	Safety Green	CAUTION BURIED SEWER LINE BELOW

Installation of detectable tapes shall be per manufacturer's recommendations, and shall be as close to the grade as is practical for optimum protection and detectability. Allow a minimum of 18 inches between the tape and the water line. Payment for detectable tapes shall be included in the linear foot price bid for applicable pipe(s).

68. **PIPE CLEANING:** Joints shall be wiped and then inspected for proper installation by the inspectors. Each joint shall be swept daily and kept clean during installation. A temporary night plug shall be installed on all exposed pipe ends during any period of work stoppage.
69. **WATER FOR CONSTRUCTION:** The Contractor shall acquire a meter and make the necessary arrangements with the Town of Addison for securing and transporting all water required for construction, including water required for mixing of concrete, sprinkling, testing, irrigation or flushing. There will be no separate pay item for connection into the existing water system and quantity of water required for construction purposes. The Town of Addison will furnish water for initial cleaning and sterilization of water lines. All additional water used by the Contractor for irrigation, compaction or any other purpose incidental to this project may be obtained from existing hydrants along adjacent roadways through a loan meter obtained from the Town of Addison at the Contractor's expense. Note that the Contractor will be responsible for supplying chlorine gas or chlorinated lime (HTH) for water line sterilization.
70. **IRRIGATION AND SPRINKLER REPAIR:** The Contractor shall maintain all existing irrigation systems within the limits of the project, not designated to be removed or disconnected, during the duration of the contract. The Contractor shall employ a licensed irrigator who is responsible for the repair or replacement of any damage to existing irrigation lines, valves, controllers, sprinklers, wiring and appurtenances that currently serve adjacent properties. This repair is subsidiary to the various other items bid. The Contractor will also be responsible for any vegetation that dies as a result of damage to the irrigation system and replace it with equal vegetation at his own cost.
71. **PAVEMENT REMOVAL AND REPLACEMENT:** The Contractor will be responsible for any pavement that is damaged or destroyed by Contractor's operations. Concrete street or sidewalk repair shall be full panel replacement to the standard of the previously removed portion or better. In the event the Contractor fails in his obligations to properly repair the work in a timely manner, the Town of Addison shall make such repairs as are necessary and the cost of such repairs shall be deducted from payment due the Contractor.
72. **SILICONE JOINT SEALANT:** Silicone joint sealant must be used in all instances where joint sealing applies to Portland cement concrete pavement. Payment for the use of silicone joint sealant throughout this project will in all cases be subsidiary to this contract at no extra payment.
73. **EXCAVATION AND CONTROLLED DENSITY PLACEMENT OF EMBANKMENT MATERIALS:** Grading of the streetscape areas and the park, including excavation of the creek and pond areas, construction of embankment areas, and filling to sub-grade elevations,

will be performed under this pay item. It shall be this contractor's responsibility to grade the streetscape areas and the entire park area, including the pond and channel areas, to within  $0.10 \pm$  of a foot of proposed sub-grade elevations under proposed paved areas, and to within  $0.30 \pm$  of a foot of proposed sub-grade elevations under all other areas. The Contractor shall hire a Surveyor to certify that the proposed tolerances for grading have been complied with. Any discrepancies so identified shall be eliminated before final pavement, landscaping, etc. on the project is completed. Payment for this grade certification shall be subsidiary to the price bid for "Excavation and Controlled Density Placement of Embankment Materials".

Suitable excess material from excavation activities in the park area shall be placed on the property immediately south of and adjacent to the park area as shown on sheets C304 and C305. In the event that the amount of excavated material from the Park site is in excess of the amount necessary to grade the property to the proposed elevations shown, or if the amount of material is short of that necessary to grade the properties as shown, the Engineer will make an adjustment to the contours and grades shown, and therefore no import or export of suitable fill material will be required.

Topsoil shall be stripped and stockpiled from locations where embankment materials and/or excess material is to be placed. The Contractor shall scarify the spoil area to a depth of 6 inches and shall place the spoil material in 6-inch lifts, compacted to between ninety-five percent (95%) and one hundred percent (100%) of the maximum density as determined by ASTM D-698 Standard Proctor Test Method at or slightly above optimum moisture content. Rock shall be broken or crushed so that the maximum dimension is 8". No rock larger than 4" will be allowed in the upper 12" of fill. After completion of filling, replace topsoil and smooth grade to the contours shown on the drawings. Tree stumps and limbs, asphalt and concrete debris, discarded materials and all unsuitable excess spoil material, including rock measuring larger than 8" in the largest dimension, shall become the property of the Contractor and shall be removed from the site and disposed of by the Contractor at his expense. The Contractor shall also comply with all applicable laws governing spillage of debris while transporting to a disposal site, and shall indemnify and save harmless the Town of Addison and the Engineer from all suits, actions, or claims of any character resulting from his arrangements for the disposal of spoil.

All costs for hauling, placement, compaction and final grading of embankment materials and/or suitable excess material from excavation activities in the park area shall be subsidiary to the cost bid for "Excavation and Controlled Density Placement of Embankment Materials".

74. **GRASSING:** This Contractor will be responsible for grassing of all additional areas outside of the immediate park area that are disturbed by this Contractors' operations including areas where excess material has been spread and graded (reference sheets C304 and C305), job staging area, batch plant site, haul roads, and any additional areas of the project site that are not to be paved or to be landscaped. Hydro mulch seeding shall be provided in accordance with North Texas Council of Government Item 3.10. "Seeding". Contractor shall provide all watering and fertilizing necessary to obtain coverage of at least 80% of all disturbed areas prior to acceptance. Cost of grassing shall include watering, fertilizing, and all other incidentals necessary to obtain the required stand of grass for these areas.

75. **CONSTRUCTION TRAFFIC OVER PIPE LINES:** The design of the new pipes and the design of the existing pipe have been taken into account and provided for highway live loads. It is apparent, however, that certain construction vehicles could exceed this highway load condition under shallow bury conditions. It will be the responsibility of the Contractor to protect both the new line and the existing lines from these possibly excessive loads. The Contractor shall not at any time cross the existing or new pipe with a truck delivering new pipe to the site. Any damage to the existing or new pipe will be repaired or replaced by the Contractor to the satisfaction of the Town of Addison.

In locations where it is not permissible to cross the existing or proposed pipes without additional protection, the Contractor may elect to provide additional protection of the pipes so that more frequent crossings of the pipes are allowed. It still is, however, the responsibility of the Contractor to repair any damage to the existing or proposed lines if the damage results from any phase of his construction operation.

76. **REMOVALS, ADJUSTMENTS AND REPLACEMENTS:** Existing pavements, curbs, gutters, walls, stairs, sidewalks, etc., to be demolished and removed to facilitate the construction of the improvements shall be broken up and disposed of. Care shall be exercised to leave a neat, uniform edge or joint at the excavation limits or sections removed where only portions are to be removed. The Engineer will designate the limits to be removed. Where pavements, curbs, gutters, sidewalks, etc., shall be replaced, then said replacements shall be to the standard of the previously removed portion or better. Re-sawing of damaged edges will be at the Contractor's expense.

Existing structures such as manholes, inlets, cleanouts, valve boxes, etc. which are not the property of a private firm or company, or an individual required to move their own property, shall be adjusted, altered or reset to the required elevation and alignment. New materials and workmanship necessary shall conform to the requirements of these Specifications covering the particular Work. Salvaged materials in good condition may be used in rebuilding such structures, provided the materials are thoroughly cleaned before their use. These items shall be subsidiary to other bid items unless quantified in the proposal as separate bid items. All private obstructions which are indicated on the Plans to be moved, will be removed and replaced, or moved to new permanent locations by the Contractor, without additional payment to the Contractor. Any such additional item which the Contractor moves or causes to be moved for his own convenience shall be at his expense.

77. **REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK:** All work which has been rejected or condemned shall be repaired; or if it cannot be repaired satisfactorily, it shall be removed and replaced at the Contractor's expense. Defective materials shall be immediately removed from the work site. Work done without line and grade having been provided; work done beyond the line or not in conformity with the grades shown on the Drawings or as provided, work done without proper inspection; or any extra or unclassified work done without written authority and prior agreement in writing as to prices, shall be at the Contractor's risk and will be considered unauthorized, and at the option of the Town of Addison may not be measured and paid for and may be ordered removed at the Contractor's

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

78. **DISPOSITION AND DISPOSAL OF MATERIALS:** All materials to be removed from the site including unsuitable spoil material, refuse and other debris shall become the property of the Contractor and shall be disposed of outside the limits of the project in accordance with state regulations. Contractor shall also comply with all applicable laws governing the spillage of debris while transporting to a disposal site.
79. **CONTRACTOR'S CONTINUING OBLIGATION:** Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by the Town of Addison, nor the issuance of a certificate of Substantial Completion, nor any payment by Town of Addison to Contractor under the Contract Documents, nor any use or occupancy of the Work or any part thereof by Town of Addison, nor any act of acceptance by Town of Addison nor any failure to do so, nor any review and approval of a Shop Drawing or sample submission, nor the issuance of a notice of acceptability by the Town of Addison pursuant to final payment nor any correction of defective Work by Town of Addison will constitute an acceptance of Work not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents.
80. **DURING CONSTRUCTION:** During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove same from any portion of the site if, in the opinion of the Town of Addison or the Engineer, such material, debris or rubbish constitutes a nuisance or is objectionable. In case of failure on the part of the Contractor to maintain a clean site, the Town of Addison may, upon 24 hour written notice, clean the site, and the cost thereof shall be deducted from any monies due or to become due to the Contractor under his contract; or where sufficient contract funds are unavailable for this purpose, the Contractor or his surety shall reimburse the Town of Addison for all such costs.
81. **TV INSPECTION OF WASTEWATER AND STORM DRAIN SYSTEMS:** Part of the final inspection of the wastewater and storm drain systems on this project shall include a closed circuit TV survey of the completed pipe installation, exclusive of services, and all imperfections in the installed facility revealed by the TV survey of the imperfections in the installed facilities revealed by the TV survey shall be remedied by the Contractor prior to acceptance of the project as complete. All TV survey work, including furnishing of necessary personnel, equipment and material shall be performed by the Contractor.
82. **RECYCLING OF ASPHALT AND CONCRETE:** Any existing asphalt or concrete pavement that is removed during the course of this project shall be recycled at a facility



approved by the Town of Addison. Proof of recycling of all asphalt and concrete from this project will be required from the Contractor.

83. **LAKE EDGE WALL:** The linear foot bid for “Lake Edge Wall” shall be all inclusive for the lake edge wall as shown on the structural drawings (reference sheet SP 301) including concrete piers and wall, concrete cap, #57 stone backfill material, filter fabric, water proof membrane, MDO form board and wall ties, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown. The lake edge wall and concrete cap shall receive a medium sand blast concrete finish, and shall match appearance with the mock-up established at the project site. The Engineer has estimated the following quantities for pier construction: 12” Diameter Pier – 2250 linear feet; 18” Diameter Pier – 630 linear feet. The Contractor shall verify or estimate his own quantities for pier construction and base his Linear Foot price for Lake Edge Wall accordingly.
84. **SITE RETAINING WALLS:** The linear foot bid for “Site Retaining Walls” shall be all inclusive for the retaining wall and footing, complete with medium sand blast concrete finish, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (reference sheet SP 300).
85. **SITE SCREENING WALLS:** The linear foot bid for “Site Screening Walls” shall be all inclusive for the CMU burnished block screening wall and pier footing, #57 stone backfill material and 4” diameter perforated perimeter drain pipe with filter fabric, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the structural drawings (reference sheet SP304) and on the architectural drawings (reference sheets L3-02 and L3-03).
86. **SITE SCREENING WALL WITH INTEGRAL RETAINING WALL:** The linear foot bid for “Site Screening Wall with Integral Retaining Wall” shall be all inclusive for the CMU burnished block screening wall with integral concrete retaining wall footing, #57 stone backfill material and 4” diameter perforated perimeter drain pipe with filter fabric, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the structural drawings (reference sheet SP304) and on the architectural drawings (reference sheets L3-02 and L3-03). Height of concrete retaining wall will vary. Reference sheet C303 for top and bottom elevation for concrete retaining wall.
87. **SOUTH PEDESTRIAN BRIDGE LANDINGS:** The lump sum bid for “South Pedestrian Bridge Landings” shall be all inclusive for structural concrete for piers, grade beams, upturned concrete benches, concrete slabs, backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on sheets L3-05 and SP 306 & SP308. The Engineer has estimated the following quantities for structural concrete construction: 12” Diameter Pier – 180 linear feet for both the east and west side landings; 1’ x 2’ concrete grade beam – 80 linear feet for both the east and west side landings; 1’-8” x 1’-6” concrete upturn bench – 50

linear feet for the east side landing and 40 linear feet for the west side landing; and 5" thick concrete slab (saw cut patterned, medium float finish) – 570 square feet for the east side and 470 square feet for the west side landing. The Contractor shall verify or estimate his own quantities for construction and base his Lump Sum price for South Pedestrian Bridge Landing (East Side) and South Pedestrian Bridge Landing (West Side) accordingly.

88. **FALSE WEIR STRUCTURE BENEATH PONTE BRIDGE:** The lump sum bid for “Weir Structure Beneath Ponte Ave. Bridge” shall be all inclusive for structural concrete for the weir walls, concrete cap, downstream splash and energy dissipation pad with 2" grouted beach pebble lining, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheet SP303/05 & 06). The Engineer has estimated the following quantities for structural concrete construction: 1' thick Concrete Wall – 1,500 square feet; 2' x 8'-9" Weir Wall – 70 linear feet; 2' x 1'-11 1/2" Weir Wall – 70 linear feet; 1'-3 1/2" x 3'-5 1/2" concrete Weir Cap – 71 linear feet; and 1' x 8'-9" Weir Wall – 70 linear feet. The Contractor shall verify or estimate his own quantities for pier construction and base his Lump Sum price for Weir Structure beneath Ponte Avenue Bridge accordingly.
89. **CONCRETE HANDICAP ACCESSIBLE RAMPS:** The lump sum bid for “Concrete Handicap Accessible Ramps” shall be all inclusive for structural concrete for piers, walls, and sidewalk ramps, hot dipped galvanized metal guard rails and handrails, backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheets SP 315 & 316 and L4-02, 03 & 31-33). The Engineer has estimated the following quantities for structural concrete construction: 12" Diameter Pier – 980 linear feet (west side) and 880 linear feet (east side); 8" x 2' concrete wall with guard rail and hand rail – 295 linear feet (west side) and 270 linear feet (east side); 8" x 5'-6" concrete wall – 20 linear feet (west side) and 10 linear feet (east side); 5" thick concrete sidewalk – 1,750 square feet (west side) and 1,610 square feet (east side); and 8" thick concrete wall – 2,110 square feet (west side) and 1,600 square feet (east side). Note that landscaping is not a part of this bid item. The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for Concrete Handicap Accessible Ramps accordingly.
90. **PONTE AVENUE BRIDGE STAIRCASES:** The lump sum bid for “Ponte Avenue Bridge Staircases” shall be all inclusive for structural concrete for piers, walls, and sidewalk ramps, hot dipped galvanized metal guard rails and handrails, backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheets SP 317 & 318 and L4-01 & L4-30). The Engineer has estimated the following quantities for structural concrete construction: 12" Diameter Pier – 320 linear feet (west and east sides); and concrete pier supported stairs – 95 linear feet (west and east sides). The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for Ponte Avenue Bridge Staircases accordingly.
91. **STONE VENEER TREATMENT OF EXISTING BRIDGE ABUTMENT WALLS:** The square foot bid price for “Stone Veneer Treatment of Existing Ponte Avenue Bridge

Abutment Walls” shall be all inclusive for applying stone veneer finish (Ref. Special Provision 115) to the existing abutment walls of the Ponte Avenue Bridge Structure, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings.

92. **SLOPE REINFORCEMENT IMMEDIATELY DOWNSTREAM OF PONTE BRIDGE:** The square yard bid price for “Slope Reinforcement Immediately Downstream of Ponte Bridge” shall be all inclusive and shall be full compensation for furnishing and installing 3’ diameter (minimum in all directions) cut limestone rock, complete with all grading and backfilling, and all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheet SP 302). The contractor shall provide a sample of the cut limestone at the site for approval by the Town for size, color and hardness of the chosen stone prior to installation.
93. **STRUCTURED STAIR SLOPE TREATMENT AT PONTE BRIDGE BETWEEN TRAIL AND LAKE EDGE WALL:** The lump sum bid for “Structured Stair Slope Treatment at Ponte Bridge between Trail and Lake Edge Wall” shall be all inclusive for structural concrete for grade beams, concrete stepped structure with stone veneer finish, concrete weir creek wall, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheet SP 303/01 and L4-04 & 34). The Engineer has estimated the following quantities for structural concrete construction: 1’-6” x 2’-6” concrete grade beam – 60 linear feet (east and west sides); 1’-6” x 3’-1” concrete grade beam – 180 linear feet (east and west sides); 1’-4” x 10’-6” concrete weir creek wall – 180 linear feet (east and west sides); and stepped concrete stair structure – 1,530 square feet (east and west sides). The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for Structured Stair Slope Treatment at Ponte Bridge” accordingly.
94. **TREE PRESERVATION WALL:** The lump sum bid for “Tree Preservation Wall” shall be all inclusive for structural concrete for piers, pilasters and walls, stone veneer finish, concrete cap, #57 stone backfill material and 4” diameter perforated perimeter drain pipe with filter fabric, backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheet SP 311 and 312). The Engineer has estimated the following quantities for structural concrete construction: 12” diameter concrete pier – 165 linear feet; 8” thick concrete wall – 550 square feet; 6” x 14” concrete cap – 89 linear feet; and additional 4” x 1’ concrete pilaster – 32 linear feet. The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for “Tree Preservation Wall” accordingly.
95. **FORD STRUCTURES TO ISLANDS:** The lump sum bid for “Ford Structures to Islands” shall be all inclusive for structural concrete for piers, pilasters and walls, slabs, and turndowns, trex deck surface treatment, hot dipped galvanized metal guard rails, backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheet SP 401, 402, 403 and 404). The Engineer has estimated the following quantities for

structural concrete construction: **Ford to Small Pedestrian Island:** 12” diameter concrete pier – 133 linear feet; 18” diameter concrete pier – 60 linear feet; 8” thick concrete wall – 230 square feet; 4” thick concrete slab – 215 square feet; 10” thick concrete slab – 110 square feet; 8” x 7” slab turn down – 57 linear feet; 8” x 1’ slab turn down – 18 linear feet, 1’ x 1’ concrete pilaster – 20 linear feet; and 1’-6” x 1’-6” concrete pilaster – 27 linear feet. **Ford to Large Pedestrian Island (West Side):** 12” diameter concrete pier – 120 linear feet; 18” diameter concrete pier – 96 linear feet; 8” thick concrete wall – 535 square feet; 4” thick concrete slab – 320 square feet; 10” thick concrete slab – 205 square feet; 8” x 7” slab turn down – 65 linear feet; 8” x 1’ slab turn down – 18 linear feet, 1’ x 1’ concrete pilaster – 15 linear feet; 1’-6” x 1’-6” concrete pilaster – 80 linear feet; and 12” x 18” concrete tie beam – 12 linear feet. **Ford to Large Pedestrian Island (East Side):** 12” diameter concrete pier – 182 linear feet; 18” diameter concrete pier – 52 linear feet; 8” thick concrete wall – 220 square feet; 4” thick concrete slab – 285 square feet; 10” thick concrete slab – 205 square feet; 8” x 7” slab turn down – 65 linear feet; 8” x 1’ slab turn down – 18 linear feet, 1’ x 1’ concrete pilaster – 15 linear feet; and 1’-6” x 1’-6” concrete pilaster – 35 linear feet. The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for “Ford Structure to Small Island” and “Ford Structure to Large Islands” accordingly.

96. **CONCRETE WEIR STRUCTURES UNDER FORD STRUCTURES:** The lump sum bid for “Concrete Weir Structures Under Ford Structures” shall be all inclusive for structural concrete for grade beams, concrete slab, concrete stepped structure with 2” grouted beech pebble finish, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheet SP 405 and L6-20 & 21). The Engineer has estimated the following quantities for structural concrete construction: 1’ x 2’ concrete beam – 22 linear feet (east and west side weir structures); 1’ x 2’-10” concrete beam – 23 linear feet (west weir) and 25 linear feet (east weir); 1’ concrete slab – 195 square feet ( both east and west side weir structures); and concrete stepping structure – 345 cubic feet (west side weir) and 375 cubic feet (east side weir). The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for “Concrete Weir Structures under Ford Structures” accordingly.
97. **GROTTO STAIRCASES:** The lump sum bid for “Grotto Staircases” shall be all inclusive for structural concrete for walls and sidewalk ramps, hot dipped galvanized metal guard rails and handrails, backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheets SP 318/05 & 06 and L9-02, 04, 10). The Engineer has estimated the following quantities for structural concrete construction: Concrete stairs – 55 linear feet (west and east sides). The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for Grotto Staircases accordingly.
98. **GROTTO FORD STRUCTURE:** The lump sum bid for “Grotto Ford Structure” shall be all inclusive for structural concrete for piers, pilasters and walls, slabs, and turndowns, trex deck surface treatment, hot dipped galvanized metal guard rails, backfilling and grading, and

shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheet SP 406 & 407 and L9-02, 03 & 13). The Engineer has estimated the following quantities for structural concrete construction: 12” diameter concrete pier – 70 linear feet; 18” diameter concrete pier – 131 linear feet; 8” thick concrete wall – 265 square feet; 4” thick concrete slab – 135 square feet; 10” thick concrete slab – 425 square feet; 8” x 7” slab turn down – 27 linear feet; 8” x 1’ slab turn down – 18 linear feet, 1’ x 1’ concrete pilaster – 15 linear feet; and 1’-6” x 1’-6” concrete pilaster – 28 linear feet. The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for “Grotto Ford Structure” accordingly.

99. **GROTTO STRUCTURE:** The lump sum bid for “Grotto Structure” shall be all inclusive for structural concrete for piers, pilasters, walls, grade beams, concrete overhangs, fountain beams and column structures, wing wall footings, subsoil drainage system backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheets SP 308, 319 & 321 and L9-02, 03, 04, 10, 11, 12, 15 & 16). The Engineer has estimated the following quantities for structural concrete construction: 18” Diameter Pier – 445 linear feet; 24” Diameter Pier - 1,135 linear feet; 1’ x 1’-6” concrete grade beam – 56 linear feet; 1’ thick concrete wall – 1,525 square feet; 1’ x 15’-3” concrete wall – 48 linear foot; 2’ x 2’-7 ½” concrete pilaster – 350 linear feet; 2’-6” wide and 6” thick concrete slab overhang – 56 linear feet; fountain structure – 250 square feet; 1’-3” thick concrete win walls – 440 square feet; and 3’ x 11’-3”x 2’ wing wall footings – 5 each. The Contractor shall verify or estimate his own quantities for structural concrete construction and base his Lump Sum price for “Grotto structure” accordingly.
100. **WILDLIFE OBSERVATION DECK:** The lump sum bid for “Wildlife Observation Deck” shall be all inclusive for structural concrete for piers, walls and cap, structural steel, trex deck surface treatment, hot dipped galvanized metal guard rails, stone veneer finish, #57 stone backfill material with filter fabric, access hatch and latter, backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheets SP 310 & 312 and L5-01 to L5-05). The contractor is to calculate his own quantities and base his lump sum bid price accordingly.
101. **BELVEDERE:** The lump sum bid for “Belvedere” shall be all inclusive for structural concrete for piers, pilasters, concrete walls, upturned concrete benches, concrete slabs, concrete cap, #57 stone backfill material, filter fabric, water proof membrane, MDO form board and wall ties, backfilling and grading, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheets SP 313 & 314 and L7-01 to L7-04). The Engineer has estimated the following quantities for structural concrete construction: 12” Diameter Pier – 380 linear feet; 24” Diameter Pier - 480 linear feet; 8” thick concrete wall – 620 square feet; 2’-2” x 1’-6” concrete bench – 26 linear foot; 2’-2” x 2’ concrete pilaster – 25 linear feet; and 8” thick concrete slab – 958 square feet. Note that light poles and fixtures, tree and landscape area, and drainage catch basins and piping are not included in this bid item. The

contractor is to calculate his own quantities and base his lump sum bid price for “Belvedere” accordingly.

102. **INTERACTIVE FOUNTAIN:** The lump sum bid for “Ponte Avenue Bridge Abutment Walls” shall be all inclusive for all structural, mechanical, electrical, plumbing, subsurface vaults and controls, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings (Ref. Sheets I101, S201, M112-118, E101 & D101-104). The contractor is to calculate his own quantities and base his lump sum bid price accordingly.
103. **RESTROOM/CONCESSIONS BUILDING:** The lump sum bid for “Restroom/Concessions Building” shall be all inclusive for structural, mechanical, electrical, plumbing and fire protection, chemical injection for foundation, electric service conduit and conductor, and shall be full compensation for furnishing all labor, tools, equipment, materials, and incidentals necessary to complete the work as shown on the drawings. The contractor is to calculate his own quantities and base his lump sum bid price accordingly.
104. **PHASING OF CONSTRUCTION:** Two additional phases of construction relating to the Vitruvian Park project (Phase 1B – Infrastructure Construction and Phase 1D – Bridge Construction) have been bid and will be under construction in concurrence with this phase of construction. The construction of the park and streetscape improvements will require coordination and proper staging in order to complete the proposed work. It is of the utmost importance that the Contractors for each of these projects work together to that end. The bridge Contractors’ limit of work will be the bridge abutments on both sides of the bridge structure. The Contractor for this phase of work (Phase 1C) will have to coordinate construction with that of the bridge Contractor and may not be able to complete his work until the bridges are substantially complete. Construction of streetscape improvements along Vitruvian Way, Ponte Avenue and the Park Entrance Road will require coordination with the Contractor for Phase 1B. In addition, the Phase 1 North Building Site will soon be under construction and it will be imperative that this contractor work closely with the Contractors for that project.
105. **BID “ADDITIVE ALTERNATES:** Bid “additive alternates” have been established for several items as follows: “Add alternate” number 1 will be the “Wildlife Observation Deck”. “Add alternate” number 2 will be the “Belvedere”. “Add alternate” number 3 will be the “Interactive Fountain”. “Add alternate” number 4 will be the “Restroom / Concessions Building”. The Town of Addison reserves the right to accept or reject each “add alternate bid” item.
106. **INSTRUCTIONS TO COMMENCE:** The Contractor shall commence with the installation of hardscape and landscape improvements along Vitruvian Way within 14 days of any written request from the Town of Addison directing them to do so.
107. **CONTRACTOR EXPERIENCE WITH FLOODPLAINS:** The Contractor must have previous experience with working in FEMA floodplain areas that have flows exceeding

2,000 cubic feet per second during a 100 year storm event. Lack of prior creek experience shall be justification for the Town to reject the bid.

**108. LIGHT FIXURE SCHEDULE:**

**SA1**

Manufacturer (2) ABS 5700-XSM-70MC-240-EL-YMS-CD-CC/(1) ABS 5700-XSW-70MC-240-RL-YMS-CD-CC  
AMERON MER - 7.5 – FINISH MOUNT – OPTS  
Voltage 240  
Number 3  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks THREE DIRECTIONAL FIXURES MOUNTED TO 24'-0" CONCRETE POLE

**SA2**

Manufacturer (2) ABS 5700-XSM-70MC-240-EL-YMS-CD-CC  
AMERON MER - 7.5 – FINISH MOUNT – OPTS  
Voltage 240  
Number 2  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks TWO DIRECTIONAL FIXURES MOUNTED TO 24'-0" CONCRETE POLE

**SA3**

Manufacturer (2) ABS 5700-XSW-70MC-240-EL-YMS-CD-CC/(1) ABS 5700-XSM-70MC-240-RL-YMS-CD-CC  
AMERON MER - 7.5 – FINISH MOUNT – OPTS  
Voltage 240  
Number 3  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks TWO DIRECTIONAL FIXURES MOUNTED TO 24'-0" CONCRETE POLE

**SA4**

Manufacturer (2) ABS 5700-XSW-70MC-240-EL-YMS-CD-CC/(2) ABS 5700-XSM-70MC-240-EL-YMS-CD-CC  
AMERON MER - 7.5 – FINISH MOUNT – OPTS  
Voltage 240  
Number 4  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks FOUR DIRECTIONAL FIXURES MOUNTED TO 24'-0" CONCRETE POLE

**SA5**

Manufacturer (3) ABS 5700-XSW-70MC-240-EL-YMS-CD-CC/(1) ABS 5700-XSM-70MC-240-EL-YMS-CD-CC  
AMERON MER - 7.5 – FINISH MOUNT – OPTS  
Voltage 240  
Number 4  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks FOUR DIRECTIONAL FIXURES MOUNTED TO 24'-0" CONCRETE POLE

**SA6**

Manufacturer (3) ABS 5700-XSW-70MC-240-EL-YMS-CD-CC  
AMERON MER - 7.5 – FINISH MOUNT – OPTS  
Voltage 240  
Number 3  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks THREE DIRECTIONAL FIXURES MOUNTED TO 24'-0" CONCRETE POLE

**SA7**

Manufacturer (2) ABS 5700-XSM-70MC-240-EL-YMS-CD-CC  
AMERON MER - 7.5 – FINISH MOUNT – OPTS  
Voltage 240

Number 2  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks TWO DIRECTIONAL FIXURES MOUNTED TO 24'-0" CONCRETE POLE

**SA8**

Manufacturer (1) ABS 5700-XSW-70MC-240-EL-YMS-CD-CC/(1) ABS 5700-XSM-70MC-240-EL-YMS-CD-CC  
AMERON MER - 7.5 – FINISH MOUNT – OPTS  
Voltage 240  
Number 2  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks TWO DIRECTIONAL FIXURES MOUNTED TO 24'-0" CONCRETE POLE

**SB**

Manufacturer BEGA 8304MH-SLV / 0708HR-SLV  
Voltage 240  
Number 1  
Lamp 70W T6 G12 CDM  
Mounting POLE MOUNT  
Remarks PEDESTRIAN POLE ON BELVEDERE

**SC**

Manufacturer BEGA 2298P-SLV  
Voltage 240  
Number 1  
Lamp CF26/DT/E/IN/830  
Mounting WALL SURFACE  
Remarks SURFACE STEPLIGHT

**SE**

Manufacturer TIVOLI LSX-B-36-3 CLEAR-C-24AC  
Voltage 24V  
Number 1  
Lamp 3W 24V AC XENON/3"  
Mounting SUSPENDED STRAND  
Remarks SUSPENDED STRAND LIGHTING FOR OBSERVATION PLATFORM AND SMALL BRIDGE

**SE-1**

Manufacturer TIVOLI TWS1G1224 / SC5005424A  
Voltage 24V  
Number 30 STRANDS WITH 3-QTRAN XFERS  
Lamp 0.90W/24VAC ON 12",CLEAR LENS CAPS, 40' PER STRAND  
Mounting SUSPENDED STRAND  
Remarks SUSPENDED STRAND LIGHTING FOR OBSERVATION PLATFORM AND SMALL BRIDGE

**SE-T**

Manufacturer QTRAN QOM-150ST-240-24-1/5-BK  
Voltage 240/24V  
Mounting SURFACE  
Remarks TRANSFORMER FOR SUSPENDED STRAND LIGHTING FOR OBSERVATION PLATFORM AND SMALL BRIDGE

**SK1**

Manufacturer BK LIGHTING RA-X-SAP-10-11-B-BCI-SAP  
Voltage 120  
Number 1  
Lamp USHIO ULTRA 20MR16/40  
Mounting SURFACE MOUNT  
Remarks TRELIS COLUMN DOWNLIGHTS

**SK2**

Manufacturer BK LIGHTING RA-X-SAP-10-11-B-BCI-SAP  
Voltage 120  
Number 1



Lamp	USHIO ULTRA 50MR16/40
Mounting	SURFACE MOUNT
Remarks	TRELLIS COLUMN DOWNLIGHTS

**L4**

Manufacturer	BEGA 9701MH-SLV-MOD-70MH-INTEGRAL BALLAST / 0908HR-SLV
Voltage	240
Number	1
Lamp	70W ED-17 MH/C
Mounting	POLE MOUNT
Remarks	ESPLANADE LEVEL SINGLE PEDESTRIAN POLE – 9’-8”

**L5**

Manufacturer	DAYBRITE VFN-26-C-U-C-LP-PG
Voltage	120
Number	1
Lamp	CF26/E/IN/735
Mounting	SURFACE MOUNT
Remarks	ESPLANADE LEVEL SINGLE PEDESTRIAN POLE – 9’-8”

- 109. STONE VENEER:** A mock-up of the selected stone veneer finish has been constructed at the project site representing the look that is to be achieved throughout this project. This Contractor shall also be required to construct a 4’ x 4’ mock-up of the stone veneer finish on site for assuring compliance with the design standard that has been chosen. Stone specifications for the Blue/Green Chinese Stone Veneer are as follows:

Veneer Thickness	3 CM
Veneer Finish	Thermal
Veneer Edges	All Four Sides to be Saw Cut
Veneer Height	All Stones to be 4”
Veneer Length	All Radius Walls – 6”, 8” and 12” Flat Surface – 8”, 13” and 21”
Mortar	Dark Gray
Coursing	To Match the on Site Mock-up

- 110. CREEK DIVERSION:** The Contractor shall prepare a creek diversion plan for approval by the Town and/or Engineer prior to starting construction within the banks of the existing creek. The plan should include methods for dewatering of the creek, rock check dams, sedimentation basins, by-pass piping, pumps and/or other methods of carrying out his plan for working within the creek. The Contractor shall be held solely responsible for damages upstream and downstream of the project site from flooding and/or the release of sediment caused by the Contractors methods of diversion.

- 111. IRRIGATION QUANTITIES:** The quantities shown for irrigation piping, heads, wiring, etc. are approximate. The Contractor is to calculate his own quantities and base his bid price accordingly to complete the work as shown on the drawings.

- 112. CLAIMS FOR DAMAGES OR INJURY:** Item 1.24.3 – Small Claims for Damage or Injury” is amended to read as follows: If any person files a claim against the Town of Addison or Contractor for personal injury or property damage resulting from, arising out of, or caused by, the operations of the Contractor, or any work within the limits of the project,

the Contractor must either submit to the Town of Addison, a duly executed full release within thirty (30) days from the date of written claim, or immediately report the claim to his liability insurance carrier for their action in adjusting the claim. If the Contractor fails to comply with this provision within the stipulated time limit, it will be automatically deemed that the Contractor has appointed the Town as its irrevocably Attorney-In-Fact authorizing the Town to report the claim directly with the liability insurance carrier. This provision is in and of itself a Power-of-Attorney from the Contractor to the Town which authorizes the Town to take said action on behalf of the Contractor without the necessity of the execution of any other document. If the Contractor fails to comply with the provisions of this item the Town, at its own discretion, may terminate this contract or take any other actions it deems appropriate. Any payment or portion thereof due the Contractor, whether it is a final payment, progress payment, payment out of retainage or refund payment may be withheld by the Town as is authorized by Item 1.52. Bankruptcy, insolvency or denial of liability by the insurance carrier shall not exonerate the Contractor from liability.

As a result of the additional work created to Town of Addison due to un-responded claims for damages by Contractor to third parties, Contractor shall incur penalties for failure to abide by this Special Provision.

In accordance with the obligations set forth in Special Provision Item 1.24.3, Contractor shall respond to the claimant in writing regarding the status of the claim, including whether Contractor disputes the claim, wishes to settle, or will notify its liability insurance carrier regarding the claim. Contractor will be assessed a penalty by the Town of \$75.00 per claim, for its failure to respond to the claimant as described above within thirty days of its written notice of claim by the Town.

To ensure Contractor compliance, the Town of Addison shall be notified, by copied correspondence of responses or settlement by Contractor.

113. **MECHANICS AND MATERIALMEN'S LIEN:** The Contractor shall be required to execute a release of mechanics and materialmen's liens upon receipt of payment.
114. **WAIVER OF CLAIMS:** The making and acceptance of final payment will constitute:
  - A. A waiver of all claims by Town of Addison against Contractor, except claims arising from unsettled Liens, from defective Work appearing after final inspection or failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by Town of Addison of any rights in respect of Contractor's continuing obligations under the Contract Documents.
  - B. A waiver of all claims by Contractor against Town of Addison other than those previously made in writing and still unsettled.
115. **CONTRACTOR'S AFFIDAVIT OF BILLS PAID:** The Contractor shall be required to execute the form provided in Section BP prior to the acceptance of the project.
116. **CLEAN-UP FOR FINAL ACCEPTANCE:** The Contractor shall make a final cleanup of all parts of the work before acceptance by the Town of Addison. This cleanup shall include

removal of all objectionable rock and other construction materials, and in general preparing the site of the work in an orderly manner and appearance.

- 117. PROJECT RECORD DOCUMENTS:** The Contractor shall maintain record drawings and legibly annotate shop drawings to record changes made after review. A red felt-tip marking pen shall be used for all recording.

Maintenance of Documents. The Contractor shall maintain at the job site one record copy of the Contract Drawings, Specifications, Shop Drawings, Change Orders, other modification to the Contract, field test records and other documents submitted by Contractor in compliance with specification requirements. These documents shall be maintained at the job site apart from documents used for construction. These documents are not to be used for construction purposes. The documents shall be maintained in clean, legible condition. The documents shall be made available at all times for inspection by the Town.

Recording. Each document shall be labeled Project Record Copy in 2-inch high printed letters. The record documents shall be kept current. No work shall be covered until required information has been recorded.

Contract Drawings. The appropriate drawing shall be legibly marked to record, where applicable:

- A. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
- B. Field changes of dimension and detail made during construction process.
- C. Changes made by Change Order or Supplemental Agreement.
- D. Details not on original Contract Drawings.
- E. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
- F. Changes made by Change Order or Supplemental Agreement.
- G. Other matters not originally specified.

Shop Drawing. The Contractor shall maintain the Shop Drawings as record drawings and legibly annotate shop drawings to record changes made after review.

Submittal. At the completion of the project, the Contractor shall deliver record drawings to the Town. The transmittal letter shall be accompanied, in duplicate, with:

- A. Date, project title and number.
- B. Contractor's name and address.

- C. Title and number of each record document.
- D. Certification that each document as submitted is complete and accurate.
- E. Signature of Contractor or his authorized representative.

**118. LANDSCAPE MAINTENANCE PROGRAM:** The Contractor will be responsible for Landscape Maintenance for a period of one (1) year beginning at the time of approval and acceptance of the overall park project. All work is to be performed within the scope of these specifications and shall be strictly managed, executed and performed by experienced personnel using only sound horticultural and irrigation practices. Landscape Maintenance shall include the complete care of all planted trees, shrubs, turf, groundcover and irrigation within the limits of this project. The Contractor shall provide all materials, equipment and labor required and/or inferred to perform all tasks identified within these specifications including watering, fertilization, pruning, spraying pesticides, weeding, herbicide applications, bed cultivation, edge trenching, mowing, edging, line trimming, irrigation checks and repairs in all landscape areas, litter removal (including dog waste), all turf areas and all tree wells, over seeding, color change-outs, and aerification of all turf areas monthly during the growing season.

A. GENERAL

1. GUARANTEE: The Contractor shall replace, at Contractor's expense, all plant material, that in the opinion of the Town, fails to maintain a healthy, vigorous condition **as a result of the Contractor's failure to perform the work specified herein.** It is the responsibility of the Contractor to notify the Town of any conditions beyond the control of the Contractor or scope of work of these specifications that may result in the damage and/or loss of plant material. This responsibility includes, but is not limited to notifying the Town of the following:

- a. Damage by others to the irrigation system.
- b. Vandalism and/or other abuse of the property that results in damage to the plant material.
- c. Areas of the site that continually hold water or are excessively wet.
- d. Areas of the site that appears too dry.

**Note: the Contractor shall be responsible for notifying the Town verbally immediately upon observation, and in writing on a weekly basis, of conditions where the site is too wet or too dry. This shall also apply to damaged irrigation and vandalism.** The Contractor shall list any such items on the Landscape Management Report, along with recommended solutions and related cost. Failure of Contractor to report such items shall cause Contractor to incur full responsibility and cost for repair of such items.

2. SCHEDULING:

- a. Timing: The Town shall determine scheduling of maintenance visits based on input from the Contractor. The Town shall be contacted 48 hours ahead of time when service cannot be performed on schedule and an alternate time shall be determined.
- b. Alterations: The Town may at any time request alterations to the general maintenance service provided that the Contractor can accomplish the request without additional equipment, labor or man-hours.

3. LANDSCAPE MAINTENANCE INSPECTION:

- a. Weekly Inspections by the Contractor: The Contractor shall be responsible for a weekly inspection of the entire property in the company of a Town designated representative and for the performance of all items required and referred to in these specifications.
- b. Monthly Inspections by the Town of Addison: The Town shall perform monthly inspections with the Contractor to review compliance with the specifications and to identify problem areas.
- c. Landscape Maintenance Report: The Contractor shall be responsible for notifying the Town via the Landscape Maintenance Report of any problems. This worksheet must be left at the offices of the Town Parks Department on the day of the maintenance. Faxed copies with a signature are acceptable. **The Contractor shall not be paid for work reflected on that week's maintenance visit if these forms are not received by the Town.** These items are very important in protecting both the Town and the Contractor when discrepancies arise. Any items not called to the attention of the Town that result in any damage to the property shall fall under the liability of the Contractor.
- d. Frequency Chart: all items listed on the Maintenance Frequency Chart must be executed as specified unless an alternate schedule is approved by the Town in writing. If the Contractor does not perform any item listed, that item shall then be deducted from that month's billing.

4. ADDITIONAL REQUIRED CONTRACTOR REPORTING:

- a. Pesticide Application Reports: Written notification and posting of Chemical Application, by law, must occur within forty-eight (48) hours of application. All such notifications must conform to the State of Texas Structural Pest Control Board (SPCB) requirements. A completed Chemical Application Report shall be submitted to the Town within forty-eight (48) hours following all pesticide or fertilizer applications. This report shall contain pertinent weather condition, exact time of application, chemicals and dilution rates used, as well as, the signature of the applicator involved. Pesticide applications shall comply with all laws and regulations of the State of Texas Structural Pest Control Board. For

fertilization reporting, always include the total number of pounds of fertilizer applied and indicate an approximate percentage of completion, if activity is not completed within a single day.

- b. Irrigation Reports: All irrigation system inspections shall include an Irrigation Report submitted to the Town within twenty-four (24) hours following the completion of each inspection. This report shall contain the following information:
  - 1. Inspection date and duration, in time, of the inspection.
  - 2. List by controller and zone number repairs made or problems found.
  - 3. Status of controller program after completion (on, off, rain mode, etc.). **All controller programming shall be done by and coordinated through a Town Parks Irrigation technician.**
  - 4. Repairs or replacement performed due to Contractor damage.
- c. Required Notifications: The Contractor shall notify the Town by phone at least forty-eight (48) hours in advance of the performance of the following activities:
  - 1. Pesticide or fertilizer applications.
  - 2. Seasonal color changes.
  - 3. Irrigation system inspections.
- d. Systems requiring immediate notification to the Town by the Contractor include:
  - 1. All situations concerning safety, health or property damages.
  - 2. All situations involving issues with electric or water utilities where an immediate response is needed.
  - 3. Changes to the Contractor's schedule.

##### 5. CONTRACTOR'S GENERAL PERFORMANCE:

- a. Personnel Requirements:
  - 1. All maintenance personnel shall be uniformed and generally neat in appearance.
  - 2. An English-speaking foreman must be present on site at all times.
  - 3. Appropriate safety equipment shall be utilized at all times.
  - 4. All lunch and break periods taken by maintenance personnel shall be within areas approved by the Town.
  - 5. While on site, all personnel must behave in a professional manner.
  - 6. Contractor shall have emergency response personnel available 24 hours per day, seven days per week. Contractor shall provide Town with "after hour" contact names and numbers.
- b. Maintenance and Support Equipment
  - 1. Only the appropriate equipment, in proper working order, shall be utilized for maintenance operations.
  - 2. Repair, servicing or fueling of equipment is not permitted within landscape areas.

3. Equipment shall be operated in a safe and effective manner at all times.
4. Mower blades shall be sharp and set to the proper heights.

## B. PRODUCTS

### 1. FERTILIZER: ORNAMENTAL TREES, SHRUBBERY, GROUNDCOVER AND VINES:

- a. Fertility Applications: Shrubs shall be maintained and fertilized to be healthy and vigorous. Fertility is scheduled for three (3) applications per year and as necessary in between scheduled applications to maintain health and vigor. The Contractor shall use only the highest-grade slow release fertilizer with a high micro nutrient package. Coverage shall include 1 lb. of nitrogen per 1,000 sq. ft.
- b. Fertilizer: the Contractor shall use Lesco brand fertilizer or its equivalent that has a full minor nutrient package. 15-5-10 element percentage (3-1-2 ratio) with a minimum 7% sulfur and 4% iron plus trace elements. Nitrogen source to be at least 50% slow release urea formaldehyde (UF) or sulfur coated urea (SCU). The Contractor shall return empty bags of fertilizer to verify quantities applied.
- c. Seasonal color and bulbs shall be fertilized using blood meal at recommended rates.

### 2. HERBICIDES: Turf areas, ornamental beds and mulched area weed control to include:

- a. Post-emergent weed control: as needed.
- b. Pre-emergent weed control; the Contractor shall control weeds with a year-round pre-emergent program.
- c. Pre-emergent application shall not be combined with fertilization unless approved by the Town.
- d. All herbicides must be approved for use by the Town.

### 3. PESTICIDES:

- a. Provide as needed for safe control of insect and/or disease problems.
- b. All pesticides must be approved for use by the Town.

### 4. MULCH:

- a. Landscape Beds: Twice ground premium grade shredded hardwood bark mulch as supplied by Living Earth Technology Co., or approved equal. Apply 1 time per year in March/April and additional applications monthly as needed to touch up areas. Maintain mulch (2) two inches thick at all times. **The Town shall inspect the quality of the mulch prior to distribution.**

- b. Trenching of curbs and sidewalks prior to mulching will take place, which is to include all hard surfaces.

C. EXECUTION:

1. IRRIGATION SYSTEM AND WATERING

- a. Irrigation System Inspection and Maintenance
  1. Inspection by the Town's representative and the Contractor's **licensed irrigation technician** shall be performed on all zones of irrigation in accordance with the annual schedule of activities. Controllers shall be manually operated and a visual inspection performed to verify proper operation of all system components.
  2. Maintenance and repair activities to be performed as needed include:
    - a. Head height adjustments.
    - b. Head repair, including nipples, and replacements.
    - c. Unclogging, adjustment and replacement of nozzles.
    - d. Adjustments to flow control devices on electric valves.
    - e. Replacement of damaged and missing valve box covers.
    - f. Adjustments to irrigation controller settings or programs (coordinated with the Town).
    - g. Elimination of any pests such as ants, spiders or mice from controller cabinets and valves, DCA and meter boxes.
    - h. Repair lateral lines and fittings.
    - i. Repair mainline piping, valves, and wiring not outlined in 'a-g' above based upon a time and materials basis. Note: No mark up of wholesale prices of materials is allowed.
  3. Only irrigation repairs of the highest quality will be accepted. This includes renovation of disturbed landscape/turf areas to their existing condition.
  4. Repairs found to be needed outside the scope of inspection, maintenance, and repairs shall be reported to the Town immediately. A cost estimate for such repairs must be supplied to the Town's representative for approval prior to commencement of work.
  5. All damages to irrigation system components caused by the Contractor's operations shall be repaired immediately.
  6. All repair work must be performed by an individual licensed in the State of Texas as a repair technician or irrigator.
- b. Irrigation System – Controller Programming.
  1. The Contractor shall make recommendations for controller programming as conditions warrant.
  2. Controller programs shall take into consideration specific site conditions as well as seasonal needs and anticipated weather conditions.



3. Landscape areas should receive an inch to an inch and one half of water, including rain, per week. Precipitation rate of the sprinkler heads is as follows:
  - a. Rotary heads approximately 1/3 I.P.H.
  - b. Spray heads approximately 1 I.P.H.
4. The Contractor shall provide the Town with written documentation of initial irrigation program, updating this program when changes are made.
5. The Contractor is responsible for coordinating with the Town representative, all required manual operations of irrigation controllers, such as turning off controllers prior to freezing or rainy periods, as well as the adjustments required in conjunction with chemical and fertilization applications. A rainy period will be defined as one (1) day of continuous rain or two inches (2") of rainfall within 24 hours and freezing conditions shall be actual or forecasted temperatures of 40 degrees or less.
- c. Tree Watering:
  1. Hand water trees as needed. Water those trees showing heat or drought stress. Be alert to over watering and discontinue applications if required.
  2. Areas needing supplemental hand watering due to irrigation malfunction or extreme drought conditions shall be watered by the Contractor on an as needed basis.
- d. Shrub and Groundcover Watering:
  1. Monitor and notify the Town's representative, in writing, of needed adjustments.

## 2. FERTILIZER:

- a. Trees:
  1. Fertilize all trees two (2) times per year in September and March according to the following specifications:
    - a. One 40-pound bag of ARBOR-GREEN fertilizer as manufactured by Lesco, Inc., per 200 gallons of water.
    - b. One gallon of Chelated Micro-Mix, as manufactured by Lesco, Inc., per 200 gallons of water.  
These two products shall be mixed together in a tank no smaller than 200 gallon capacity. The tank shall have mechanical agitation. The pump shall be able to supply a minimum operating pressure of 150 psi.
    - c. The solution shall be applied to the trees at a rate of one gallon per caliper inch. Injections shall be made every 36" equally spaced around the drip line of the tree or according to the manufacturer recommendation.
- b. Shrubs and Groundcover:
  1. Fertilize all shrub and groundcover beds in March, June and September with a 3:1:2 ratio fertilizer with iron and sulfur at 1.0

pounds of actual nitrogen per 1,000 sq. ft. of application. The nitrogen source shall be at least 50% slow release urea formaldehyde (UF) or sulfur coated urea (SCU).

c. Turf:

1. Fertilize turf areas in April, June, and August with a 3:1:2 ratio fertilizer with iron and sulfur at 1.0 pounds of actual nitrogen per 1,000 sq. ft. of application. The Nitrogen source shall be at least 50% slow release urea formaldehyde (UF) or sulfur coated urea (SCU). **Fertilizer ratios are subject to change and shall be pre-approved by the Town Parks Department.**

3. PRUNING:

a. Shade and Ornamental Trees

1. Tree Care Pruning: Winter pruning shall be done during January. At this time, the Contractor shall remove all diseased, dead or dying branches. Additionally, crossing branches not consistent with standard form, low hanging or broken limbs (heading up) posing a safety hazard, and limbs promoting poor light and air penetration shall be removed/thinned by the Contractor. Red Oaks and Live Oaks shall not be pruned during the months of February through July. Pruning techniques shall be in accordance with the latest edition of **Tree Pruning Guidelines published by the International Society of Arboriculture and the American National Standards (A.N.S.I.) A300 – Pruning Standards**. Broken limbs, dead wood, suckers and water sprouts shall be removed as detected and such removal is authorized at any time. If such removals are on oaks during the months of February through July, a pruning paint must be applied to all cuts.
2. When pruning, the Contractor shall make no flush cuts or apply pruning paint to cuts.

b. Shrubs:

1. Prune all shrubs and ground covers as needed to encourage healthy growth and to create a natural appearance based upon the plant placement and plant growth.

c. Groundcovers:

1. Trim edges of beds and any errant growth as needed during the growing season. DO NOT use line edgers to trim groundcovers. DO NOT trim vertically. Cut at a 45-degree angle.

4. PESTICIDES: Provide insect, fire ant and disease control on an as needed basis. Pesticides shall be applied by a licensed applicator. Supply the Town with written (48) hour notice prior to any applications. Follow SPCB guidelines.

5. **HERBICIDES:** Supply the Town with (48) hour written notice prior to any applications. Follow SPCB guidelines. **All pesticides and herbicides shall be applied by a Texas Structural Pest Control licensed applicator.**
  - a. Pre-emergent: The Contractor shall control weeds with a year-round pre-emergent program.
  - b. Post-Emergent: Apply post-emergent herbicide according to label instructions, as needed, to control weeds in beds, lawns, walks, paver areas, curb lines and mulched areas. All herbicides to be used must be approved by the Town.
  - c. All liquid herbicide applications shall contain a water-soluble dye (blue or green) used in strength adequate for visual verification. Care shall be taken to avoid excessive overspray of dyed solutions onto walks, curbs, walls, signs or other features. Any overspray shall be removed from these areas immediately.
  - d. All post-emergent herbicides shall be applied with a suitable surfactant additive mixed uniformly in solution.
  - e. Use chemical and/or mechanical means to maintain all pavement lines and cracks in a weed-free condition.
6. **FIRE ANT CONTROL:**
  - a. All beds and mulch areas shall receive one spring application of 'Top Choice' fire ant control according to the product label.
7. **MULCHING/TRENCHING:** Mulch all shrub beds to maintain a 2-inch depth of shredded hardwood bark mulch and/or cedar mulch. Shrub bed mulching shall occur in early spring (March-April). Mulch is to be spread such that none of the previously laid mulch is visible. Mulch shall be maintained so that no bare areas of soil are visible at any time.
8. **WEEDING/CULTIVATING:** Remove weeds as needed to maintain all areas in a weed free condition. Cultivate beds only prior to application of pre-emergent herbicide. **DO NOT** cultivate beds after pre-emergent herbicide has been applied.
9. **LITTER CONTROL:** (Includes Dog Waste): The Contractor shall be responsible for picking up trash (including dog waste) during each site visit. Trash receptacles shall be emptied and relined during each visit.
10. **WINTER OVERSEEDING:** The Contractor shall be responsible for over seeding the park with an approved blend of perennial rye grass seed. Over seeding shall be performed during the third week of September.
11. **MOWING:** The Contractor shall be responsible for mowing Vitruvian Park approximately 52 times during the year.

12. TURF AERIFICATION: All turf areas shall be aerified monthly during the growing season (4 times per year) utilizing walk-behind core-type units.

119. TOWN OF ADDISON APPROVAL: This project is subject to final approval and acceptance by the Town of Addison. Final approval acceptance will not be given until the punch list items are completed to the Town's satisfaction and as-built drawings are given to the Town of Addison.

## PREVAILING WAGE RATES

GENERAL DECISION: TX20080043 02/08/2008 TX43

Date: February 8, 2008

General Decision Number: TX20080043 02/08/2008

Superseded General Decision Number: TX20070045

State: Texas

Construction Types: Heavy and Highway

Counties: Collin, Dallas, Denton, Ellis, Grayson, Johnson, Kaufman, Parker, Rockwall, Tarrant and Wichita Counties in Texas.

HEAVY AND HIGHWAY CONSTRUCTION PROJECTS IN WICHITA COUNTY ONLY.  
HIGHWAY CONSTRUCTION PROJECTS ONLY FOR REMAINING COUNTIES.

Modification Number	Publication Date
0	02/08/2008

	Rates	Fringes
Air Tool Operator.....	\$ 10.06	0.00
Asphalt Distributor Operator...	\$ 13.99	0.00
Asphalt paving machine operator	\$ 12.78	0.00
Asphalt Raker.....	\$ 11.01	0.00
Asphalt Shoveler.....	\$ 8.80	0.00
Batching Plant Weigher.....	\$ 14.15	0.00
Broom or Sweeper Operator.....	\$ 9.88	0.00
Bulldozer operator .....	\$ 13.22	0.00
Carpenter.....	\$ 12.80	0.00
Concrete Finisher, Paving.....	\$ 12.85	0.00
Concrete Finisher, Structures..	\$ 13.27	0.00
Concrete Paving Curbing Machine Operator.....	\$ 12.00	0.00
Concrete Paving Finishing Maching Operator.....	\$ 13.63	0.00
Concrete Paving Joint Sealer Operator.....	\$ 12.50	0.00
Concrete Paving Saw Operator...	\$ 13.56	0.00
Concrete Paving Spreader Operator.....	\$ 14.50	0.00
Concrete Rubber.....	\$ 10.61	0.00
Crane, Clamshell, Backhoe, Derrick, Dragline, Shovel Operator.....	\$ 14.12	0.00
Electrician.....	\$ 18.12	0.00
Flagger.....	\$ 8.43	0.00
Form Builder/Setter, Structures	\$ 11.63	0.00
Form Setter, Paving & Curb.....	\$ 11.83	0.00
Foundation Drill Operator, Crawler Mounted.....	\$ 13.67	0.00
Foundation Drill Operator, Truck Mounted.....	\$ 16.30	0.00
Front End Loader Operator.....	\$ 12.62	0.00
Laborer, common.....	\$ 9.18	0.00
Laborer, Utility.....	\$ 10.65	0.00
Mechanic.....	\$ 16.97	0.00
Milling Machine Operator, Fine Grade.....	\$ 11.83	0.00
Mixer operator.....	\$ 11.58	0.00
Motor Grader Operator, Fine Grade.....	\$ 15.20	0.00
Motor Grader Operator, Rough...	\$ 14.50	0.00
Oiler.....	\$ 14.98	0.00
Painter, Structures.....	\$ 13.17	0.00
Pavement Marking Machine Operator.....	\$ 10.04	0.00
Pipelayer.....	\$ 11.04	0.00
Reinforcing Steel Setter, Paving.....	\$ 14.86	0.00
Reinforcing Steel Setter, Structure.....	\$ 16.29	0.00
Roller Operator, Pneumatic, Self-Propelled.....	\$ 11.07	0.00
Roller Operator, Steel Wheel, Flat Wheel/Tamping.....	\$ 10.92	0.00
Roller Operator, Steel Wheel, Plant Mix Pavement.....	\$ 11.28	0.00
Scraper Operator.....	\$ 11.42	0.00
Servicer.....	\$ 12.32	0.00

Slip Form Machine Operator.....	\$ 12.33	0.00
Spreader Box operator.....	\$ 10.92	0.00
Tractor operator, Crawler Type.	\$ 12.60	0.00
Tractor operator, Pneumatic....	\$ 12.91	0.00
Traveling Mixer Operator.....	\$ 12.03	0.00
Truck driver, lowboy-Float.....	\$ 14.93	0.00
Truck driver, Single Axle, Heavy.....	\$ 11.47	0.00
Truck driver, Single Axle, Light.....	\$ 10.91	0.00
Truck Driver, Tandem Axle, Semi-Trailer.....	\$ 11.75	0.00
Truck Driver, Transit-Mix.....	\$ 12.08	0.00
Wagon Drill, Boring Machine, Post Hole Driller Operator.....	\$ 14.00	0.00
Welder.....	\$ 13.57	0.00
Work Zone Barricade Servicer...	\$ 10.09	0.00

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

**SECTION PS**

**PROJECT SIGN**



## **PROJECT SIGN**

### **1. Quantity**

One (1) Project Designation sign shall be constructed and installed on the project site as directed by the Owner. It will be the responsibility of the Contractor to maintain the sign in a presentable condition at all times during construction. Maintenance will include painting and repairs as directed by the City Engineer or his appointee. The locations of the signs will be given to the Contractor by the Town of Addison at the Pre-Construction Meeting.

### **2. Material**

Sign shall be constructed of 3/4-inch thick smooth finish fir plywood (Grade A-C, exterior or better).

Sign will be securely mounted to 6" x 6" square posts. Nuts and bolts will not protrude from face of sign. Posts will be mounted to a support system that will provide adequate stabilization to ensure the sign will not fall over in heavy winds. Sand bags or other techniques may be necessary to protect sign.

### **3. Dimensions**

Size of sign will be four feet tall and six feet wide. The height and arrangement of the lettering shall be in accordance with the attached detail.

### **4. Paint**

Sign will be one-sided and will have a white background. Text will be black, except for the word "Addison!" which will be a blue color approved by the City Engineer. The paint will be an outdoor paint and will be maintained throughout the project in proper order. The quality of the paint, painting, and lettering on the signs shall be approved by the City Engineer or his appointee.

### **5. Payment**

Project Signs will be a separate pay item. This will include all labor, equipment, tools, and incidentals necessary to complete and install the work.

The Town of *Addison!*

**PLEASE PARDON THE TEMPORARY  
INCONVENIENCE DURING THIS PROJECT**

**PARK AND STREETScape IMPROVEMENTS**

ASSOCIATED WITH

**VITRUVIAN PARK  
PUBLIC INFRASTRUCTURE – PHASE 1C**

CONTRACTOR: \_\_\_\_\_

ESTIMATED COMPLETION DATE: June 2010

**AN ADDISON PROJECT  
FOR MORE INFORMATION, PLEASE CALL 972-450-2871**

## SECTION TS

# TECHNICAL SPECIFICATIONS

### TS -1 TECHNICAL SPECIFICATION DIVISIONS

#### DIVISION 1 – GENERAL REQUIREMENTS

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## **SECTION 01570**

### **EROSION AND SEDIMENT CONTROL**

#### **PART 1 – GENERAL**

##### **1.01 NOTICE OF INTENT**

- A. Contractor and Owner shall jointly submit an EPA Notice of Intent (NOI) prior to construction.

#### **PART 2 – PRODUCTS**

##### **2.01 PRODUCTS**

- A. Grass: Materials for Seeding and Sodding shall conform to Section 02921 and Section 02923.
- B. Fertilizer: Use commercial grade fertilizers to insure germination and growth. Analysis by weight shall be 19-4-8 or 15-5-10 for Nitrogen, Phosphoric Acid and Potash.
- C. Silt Fence: Lundin "Silt Buster", Mirafi "Envirofence" or approved equal.
- D. Straw Bales: Standard rectangular hay bales bound by baling wire.
- E. Sediment Traps: Standard manufacture designed to fit the intended inlet.

#### **PART 3 – EXECUTION**

##### **3.01 GENERAL**

- A. Contractor shall keep disturbed areas to a minimum required to adequately perform the work. At all times the Contractor shall maintain the site in such a manner that minimizes erosion of the site. The execution of work under this section shall be in conformance with the NPDES rulings and the site Storm Water Pollution Prevention Plan (SWPPP).

##### **3.02 SEEDING**

- A. Disturbed portions of the site and stockpile areas shall be seeded within 14 days if the phasing of the construction operations are anticipated to leave those portions of the areas unworked for 21 days or more.
- B. Seeding operations shall be performed in accordance to the state's Standard Specifications, using the materials specified and the season in which the seeding operations are to occur.
- C. Seeded areas shall be maintained until the project is accepted by the Owner. Maintenance shall include but not be limited to watering, fertilizing, reseeding, mowing and erosion repair as may be required. Grass shall be cut when the average height of the grass reaches 6 inches. Clipping may be mulched back into the seeded areas.

##### **3.03 TEMPORARY AND PERMANENT SWALES**

- A. Description
  - 1. Temporary and permanent drainage swales shall be provided as required to carry drainage away from the work area to an approved outfall point.
  - 2. Unless otherwise shown on the drawings, swales shall be earthen "V" shaped channels graded to a sufficient depth and slope to carry the anticipated runoff, but at least 2 feet deep with a slope of 0.1 percent.

3. Swales not designated to remain in place at the completion of the contract shall be cleaned of any muck, debris and other unsuitable material and filled with approved fill before final grading operations begin.
4. Swales shall have erosion control barriers as required.
5. All permanent swales shall be sodded to a minimum width of 10 feet on either side of the centerline of the swale.

**B. Maintenance**

1. During the course of construction, all temporary swales constructed for this contract shall be maintained so as to allow proper drainage from the construction area. Before Contractor leaves the site at the end of construction, all temporary swales to remain shall be placed in good working condition.
2. Contractor shall work with other contractors at the site in maintaining existing swales and ditches.
3. Where necessary for access to the work areas, adequately sized culverts shall be installed and maintained to provide the access without disturbing the site drainage.
4. Care shall be taken not to rut and damage sodded swales. Damaged swales shall be repaired immediately.
5. Keep sodded swales mowed.

**3.04 DRAINAGE DITCHES**

- A. Drainage ditches shall be hydro mulched immediately upon final grading.
- B. Erosion of the banks of the drainage ditches shall be repaired immediately and re-stabilized.
- C. Sediment barriers shall be placed at intervals along the ditch as shown on the plans and as necessary to help trap sediment on the site. Sediment and other debris trapped by the barriers shall be removed on a daily basis as needed.
- D. Ditch side slopes shall not be steeper than 3 feet horizontal to 1 foot vertical.
- E. Maintenance of the ditches during construction shall include but not be limited to mowing, re-grading, sediment removal, re-hydro mulching, bank repair and debris removal.
- F. Sediment removed from the ditches may be re-spread on the site as directed by the Owner.

**3.05 FILL AND CUT SLOPES**

- A. Fill slopes in all cases shall be not steeper than 3:1 unless specifically stated on the plans or approved by the Owner's soil Engineer.
- B. When cut slopes exceed 2:1 for depths over 3 feet, proper bracing and shoring per OSHA requirements shall be used and maintained.
- C. For permanent slopes, cut or fill, between 2:1 and 10:1, erosion protection shall be provided with hydro mulching, sodding, seeding, or other methods as approved.

**3.06 SEDIMENTATION BASINS**

- A. Description
  1. Sedimentation ponds shall be provided where designated on the plans or as required to control sedimentation run-off.
  2. All drainage from cleared areas shall be routed through a sedimentation basin.
  3. Contractor will be responsible for the operation and maintenance of the sedimentation basin during construction.

B. Maintenance

1. Contractor shall be responsible for maintaining the pond and the outfall and sediment retarding structure in good working condition throughout the time the basin is to be in operation.
2. When sediment and debris fill the pond to over 1/3 its designed capacity, the pond shall be cleaned out.

**3.07 EROSION CONTROL BARRIERS**

- A. Erosion control barriers shall be provided at intervals along swales and ditches as shown on the drawings and as necessary to meet the requirements of the Storm Water Pollution Prevention Plan (SWPPP).
- B. The barriers shall be silt fence or hay bales placed as shown on the drawings and details. Barriers shall be maintained in good working condition and replaced when damaged.

**END OF SECTION**

## **SECTION 02050**

### **DEMOLITION**

#### **PART 1 – GENERAL**

##### **1.01 SCOPE**

- A. This specification covers the demolition and disposal of existing structures and/or substructures and other items as indicated on the plans or as required by the Owner.

##### **1.02 RELATED WORK**

- A. Section 02100 – Site Preparation.
- B. Section 02115 – Clearing and Grubbing
- C. Section 02200 – Earthwork.

#### **PART 2 – EXECUTION**

##### **2.01 PROTECTION**

- A. Prior to starting the demolition for this contract, the Contractor shall install, erect or otherwise provide the necessary protection of adjacent property and structures as well as existing structures that are to remain and be integrated into this contract.
- B. Barricades, lights, fences and necessary warning signs shall be erected and maintained throughout the demolition phase for protection of the workers and general public.
- C. The Contractor shall obtain and comply with permits that may be required by the local and state authorities.

##### **2.02 EXPLOSIVES**

- A. The intent of this specification is that no explosives shall be used during the execution of the demolition phase of this contract.
- B. Should it be necessary and the use of explosives is allowed, the Contractor shall:
  - 1. Obtain all necessary permits required and provide all necessary safety requirements of the local authorities and OSHA.
  - 2. Use only qualified personnel in the use of, handling and storage of explosives.
  - 3. Remove all explosives from the site immediately after the requirement of explosives has terminated.

##### **2.03 UTILITIES**

- A. The Contractor shall cut, remove, plug or otherwise alter the condition of existing utilities as indicated on the plans and shall repair or replace those utilities damaged or destroyed that are to remain in place.
- B. The Contractor shall notify all utility companies, public or private, of his intended operations and determine if any utilities exist that are not indicated on the plans. Close coordination shall be maintained between the Contractor and utility companies.

#### **2.04 DEMOLITION OPERATIONS**

- A. Concrete structures or pavement specified to be removed shall be saw cut when adjacent to existing structures or pavement to remain in place. Edges of concrete (or asphaltic pavement) to remain shall be protected from chipping or spalling.
- B. For removal of trees, shrubs or other vegetation, refer to and comply with Section 02100 – Site Preparation and Section 02115 – Clearing and Grubbing.
- C. Fences and gates that are to be replaced after demolition operations shall be equal to or better than the original condition.
- D. Avoid excessive vibrations in demolition procedures that would be transmitted through existing structures and finish materials.
- E. Provide necessary shoring, bracing, needle pinning and other precautions required to properly support existing structures during cutting and demolition operations.

#### **2.05 DISPOSITION AND DISPOSAL OF MATERIALS**

- A. All material to be removed from the site shall become the property of the Contractor and shall be disposed of outside the limits of the project.
- B. Unless otherwise specified by the Owner, disposal sites shall be the responsibility of the Contractor.
- C. Items shown on the plans to be salvaged shall be removed, cleaned if required, protected and delivered to the Owner or other agency at the location specified.
- D. The intent of this specification is that burning of refuse and debris from the demolition operations will not be permitted at the project site.
- E. Should burning be permitted by the appropriate authorities, it shall be the Contractor's responsibility to obtain all necessary permits and comply with the requirements therein. The Owner and Engineer shall be held harmless from and damage or claims resulting from burning of refuse or debris.
- F. Remove demolition debris at least once each day in accordance with applicable city, county, state and federal laws and/or ordinance.
- G. The Contractor shall meet the laws governing spillage of debris while transporting to the disposal site.
- H. Remove combustible waste materials, handle and dispose hazardous waste and debris in accordance with applicable city, county, state and federal laws and/or ordinances.

#### **2.06 SCHEDULE OF DEMOLITION**

- A. Prior to beginning any demolition for this contract, the Contractor shall provide to the Owner a demolition schedule outlining his priorities and times of his activity during the demolition phase.
- B. No demolition will be permitted until the Contractor presents evidence of the necessary insurance and permits required by all the agencies involved.

#### **2.07 COMPLETION**

- A. The Contractor shall leave the site in a clean and pleasing condition by removing all disposal debris, filling all excavations to natural ground and removing any temporary items not necessary for the protection of the site.
- B. The Contractor shall prepare an "as-built" drawing showing the locations of all cut, plugged, removed or relocated utilities or other items.

**END OF SECTION**



**SECTION 02100**  
**SITE PREPARATION**

**PART 1 – GENERAL**

**1.01 SCOPE**

- A. Perform all work required to complete the site preparation, clearing and grubbing indicated by the contract documents and other items necessary for the proper execution and completion of this project.

**1.02 REFERENCE POINTS**

- A. Locate bench marks, monuments and other reference points for elevation and location of buildings. Notify Engineer of apparent discrepancies in indicated locations.
- B. Protect reference points from dislocation or damage. Replace or repair immediately any points damaged, destroyed or dislocated.
- C. Do not proceed with construction work until reference points have been approved.

**PART 2 – EXECUTION**

**2.01 TREES TO REMAIN**

- A. Protect tops, trunks and roots of existing trees and shrubs located in planting areas and elsewhere indicated to remain. Box, fence or use other suitable means of protection.
- B. Remove branches and limbs that interfere with work without injury to body of tree or shrub. Paint cuts promptly with tree paint.

**2.02 REMOVAL OF TREES**

- A. Remove all trees and stumps from area to be occupied by new structures and elsewhere where indicated to be removed. Do not remove trees or shrubs until they are marked and approved for removal.
- B. Remove trees and shrubs by methods that will prevent injury to adjacent natural growth. Grub out stumps and large roots to depth required. Fill voids to maintain indicated grade.
- C. Dispose of limbs, trunks, stumps, roots and debris by chipping and spreading of mulch in areas as designated by the Owner and/or Engineer. No blasting, burning or burying on site without written approval.

**2.03 STRIPPING VEGETATION**

- A. Remove vegetation in spaces designed as structures, drives, walks and paving.
- B. Scrape or rake to remove brush, roots, grass and weeds.
- C. Remove vegetation and trash away from site.

**2.04 TOPSOIL**

- A. Remove topsoil in spaces designated as buildings, drives, walks and paving.
- B. No debris, stones larger than two inches or an excessive amount of subsoil shall be allowed in stripped topsoil.

- C. Store topsoil for fill-in planting areas in neat piles at designated locations on site. Arrange storage to avoid interference with building operations.
- D. Remove excess topsoil, vegetation and trash away from site.

**2.05 CLEARING AND GRUBBING**

- A. Remove obstructions within work areas to a depth of six inches in areas to be covered by structures and to a depth of 12 inches in areas to be planted, sodded or surfaced.
- B. Remove curbs, gutters, drive approaches and paving, as required.
- C. Remove all foundations, trash, stumps, old lumber, structures, etc., located either above, on the surface or below the ground which may interfere in any way with the new construction.
- D. Refill, with suitable material, all depressions excavated below the original ground surface by the normal removal of stumps, foundations, roots, etc., and compact to the required density.
- E. Dispose of removed obstructions and debris away from site.

**END OF SECTION**

## **SECTION 02115**

### **CLEARING AND GRUBBING**

#### **PART 1 – GENERAL**

##### **1.01 DESCRIPTION**

- A. This section shall include all work necessary for and incidental to the execution and completion of clearing, grubbing, removing and disposing of trees, brush and other vegetation designated for removal.

##### **1.02 PROTECTION**

- A. Protect all reference points, bench marks and monuments from damage or dislocation.
- B. Replace and/or repair any reference points damaged, destroyed or dislocated.
- C. Protect and maintain all conduits, drains, inlets, sewers, pipes, electrical and communications systems that are to remain in service.
- D. Protect adjacent lawn or surface areas outside clearing and grubbing limits from damage.
- E. Protect all trees designated for relocation.
- F. Protect all existing trees designated to remain.

#### **PART 2 – EXECUTION**

##### **2.01 CLEARING**

- A. Clearing shall consist of the felling, trimming and cutting of trees including down timber, snags, brush and rubbish occurring within the areas to be cleared. Trees, stumps, roots, brush and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees and vegetation to be left standing shall be protected from damage incidental to clearing, grubbing and construction operations by the erection of the specified fencing or by such other means as the circumstances require.

##### **2.02 GRUBBING**

- A. Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be excavated and removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, structures, and areas to be paved. In areas to be paved, unsuitable material shall be excavated and removed to a depth of 12 inches below the finished grade where required to permit proper compaction. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

##### **2.03 TREE REMOVAL**

- A. Where indicated or directed, trees and stumps designated as trees to be removed shall be removed from areas inside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified herein before in paragraph DISPOSAL OF CLEARED AND GRUBBED MATERIALS.

#### **2.04 DISPOSAL OF GRUBBED MATERIALS**

- A. All suitable materials such as logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations shall be grinded and chipped into mulch, and then spread on the site at locations as designated by the Owner. All unsuitable refuse and debris shall become the property of the Contractor and shall be disposed of off-site at the expense of the Contractor. Arrangements for off-site disposal shall be the sole responsibility of the Contractor.

#### **2.05 BACKFILL**

- A. Backfill holes in accordance with Section 02220: EXCAVATION AND EMBANKMENT

#### **2.06 ADJUSTMENTS**

- A. Restore damaged surfaces to original grades and conditions.

**END OF SECTION**

## **SECTION 02200**

### **EARTHWORK**

#### **PART 1 – GENERAL**

##### **1.01 SCOPE**

- A. Perform all work required to complete the earth excavating, filling, backfilling, compaction and grading indicated by the contract documents and other related items necessary for the proper execution and completion of this project.

##### **1.02 RELATED WORK**

- A. Site Preparation – Section 02100
- B. Finish Grading – Section 02210

##### **1.03 SUBMITTALS**

- A. Test Reports:
  - 1. Submit to evidence compliance with these specifications.
  - 2. Submit test reports from soil testing laboratory verifying that select fill complies with the specifications.

#### **PART 2 – PRODUCTS**

##### **2.01 MATERIALS**

- A. Select Fill:
  - 1. Material: Clayey sand (less than 50% passing #200 sieve).
  - 2. Plasticity Index: Four to sixteen (4 to 16).
- B. Engineered Fill: Approved excavated on-site material free from matter subject to deterioration or termite attack and having Unified Soil Classifications of SW, SP, SM, SC, CL and CH. Top six inches shall be free from rocks larger than one inch in diameter.

#### **PART 3 – EXECUTION**

##### **2.01 PREPARATION**

- A. Report encounter of active utilities not indicated by the contract documents. Disposition shall be as directed with adjustment in contract amount. Extra payment will not be authorized for work that could have been foreseen by a careful examination of the site.
- B. Notify respective utility companies of any damage caused to active utilities and protect active utilities pending instruction for disposition.
- C. Protection of Adjacent Areas or Surfaces:
  - 1. Protect all reference points, bench marks and monuments from damage or dislocation. Replace or repair immediately any points damaged, destroyed or dislocated.
  - 2. Sprinkle and dampen all dusty material from the beginning of work to its completion.
  - 3. Protect and maintain all conduits, drains, inlets, sewers, pipes and wires that are to remain on the property.

4. Shore and use sheet piling to prevent caving of earth banks and side walls of trenches as required for safety. Remove shoring, sheet piling and protections as work progresses. Temporary wood shall not be left in concrete, masonry or fill.
  5. Cover holes and trenches when work is not in progress. Fence or barricade changes of plane more than 45 degrees with horizontal and more than three feet in height.
  6. Keep trenches and excavated areas free from water by pumping or drainage. Grade to drain surface water away from excavation. Pump or drain water as required and distribute discharge to prevent excessive erosion.
- D. Protection of Trees:
1. Fill around trees, when finished grade will be raised, with collar of clean gravel from one inch to two inches in diameter. Make width of collar a minimum of 24 inches. Finish at trunk three inches above adjacent finished grade with no earth fill in contact with trunk.
  2. Excavate around trees when finish grade will be lowered by hand-digging to avoid damage to trunk or roots that will remain. Cut roots that must be removed at least four inches below grade and paint with tree paint.
  3. Tunnel or hand excavate around roots for trenching near trees. Prevent damage to roots.
  4. Replace trees and shrubs indicated to remain that have been damaged by construction to an extent that would interfere with normal continuing growth.

### **3.02 EARTH EXCAVATING**

- A. Excavate for foundations to lines and grades indicated, and allow additional space as required for construction operations and inspecting foundation.
- B. Remove obstructions within building lines to a depth of six inches below the depth of excavation indicated on the drawings. Remove obstructions in planting and paving areas to 12 inches below finish grade.

### **3.03 FILLING**

- A. Before filling, clear area of vegetation, large rocks, fibrous matter and loose material. Area to be filled shall be approved before filling is started.
- B. Fill, in even layers, not more than eight inches in depth compacted before next layer is placed. Compact to density scheduled.
- C. Moisten fill if necessary or allow to dry to correct moisture content before compaction. Do not place fill on sub-grade that is muddy, frozen or contains frost.
- D. Scarify surface of ground prior to placing fill to a depth of six inches. Moisture content of loosened material shall be sufficient that first layer of fill will readily bond to surface. Recompact to a minimum of 95% of the maximum density as defined by ASTM D-698 under paved areas and 90 percent in all other areas receiving topsoil.
- E. All soft areas that develop under construction operations shall be scarified, aerated or moistened as required and compacted to the full depth required to obtain the specified density for each layer.
- F. Compact, by tamping in three inch layers with mechanical tampers, those portions of fill which are too near adjacent walls, pavement or other fixed objects to permit the use of heavy rolling equipment.

### **3.04 BACKFILLING**

- A. Do not start backfilling until surfaces to be covered have been approved. Remove all debris subject to termite attack, rot or corrosion and all other deleterious materials from areas to be backfilled.

- B. Backfill against foundation walls only after the slab has been poured to support the top of the wall and approval has been obtained. Do not damage waterproofing when placing backfill.
- C. Deposit backfill, in layers not more than eight inches thick, free from roots, plaster, bats and unsuitable material. Stones larger than four inches thick maximum dimension shall not be permitted in the upper six inches of fill.
- D. Place backfill material in successive horizontal layers, in loose depth as specified, for the full width of the cross section. Do not flood excavated areas with water before or during backfilling.
- E. Thoroughly compact each layer to density scheduled.
- F. Bring finished sub-grade elevations indicated and sloped to drain water away from the building walls. Fill to required elevations any areas where settlement occurs.

### **3.05 EMBANKMENT**

- A. Unless otherwise indicated on plans, the surface of the ground of all unpaved areas other than rock, which are to receive embankment, shall be loosened by scarifying or plowing to a depth of not less than four inches. The loosened material shall be recompact with the new embankment as hereinafter specified.
- B. Trees, stumps, roots, vegetation or other unsuitable materials shall not be placed in embankment.
- C. Except as otherwise specified, earth embankments shall be constructed in successive layers for the full width of the cross section and in such lengths as are best suited to the sprinkling and compaction methods utilized.
- D. Each layer of embankment shall be uniform as to material, density and moisture content before beginning compaction. Where layers of unlike materials abut each other, each layer shall be featheredged or the material shall be so mixed as to prevent abrupt changes in the soil.
- E. No material placed in the embankment by dumping in a pile or windrow shall be incorporated in a layer in that position but all such piles or windrows shall be moved by blading or similar methods. Clods or lumps of material shall be broken and the embankment material mixed by blading, harrowing, discing or similar methods to the end result such that a uniform material of uniform density is secured in each layer.
- F. Water required for sprinkling to bring the material to the moisture content necessary for maximum compaction shall be evenly applied, and it shall be the responsibility of the Contractor to secure a uniform moisture content throughout the layer by such methods as may be necessary.
- G. Layers of embankment may be formed by utilizing equipment which will spread the material as it is dumped or formed by being spread by blading or other acceptable methods from piles or windrows dumped from excavating or hauling equipment and in such amounts that materials is evenly distributed.
- H. Minor quantities of rock encountered in constructing earth embankment shall be incorporated in the specified embankment layers provided such placement is not immediately adjacent to a structure.
- I. Each layer shall not exceed eight inches of loose depth and shall be compacted to density scheduled. Prior to, and in conjunction with the rolling operation, each layer shall be brought to moisture content scheduled and shall be kept leveled with suitable equipment to insure uniform compaction over the entire layer.

### **3.06 GRADING**

- A. Slope rough graded surfaces to drain surface water away from buildings and structures; minimum slope  $\frac{1}{4}$  inch in 12 inches.

- B. Grade uniformly with rounded surfaces at tops and bottoms of abrupt changes of plane. Hand-grade steep slopes and areas that are inaccessible for machine work.
- C. Protect graded areas from undue erosion. Refill and compact where noticeable settlement occurs.
- D. Grade areas to elevations and slopes indicated without depressions causing pocketing of surface water or humps producing localized runoff and gulying. Allow for thickness of paving, sidewalks, sodding, etc., as indicated.

**3.07 CLEAN UP**

- A. Keep excavated areas free from debris and stored materials that could damage surfaces or interfere with progress of work.
- B. Remove excess materials from the site promptly to prevent large accumulation. Store reusable material neatly in designated locations.
- C. Upon the completion of the work of this section, dispose of (away from site) all debris, trash, containers, residue, remnants and scraps which result from the work of this section.

**END OF SECTION**



## **SECTION 02210**

### **FINISH GRADING**

#### **PART 1 – GENERAL**

##### **1.01 SCOPE**

- A. Provide all equipment and execute all labor to achieve finish grading of areas as indicated by the drawings and specifications.

##### **1.02 RELATED WORK**

- A. Site Preparation – Section 02100
- B. Earthwork – Section 02200

##### **1.03 REQUIREMENTS OF REGULATORY AGENCIES**

- A. Perform work in accordance with all applicable laws, codes and regulations required by authorities having jurisdiction over such work.
- B. Provide for all inspections and permits required by federal, state and local authorities in furnishing and transporting equipment.

##### **1.04 APPLICABLE STANDARDS**

- A. ASTM D-698 - Moisture-Density Relations of Soils and soil-Aggregate Mixture using a 5.5-lb. Rammer and 12-in. Drop.

##### **1.05 DEFINITIONS**

- A. Percent Compaction: The required in-place dry density of the material, expressed as a percentage of the maximum dry density of the same material determined by ASTM D-698 test procedure.
- B. Finished Grade: The required final grade elevations indicated on the grading plans.

##### **1.06 INTENT OF DRAWINGS AND SPECIFICATIONS**

- A. It is the intent of the drawings and specifications to provide smooth, firm, positive draining finish grades, free from holes and bumps. Any items not specifically shown in the drawings or called for in the specifications, but which are normally required to conform with such intent, are to be considered as part of the work.

##### **1.07 PROTECTION OF EXISTING CONDITIONS**

- A. General: The Contractor shall use every possible precaution to prevent damage to existing facilities to remain, such as structures, utilities, irrigation systems, plant materials and paving on or adjacent to the site of the work.
- B. Barriers: Provide barricades, fences or other barriers as necessary to protect existing conditions to remain from damage during construction.
- C. Operations: Do not store materials or equipment on areas for grading or permit burning or parking equipment under the branches of existing plants to remain.
- D. Notifications of Damages: Submit written notification of all conditions damaged during construction to the Owner immediately.
- E. Replacement of Existing Plant Material: Replace all existing plants that are to remain, which are damaged during construction, with plants of the same species and size as those damaged at no cost to the Owner.

## **1.08 SURVEY REQUIREMENTS**

- A. Lines and Levels: Establish lines and levels, locate and lay out by instrumentation and similar appropriate means for all area finish grades.
- B. Staking: Provide staking as required to achieve approved finish grades and positive drainage of grading areas.

## **PART 2 – EXECUTION**

### **2.01 TOLERANCES**

- A. The Contractor responsible for finish grading shall receive site in a rough graded condition to within one tenth foot plus or minus of the elevations indicated on the grading plans. Contractor shall be required to bring all areas to finish grades indicated on the grading plans. Make proper allowances for settlement, spoils from plant pits and addition of soil amendment and topsoil depths.

### **2.02 FINISH GRADE OPERATIONS**

- A. General: Generally, grade with uniform slope between points where elevations are given or between such points and existing grades.
- B. Drainage: Slope finish grades to drain surface water away from buildings, walks, pavings and other structures unless otherwise noted. Slope finish grades to drain surface water to catch basins, area drains or trench drains as shown on the drawings.
- C. Equipment: Use equipment of adequate size and appropriate type to achieve the profiles and degree of smoothness.
- D. Depressions and Loose Material: Fill and compact any depressions and remove all loose material to finish line and grade presenting a smooth, compacted and unyielding surface.

### **2.03 SETTLEMENT**

- A. Settlement in fill or backfill which may occur within guarantee period shall be corrected at no cost to the Owner.

### **2.04 CLEAN UP**

- A. Daily: Keep all areas of work clean, neat and orderly at all times.
- B. Final: Clean up and remove all deleterious materials and debris from the entire work area prior to final review.

**END OF SECTION**

## **SECTION 02220**

### **EXCAVATION AND EMBANKMENT**

#### **PART 1 – GENERAL**

##### **1.01 DESCRIPTION**

- A. This section covers excavating, removing and satisfactorily disposing of all materials within the limits of the work required for site grading in accordance with these specifications and in conformity with the dimensions and elevations, lines and grades as shown on the plans.
- B. Suitable material taken from the excavation may be used in the formation of embankment, subgrade and for backfilling as indicated on the plans or as directed by the Owner.
- C. When the volume of excavation is not sufficient for constructing the fill to the grades indicated, the Engineer will modify the proposed grading so that borrow will not be required.
- D. When the volume of excavation is in excess of that required for embankment, the Engineer will modify the proposed grading so that haul off of excess suitable material will not be required.

##### **1.02 RELATED WORK**

- A. Clearing and Grubbing – Section 02115

##### **1.03 CLASSIFICATION**

- A. All material excavated shall be defined as “Unclassified Excavation.”
- B. “Unclassified Excavation” shall include all excavation performed under this item regardless of the material encountered.

##### **1.04 CONSERVATION OF TOPSOIL**

- A. Where indicated, topsoil shall be removed without contamination with subsoil and stockpiled convenient to areas for later application or at locations specified. Topsoil shall be stripped to full depth and shall be stored separate from other excavated materials and piled free of roots, stones and other undesirable materials. Any surplus of topsoil from excavations and grading shall be disposed of as directed by the Owner.

##### **1.05 SUBSURFACE EXPLORATION**

- A. Subsurface data and soils report are available to the Contractor in separate report form. The existence of any soils information does not warrant the actual subsurface conditions and the Contractor must satisfy himself as to the actual condition.

##### **1.06 FIELD TESTING CONTROL**

- A. Testing shall be the responsibility of the Owner and shall be performed by an approved testing laboratory. Field density tests shall be performed insufficient number to insure that the specified density is being obtained. Test results shall be furnished to the Contractor. When test results indicate that compaction is not as specified, the material shall be removed and replaced or recompacted to meet specification requirements at no expense to the Owner. Subsequent tests on recompacted areas shall be performed to determine conformance with specification requirements.

##### **1.07 FIELD ENGINEERING**

- A. Control points and property line data shall be by a licensed land surveyor.
- B. Establish lines and levels, locate and lay out by instrumentation or similar appropriate means:
  - 1. Site improvements, including pavements; stakes for grading, fill and topsoil placement.

2. Grid or axis for structures.
  3. Structure pad locations and ground floor elevations and landscape berms.
- C. Furnish additional staking as requested by the Architect/Engineer to determine the accuracy of grades.

## **PART 2 – PRODUCTS**

### **2.01 MATERIALS**

- A. Excavated Material: Only excavated material free of roots and organic matter and free of rocks larger than six inches in greatest dimension for embankment and two inches in greatest dimension for backfill shall be used upon approval of the testing laboratory.
- B. Borrow Material: Off-site materials which are to be hauled to the site for embankment or backfill or topsoil shall be subject to laboratory certification and Engineer approval and shall be free of toxic or hazardous materials and so certified.
- C. Gravel: Free draining material with gradation between #4 sieve and one inch containing no organic matter.
- D. Granular Fill: Free draining, clean, coarse sand graded between No. 4 sieve and No. 40 sieve containing no organic matter.
- E. Select Fill: Very sandy clay to clayey sand (less than 50 percent passing the number 200 sieve) with a plasticity index (PI) of between 4 and 15 containing no organic matter. Submit tests to the Architect/Engineer as directed verifying that select fill meets these requirements.
- F. Topsoil for use On-Site: Upper four inches of natural soil on site.

### **2.02 EQUIPMENT**

- A. The Contractor may use any type of earth-moving, compaction and watering equipment he may desire or has at his disposal, provided the equipment is in a satisfactory condition and is of such capacity that the construction schedule can be maintained as planned by the Contractor. The Contractor shall furnish, operate and maintain such equipment as is necessary to control uniform density, layers, section and smoothness of grade.

## **PART 3 – EXECUTION**

### **3.01 GENERAL**

- A. The excavation shall be carried to the specified depth. Should the Contractor, through negligence or other fault, excavate below the designated lines, he shall replace the excavation with approved materials, in an approved manner and condition, at his own expense. The Architect/Engineer shall monitor the excavation, moving, placing and disposition of all material and shall determine the suitability of material to be placed in embankments. All material determined unsuitable shall be disposed of by the Contractor. Topsoil shall not be used in fills or in subgrades but shall be handled and placed as directed.
- B. The Contractor shall inform and satisfy himself as to the character, quantity and distribution of all material to be excavated.
- C. Those areas outside of the work areas in which the top layer of soil material becomes compacted due to hauling or to any other activity of the Contractor shall be scarified and disced to a depth of four inches, as directed, to loosen and pulverize the soil. Existing grass in these areas shall be replaced at Contractor's expense.

### **3.02 EXCAVATION**

- A. Excavation shall be performed as indicated on the contract plans to the lines, grades and elevations shown, and shall be made so that the requirements for formation of embankments can be followed. All material encountered within the limits indicated shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained so that it will be well drained at all times. Temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the work. No excavation or stripping shall be started until the Contractor has staked out the proposed work and the Owner has verified the Contractor's work.
- B. Rock, shale, hardpan, loose rock, boulders or other material – unsatisfactory for subgrades, roads, intermediate areas or any areas intended for turfing shall be excavated to a minimum depth of 12 inches or to the depth specified below the contemplated surface of the subgrade or the designated grades. Muck, peat, matted roots or other yielding material unsatisfactory for subgrade foundation shall be removed to the depth specified to provide a satisfactory foundation. Unsatisfactory materials shall be disposed of and the portion so excavated shall be refilled with suitable selected material as specified and thoroughly compacted by rolling. The necessary refilling will constitute a part of the embankment.
- C. The subgrade under areas to be paved shall be compacted to the depths and to the densities as shown on the plans and/or as specified in other sections.
- D. Stones or rock fragments larger than six inches in their greatest dimension will not be permitted in the top six inches of the subgrade.
- E. In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope, cross section and alignment shown on the plans.

### **3.03 PREPARATION OF EMBANKMENT AREA**

- A. Embankment areas shall be cleared and grubbed. All depressions or holes below the ground surface, whether caused by grubbing or otherwise, shall be backfilled with suitable material and compacted to ground surface before the construction of the embankment will be permitted to start.
- B. Immediately prior to the placing of the fill materials, the entire area upon which the embankment is to be placed, except where limited by rock, shall be scarified and broken by means of a disc, harrow or plow, or other approved equipment, to a depth of six inches. The scarified soils shall be recompacted to a minimum of 92 percent and a maximum of 98 percent of the Standard Proctor Density (ASTM D-698) at moisture content of from 0 to 4 percentage points above optimum. Scarifying shall be done approximately parallel to the axis of the fill. All roots, debris, large stones or objectionable material that would cause interference with the compaction of the foundation or fill shall be removed.

### **3.04 STRIPPING**

- A. All vegetation such as brush, heavy sods, heavy growth of grass, decayed vegetable matter, rubbish, and any other unsuitable material within the area upon which embankment is to be placed shall be stripped or otherwise removed before the embankment is started, and in no case shall such objectionable material be allowed in or under the embankment.

### **3.05 FORMATION OF EMBANKMENTS**

- A. Slope Embankments shall be formed of satisfactory materials placed in successive horizontal layers of not more than eight inches (or as specified by an approved soils lab) in loose depth for the full width of the cross section.
- B. The grading operations shall be conducted, and the various soil strata shall be placed, to produce a soil structure as shown on the typical cross section or as directed. All materials

entering the embankment shall be reasonably free of organic matter such as leaves, grass, roots and other objectionable material. Soil, granular material, shale, and any other material permitted for use in embankment shall be spread in successive layers as specified.

- C. Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing weather or other unsatisfactory conditions. The Contractor shall drag, blade or slope the embankment to provide proper surface drainage.
- D. The material in the layers shall be of the proper moisture content before rolling to obtain the prescribed compaction. For swelling soils (soils with a plasticity index of 15 or more) which are placed in embankments, the moisture content during compaction shall be no more than 4 percentage points above optimum.
- E. Wetting or drying of the material and manipulation when necessary to secure a uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work on all portions of the embankment thus affected shall be delayed until the material has dried to the required moisture content. Sprinkling shall be done with approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times. Samples of all embankment materials for testing, both before and after placement and compaction, will be taken at frequent intervals. From these tests, corrections, adjustments and modifications of methods, materials and moisture content will be made to construct the embankment.
- F. Rolling operations shall be continued until the embankment in all areas is compacted to not less than required density as determined by ASTM D-698. Field density tests may be made with approved nuclear soil moisture density gages. Any areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers.
- G. During construction of the embankment, the Contractor shall route his equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.
- H. In the construction of embankments, starting layers shall be placed in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished grade line.
- I. When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated under the future paved areas. Stones or fragmentary rock larger than 4 inches in their greatest dimension will not be allowed in the top 6 inches of the subgrade. Rock fill shall be brought up in layers as specified or as directed and every effort shall be exerted to fill the voids with the finer material to form a dense, compact mass. Rock or boulders shall not be disposed of outside of the excavation or embankment areas unless designated by the Architect/Engineer.
- J. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material.
- K. The Contractor shall be responsible for the stability of all embankments made under the contract and shall replace any portion which, in the opinion of the Architect/Engineer, has become displaced due to carelessness or negligence on the part of the Contractor.

### **3.06 PLACEMENT OF TOPSOIL**

- A. Do not place topsoil until subgrade has been approved.
- B. Cross-rip all areas to receive topsoil to a depth of six inches prior to placement of topsoil.
- C. Clear subgrade of all stones larger than tree inches, sticks, and other extraneous materials prior

to placement of topsoil.

- D. Spread topsoil to the minimum depth shown on the drawings after natural settlement and light rolling to conform to finish grades and elevations shown on the drawings.
- E. Remove stones larger than three inches from sub-soil and remove refuse, tree and shrub roots, clods, sticks or other extraneous materials from topsoil during spreading.

### **3.07 COMPACTION**

- A. Paved Areas: Areas to be paved and other areas indicated as requiring compaction suitable for paved areas shall be compacted to at least 95 percent of maximum density as defined by ASTM D-698 shown for specific ranges of depth below the surface of the pavement.
- B. Other Than Paved Areas and Areas to Receive Topsoil: Each layer of the fill or embankment shall be compacted to at least 90 percent of maximum density as defined by ASTM D-698

### **3.08 FINISHED EXCAVATION, FILLS AND EMBANKMENT**

- A. All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. Final surfaces shall be bladed with the contours to achieve a continuity of landforms as shown on the drawings. The finished surface shall be smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operation, except as otherwise specified. Ditches and gutters shall be finished to permit adequate drainage. The surface of areas to be turfed shall be finished to smoothness suitable for the application of turfing materials. For subgrade areas to be paved, the following shall be accomplished as required:
  - 1. Soft or otherwise unsatisfactory material shall be replaced with satisfactory excavated material or other approved materials.
  - 2. Rock encountered in the cut sections shall be excavated to a depth of six inches below finished grade for the subgrade.
  - 3. Low areas resulting from removal of unsatisfactory material or from excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade and cross section and shall be compacted as specified.
  - 4. The surface of embankments or excavated areas for road construction or other areas on which a base course or pavement is to be placed shall vary not more than 0.10 foot from the established grade and approved cross section.
  - 5. Other surfaces shall be finished not more than 0.10 foot above or below the established grade or approved cross section.

### **3.09 PROTECTION OF THE SUBGRADE**

- A. At all times, the subgrade shall be kept in such condition that it will drain readily and effectively. In handling materials, tools and equipment, the Contractor shall protect the subgrade from damage. In no case will vehicles be allowed to travel in a single track. If ruts are formed, the subgrade shall be reshaped and rolled. Storage or stockpiling of materials on the top of the subgrade will not be permitted. Until the subgrade has been checked and approved, no subbase, base, surface course, pavement or topsoil shall be laid thereon.

### **3.10 SPILLAGE, DUST AND EROSION CONTROL**

- A. Spillage: The Contractor shall prevent spillage when hauling on or adjacent to any public street or highway. In the event that spillage occurs, the Contractor shall remove all spillage and sweep, wash, or otherwise clean such streets or highways as required by local City and County and/or State authorities.
- B. Dust and Erosion Control: The Contractor shall take all precautions needed to prevent a dust nuisance to adjacent public or private properties and to prevent erosion and transportation of

soil to downstream of adjacent properties due to his work under this Contract. Any damage so caused shall be corrected or repaired by the Contractor at no cost to the Owner.

- C. Architect/Engineer's Prerogative: In the event the Contractor fails to take such precautions or make such corrections or repairs promptly, the Architect/Engineer may take such steps as he may deem necessary and deduct the cost of the same from the monies due the Contractor. Any such action or lack of action on the part of the Architect/Engineer in no way alters or relieves the Contractor from the proper protection of the work.

**END OF SECTION**



## **SECTION 02240**

### **TRENCH EXCAVATION PROTECTION**

#### **PART 1 – GENERAL**

##### **1.01 SCOPE**

- A. This specification shall govern for the Trench Excavation Protection required for the construction of all trench excavation protection systems to be utilized in the project and including all additional excavation and backfill necessitated by the protection system in accordance with the law.

#### **PART 2 – EXECUTION**

##### **2.01 COMPLIANCE**

- A. Verify location, size, elevation, and other pertinent data of existing utilities and drainage systems.
- B. All construction, inspections, protection, and monitoring shall comply with all OSHA, State and local laws, ordinances, and procedures. This shall include all construction, methods, materials, and safety procedures. Additional trench safety design, monitoring and inspections shall be designed and furnished by the contractor and comply with OSHA, State and local laws, ordinances and regulation

**END OF SECTION**

**SECTION 02514**  
**CONCRETE WALKS**

**PART 1 – GENERAL**

**1.01 SCOPE**

- A. Work Included: Perform all concrete paving work necessary and required for the construction of the project as indicated. Such work includes, but is not limited to, the following:
  - 1. Subgrade preparation.
  - 2. Formwork.
  - 3. Concrete mixing, placing, finishing and curing.
  - 4. Contraction and expansion joints.

**1.02 RELATED WORK**

- A. Section 02200 - Earthwork.
- B. Section 03100 - Concrete Formwork
- C. Section 03200 - Reinforcing Steel
- D. Section 03300 – Portland Cement Concrete

**1.03 PROTECTION**

- A. The completed pavement shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Pavement that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion shall not be acceptable. Removed, damaged portions shall be disposed of as directed by the Owner.

**PART 2 – PRODUCTS**

**2.01 MATERIALS**

- A. Concrete and the equipment, workmanship, and materials shall conform with the requirements of Section 03300 – Portland Cement Concrete.

**PART 3 – EXECUTION**

**3.01 SUBGRADE**

- A. The subgrade shall be constructed true to grade and cross-section. The subgrade shall be prepared in accordance with Section 02200 – Earthwork. The completed subgrade shall be tested for grade and cross-section with a template extending the full width of the pavement and supported between side forms. The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when the concrete is placed. In cold weather, the subgrade shall be prepared and protected so as to provide a subgrade free from frost when the concrete is deposited.

### **3.02 FORMS**

- A. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete, and of a height equal to the full depth of the finished pavement. Wood forms shall be surfaced plank of 2" nominal thickness. Steel forms shall be of approved section with a flat top surface. Forms shall be set with the upper edge true to line and grade and shall be held rigidly in place by stakes placed at intervals no to exceed 4'. Forms shall be coated with form oil each time before concrete is placed. Wood forms may be thoroughly wetted with water before concrete is placed except when probable freezing temperatures are expected. Oiling is mandatory when freezing temperatures are forecast. Side forms shall not be removed for less than 12 hours after finishing has been completed.

### **3.03 CONCRETE PLACEMENT AND FINISHING**

- A. Concrete shall be placed in the forms in one layer of such thickness that when compacted and finished the pavement will be of the thickness indicated on the plans. After the concrete has been placed in the forms, a strike-off guided by the side forms shall be used to bring the surface to the proper section to be compacted. The concrete shall be tamped and consolidated with a suitable wood or metal tamping bar and the surface shall be finished to grade with a wood float and by scoring in parallel lines with a stable broom perpendicular to the direction of traffic unless otherwise indicated on the plans. The finished surface of the pavement shall not vary more than 3/16" from the testing edge of a 10' straight-edge. Irregularities exceeding the above shall be satisfactorily corrected at no cost to the Owner. The surface shall be divided into rectangular areas by means of control joints.
- B. Control joints shall be formed in the fresh concrete by cutting or scoring a groove in the top portion of the slab. Saw cuts shall be cut to a depth of at least 1/4 of the pavement slab thickness. Score marks shall be made to a depth of 3/8" or as shown on the pavement plans.
- C. Expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the pavement is not in contact with the curb, expansion joints shall be installed as indicated on the plans.
- D. The completed surface shall be uniform in color and free of surface blemishes and tool marks.

### **3.04 CURING**

- A. Immediately after the finishing operations, the exposed concrete surface shall be cured by preventing the loss of moisture for 7 days by the mat, impervious-sheet, or membrane-curing method. The Contractor's curing procedure shall be subject to the approval of the Engineer.

### **3.05 BACKFILLING**

- A. After curing, all debris shall be removed and the area adjoining the pavement shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with the lines and grade indicated on the plans.

**END OF SECTION**

**SECTION 02783**  
**CONCRETE PAVERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Interlocking concrete paver units and detectable warning pavers.
- B. Sand setting bed.
- C. Sand joint filler.

**1.02 PRICE AND PAYMENT PROCEDURES**

- A. Pavers on Sand Bed: By the square foot (meter). Includes preparation of substrate, sand setting bed, pavers, sand jointing, finishing.

**1.03 REFERENCE STANDARDS**

- A. ASTM C 33 - Standard Specification for Concrete Aggregates; 2007.
- B. ASTM C 936 - Standard Specification for Solid Concrete Interlocking Paving Units; 2008.

**1.04 SUBMITTALS**

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Reference Civil Engineer's drawings for submittal procedures.
- C. Product Data: Provide characteristics of paver unit, detectable warning pavers, dimensions, and special shapes.
- D. Samples: Submit two samples of each paver type, illustrating style, size, color range and surface texture of units being provided.
- E. Manufacturer's Installation Instructions: Indicate substrate requirements, , and installation methods.
- F. Experience: Provide documentation of installer's experience.

**1.05 QUALITY ASSURANCE**

- A. Installer: Company specializing in the installation of solid concrete interlocking pavers with five (5) years documented experience written verification from the manufacturer that the installer has successfully completed similar installations.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Concrete Pavers: The design is based on the following Pavestone Company products:
  - 1. Holland Stone - Holland Stone; 60mm = 2 3/8" Height/Thickness: [www.pavestone.com](http://www.pavestone.com).
  - 2. City Stone Series - City Stone I; 60mm = 2 3/8" Height/Thickness: [www.pavestone.com](http://www.pavestone.com).
  - 3. ADA Paver - ADA Paver; 60mm = 2 3/8" Height/Thickness: [www.pavestone.com](http://www.pavestone.com).
  - 4. Substitutions: Not permitted.
- B. Reference Landscape Architect's drawings for location and color of each paver type.

## 2.02 MATERIALS

- A. Interlocking Concrete Pavers: Hydraulically pressed concrete, configured for interlocking with adjacent units and complying with ASTM C 936.
  - 1. Compressive Strength: 8000 psi (55 MPa) average, with minimum of 7200 psi (50 MPa).
  - 2. Absorption: 5 percent average, with maximum of 7 percent.
  - 3. Size: As indicated on Landscape Architect's drawings.
  - 4. Thickness: 2-3/8 inches (60 mm).
  - 5. Style: Rectangular.
  - 6. Color: \_Reference Landscape Architect's drawings\_.
- B. Detectable Warning Pavers: Cast concrete with truncated domes, reference Landscape Architect's drawings for color. Provide ADA Paver manufactured by Pavestone Company .
- C. Sand for Setting Bed: Clean washed natural sand or crushed stone complying with gradation requirements of ASTM C 33 for fine aggregates.
- D. Sand for Joints: Fine washed sand with 100 percent passing No. 16 (1.18 mm) sieve and not more than 10 percent passing No. 200 (0.075 mm) sieve.

## 2.03 ACCESSORIES

- A. Square Paver Grates: Cast steel, hot-dipped galvanized finish in halves for use with pavers and expandable cast iron trim ring with 12", 16", 20" diameter tree opening, sized to resist pedestrian loads. Provide Paver Grate Model 4124 48" manufactured by Ironsmith Tree Grates,
  - 1. Paver grates shall be located as indicated on LA drawings.
  - 2. Paver grates shall be manufactured from standard steel shapes to ASTM A36 and expanded metal grating 3# to ASTM A569/569M. Units shall be manufactured true to design and all components shall fit together in a satisfactory manner. Grates are to be uniform quality, flat and free from distortion.
  - 3. Paver grate footings must be flat and leveled so that grates do not rock or appear unstable before unit pavers are set. Footings are to be set to ensure that unit pavers over the paver grate are flush and level with the surrounding areas.
  - 4. Cover paver grates with permeable landscape fabric before setting unit pavers to permit sanding joints.
  - 5. Cut unit pavers to fit around tree opening ensuring a secure fit against paver grate opening stop.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that substrate is level or to correct gradient, smooth, capable of supporting pavers and imposed loads, and ready to receive work of this Section.
- B. Verify gradients and elevations of substrate are correct.

### 3.02 INSTALLATION OF SOLID PAVER UNITS

- A. Spread sand evenly over prepared substrate surface to a maximum thickness of 1-1/2 inch (38 mm).
- B. Dampen and roller compact sand to level and even surface.
- C. Screed and scarify top 1/2 inch (12 mm) of sand.
- D. Place paver units in pattern indicated on the Landscape Architect's drawings.

- E. Cut paver units at edges with masonry saw.
- F. Place half units at edge and interruptions. Maintain tight joints.
- G. Sprinkle sand over surface and sweep into joints. Moisten joints and recover with additional sand until firm joints are achieved. Remove excess sand.
- H. Tamp and level paver units with mechanical vibrator until units are firmly bedded, level, and to correct elevation and gradients. Do not tamp unrestrained edges.

**END OF SECTION**

## SECTION 02810

### IRRIGATION SYSTEM

These revised specifications supersede any and all others. However, any discrepancies between the approved construction plans and those of the Owner **MUST** be brought to the attention of the Owner's designated representative for a final determination. The contractor will present the Owner's representative an as-built plan at the final walk-through, along with three Bucker VO75 quick coupling keys with hose-end swivels.

1. All work is to be accomplished by or directly supervised at all times by an on-site Irrigator licensed by the State of Texas.

2. The contractor shall verify the water pressure before the installation begins. If the static pressure is different than that of the design pressure, the contractor shall contact the designer and Owner's representative immediately so changes can be made. Send a fax to the Parks dept. at 972-450-2834 with the current dated and timed static pressure reading. Design head to head with no single head coverage. Use appropriate size nozzles for a given landscape area so as not to spray onto or over paved surfaces or structures. Do not exceed manufacturer's recommendations.

3. The irrigation installer is responsible for resetting head and/or box height due to settling and after turf, groundcover, shrubs, trees, and mulch is added to the landscape areas. The irrigation contractor must supply a workmanship warranty for (1) year from date of acceptance.

4. Plans are diagrammatic and field adjustments are often necessary. For this reason, prior to trenching, valve locations and head layout with flags needs to be done and approved by the Owner's irrigation inspector. Not doing so may result in the relocation of heads and/or valves at the irrigation contractor's expense.

5. **Water Taps:** Water taps will be 2" in size. **Note:** This does not imply that a 2" meter will be used; see Water Meters below. All parts must conform to the Town of Addison's Water Department specifications and are the responsibility of the irrigation contractor to provide. Inspection of taps by the Water Department Representative must occur. Excavation and tap permits are required. Contact the Town of Addison Water Department at (972) 450-2871.

6. **Water Meters:** Only meter types approved by the Town of Addison Water Department with an electronic encoder register and touch pad reader and two (2) brass flanges are acceptable. Meter lay lengths must be in accordance with the Town of Addison Water Department's specifications, housed in appropriate size (to be determined by the Owner's Irrigation Inspector) concrete box with lid. New stainless steel bolts and nuts must be used in the installation along with new neoprene gaskets. The box should be level with the final grade using concrete pavers to support and prevent sinking. Backfill inside the box, 3" below meter base with at least 6" of fine (1/2") pea gravel. Connection to main must be approved and inspected by the Town's Water Department Inspector and all tap materials are to be purchased at the expense of the contractor and must comply with the Owner's specifications. **Note:** Meter size shall not exceed 1 1/2" in size unless written approval is given by the Town of Addison Parks Department. All portions of this installation must adhere to the Town of Addison Water Department specifications as well.

7. **Backflow Devices:** Only Watts 007 M series inline check valve assemblies with the stainless steel ball valve handles and nuts are to be used. Irrigation contractor shall provide and install plugs for the test cocks in accordance to the Town of Addison Water Department specifications. Connect the device to the water meter via a separate brass flange, neoprene gasket and stainless steel nuts and bolts. Install to the flange a Teflon taped copper nipple and soldered copper pipe of sufficient length to center the DCA within its housing. The device will be housed in an appropriate size, (to be determined by the Owner's Irrigation Inspector) rectangular concrete box with lid using concrete pavers for proper stability and height

adjustment. The irrigation contractor shall be responsible for the DCA testing in accordance with State of Texas law, using a Licensed Backflow Assembly Tester registered with the Town of Addison Water Department. Copies of the results must be given to both the Town of Addison Parks and Water Departments. **Note:** All portions of this installation must adhere to the Town of Addison Water Department specifications as well.

**8. Sleeves:** All paving must have Owner approved sleeve sizes and quantities present. It is the responsibility of the irrigation contractor to notify the Owner's Irrigation Inspector of any area where sleeves should be present but are not and provide such materials at his cost. Any paving installed without sleeves will necessitate a bore and subsequent materials at the irrigation contractor's expense. All sleeves 2" and smaller will be Schedule 40 PVC with size and location noted on the plan. Larger sizes will be Class 200. All piping underneath paving, including sidewalks, must be sleeved. All sleeves are to be belled end PVC pipe. A minimum length of 12 inches of sleeve material must extend beyond the pavement.

**9. Glue and Primer:** Use Turftite brand glue on laterals and IPS Grey Heavy Body on main lines and a good quality purple primer on all. Avoid excessive use and wipe excess glue off of all joints and fittings with a clean rag.

**10. Pipe:** All main line pipe 2 inches and smaller is to be Schedule 40 belled PVC; larger sizes are to be Class 200 belled PVC with a minimum depth of 14" and a maximum depth of 16". Put not more than two (2) pipes in any one trench and separate the main line from the lateral line with at least two (2) inch of cover. Class 200 belled PVC lateral piping is to be used with a minimum depth of 12" and a maximum depth of 14". Backfill (4" and smaller pipe): Water jet and compact to 90% standard proctor density to prevent after settling. Hand rake trenches and adjoining areas to leave grade on condition equal to before installation. Backfill (6" and larger pipe): Mechanical tamp trenches to 90% standard proctor density compaction. Compact ditches in 6" lifts. Trace tape: Install in mainline/wire trench 4" below finish grade.

**A. Polyvinyl Chloride Pipe (PVC)** manufactured in accordance with the product standards as follows:

**B. Mainline Piping-PS-22-70, SDR-21, Class 200.**

Four inch (4 in.) – gasket type joints.

Less than four inch (4 in.) – solvent weld joints.

**C. Lateral Piping-PS-22-70, SDR-21, Class 200 – solvent weld joints.**

**D. Marking and Identification:** Permanently marked with the following information: manufacturer's name, pipe size, type of pipe and material, SDR number, Commercial Standard Number, and NSF (National Sanitation Foundation) Seal.

**11. Fittings:** No crosses are permitted. Separate tees, 45's, elbows and other fittings by at least 12 inches. Reduction tees are preferred over use of single reducer bushings. Multiple reducer bushings will not be accepted. Only Spears and/or Lasco fittings are permitted. Allow 18 inches outside of sleeve before the first fitting. No 45 degree elbows on 1 inch and larger pipe are allowed. Gasket PVC Pipe and Fitting Assembly:

Clean and dry the surfaces of all joint components. Inspect components and repair or replace damaged or defective items. Insert gaskets into the bell gasket groove by forming the gasket into a heart-shape for small diameters and a figure eight for larger diameters. Seat the gasket firmly in the groove with the gasket oriented in the correct direction. Use only the gasket designed for and supplied with the pipe joint.

Field cut spigots for shorter than standard pipe lengths. Cut with a PVC pipe cutter or use a hand saw with a mitre box or pre-mark for circular saw. Cut so that cut is at a right angle to the pipe axis. Bevel



ends with a PVC pipe beveler or smooth by hand with rasp or file. Mark insertion stop mark with wax crayon or felt tip marker. Use the same size factory spigot as a guide for the bevel angle, depth, and the length to stop mark.

Apply lubricant immediately before joining. Coat only the entire circumference of spigot bevel and about one inch behind the taper. DO NOT lubricate the gasket or bell. Keep the lubricant and joining surfaces free from foreign material. Use only lubricant recommended by the manufacturer.

Insert lubricated spigot into the bell until contacting the gasket uniformly. Rotating the pipe while inserting it is helpful. Take care to concentrically align the two piping components to avoid gasket displacement and to ease insertion. Do not use heavy equipment that causes loss of feel for proper joining. Use a pipe puller or bucking bar, if necessary, on larger sizes. Do not use swing stab method. Proper joining and gasket seating may be verified after joint assembly by rotation of the spigot by hand or using a strap wrench for  $\frac{1}{4}$  or  $\frac{1}{2}$  turn.

If unusual joining resistance is encountered, or if the insertion mark does not reach the flush position, disassemble the joint and verify proper gasket position. If the gasket is twisted or pushed out of its raceway, re-clean the joint components and inspect for damage to the gasket, spigot bevel and gasket raceway. Replace damaged components. Out-of-round bells or spigots may result from exposure to high temperatures and loads during handling or prolonged adverse storage of PVC pipe. They are normally useable, but require more care. Repeat the joint assembly steps using more care to concentrically align the pipe components.

- A. PVC Schedule 40, as manufactured by the Lasco Company, or approved equal.
- B. All PVC fittings shall be of the same material as the PVC pipe specified and be compatible with the PVC pipe furnished.
- C. Use only solvent recommended by the manufacturer of the PVC pipe and the manufacturer of the PVC fittings.

## 12. Valves:

**A. Master Valves:** Every point of connection to the water supply system shall have an Irritrol 200 B series valve as the Master Valve, housed in a standard (large) Armor rectangular plastic valve box with 4 to 6 inches of small ( $\frac{1}{2}$ " ) pea gravel placed underneath the valve in such a manner as to prevent soil infiltration into the box. Use concrete pavers or bricks placed under edges of valve box for stability. Note: Valve box must not rest on pipe. Blue wire shall be used as the station wire for the Master Valve.

**B. Station Valves:** Only Irritrol 200 B series valves are permitted. A Ball Valve will be installed before every station or zone valve. They are to be located within a standard (large) Armor rectangular plastic valve boxes with 4 to 6 inches of ( $\frac{1}{2}$ " ) pea gravel placed underneath the valve in such a manner as to prevent soil infiltration into the box. The pea gravel should be 2 inches from the bottom of the valve body. A minimum of 3" of valve box must extend below bottom of valve. If necessary, use valve box extensions.

**C. Ball Valves:** Female threaded plastic Spears or Lasco ball valves with positive T-handle cut off must be installed on every 200 feet of mainline for isolation purposes. A ball valve is also required to be installed before every station valves. Use 10" Armor valve box with a minimum of 3" extending below bottom of valve and fill to bottom of valve with  $\frac{1}{2}$ " pea gravel. Use bricks or concrete box.

**D. Quick Coupler Valves:** Use only Buckner V075 single lug  $\frac{3}{4}$ " quick coupling valves with a metal top. They are to be connected to a threaded fitting. Teflon tape and appropriate length of

gray schedule 80 nipples and schedule 40 fittings are to be used for the swing joint. Secure to 18 inch by ½ inch steel rebar with a stainless steel worm screw clamp. House QCV in a 10 inch round plastic Armor valve box. Install Spears ball valve prior to each QCV. Bricks or pavers need to be installed under edges of valve boxes for stability. Backfill bottom of box with ½" pea gravel half way up body of valve.

**E. Flowmeters:** Purchase from a Rain Master supplier and install appropriately sized Data Industrial flowmeter. Follow all installation instructions as approved by Rain Master. House in a standard (large) Armor rectangular plastic valve box with 4 to 6 inches of small (1/2") pea gravel placed underneath the valve in such a manner as to prevent soil infiltration into the box. Use concrete pavers or bricks placed under edges of valve box for stability. Note: Valve box must not rest on pipe. The irrigation contractor must also purchase from Rain Master and install shielded Rain Master EV-Cab-Sen flow meter cable and install within continuous ¾" or larger gray PVC conduit with 6 inch or larger J-boxes placed every 200 feet or where 360 degrees of fittings are installed; only sweep fittings are permitted. Only a continuous run of cable is allowed; no splices will be allowed except at the point of connection to the flow meter. Connections at the flow meter must first be soldered and then water proofed within a 3-M DBY connector. Note: Certain Rain Master requirements must also be met regarding installation order and distances of separation between DCA, flow meter, master valve and the first fitting. It is the responsibility of the irrigation contractor to adhere to these requirements. At final walk through, proper operation of the flow meter at the Rain Master controller must be demonstrated by the irrigation contractor.

**F. Gate Valves:** Four inch (4") and larger: Cast iron bodied, bronze fitted gate valves with gasket type pipe connections and a 200 W.O.G. rating. Valve stems shall be fit with square operating nuts of standard size. Manufacturer: Matco #10-RT.

Three inch (3") and smaller: Bronze bodied, bronze fitted gate valves with threaded connections and a 150# W.O.G. rating. Valve stems shall be equipped with a heavy cast wheel handle. Manufacturer: Nibco T113K.

**G. Drain Valves:** Bronze bodied globe valves with rubber seats and threaded IPS pipe connections with a 125 W.O.G. rating. Valve stems shall be equipped with a round wheel handle. Manufacturer: Nibco #T211Y.

**13. Heads:** All heads will be installed using polyethylene green nipples (¾"x6" for rotors and ½"x6" for pop-ups) screwed into threaded fittings unless noted otherwise. No swing joints on 4" pop-ups or rotors will be allowed.

**A. Pop-ups** – Only Rainbird 1800 series are permitted. Install ¾ inch above the finished grade.

**a. 4 inch pop-ups:** turf, tree bubblers within turf areas (use Hunter PCN 10 bubbler nozzles on spray heads).

**b. 6 inch pop-ups** with no side inlet: very low ground cover (less than 6 inches at mature height).

**c. 12 inch pop-ups** with side inlet: Ground cover and low growing shrubs. The ground cover and shrubs should not be more than 12" at maturity. The Town Inspector reserves the right to determine if and when side inlets installed using funny pipe verses the bottom inlet will be allowed. When authorized, use Hardie Blue Line Pipe with Toro barb fittings.

**d.** Use ½" Sch 80 risers with shrub adapter and Hunter PCN 10 bubbler nozzles for all tree wells with tree grates. Risers shall be a minimum of 2" below bottom of tree grates with nozzle 2" above mulch.

**B. Rotors** - Only Hunter I-20 Series are permitted, unless noted otherwise. Install  $\frac{3}{4}$ " above finished grade.

**14. Risers:** Use Sch 80 PVC with Weathermatic LXS Series shrub head adapters with a  $\frac{1}{2}$ "x6" green poly cut-off nipple screwed into the threaded fitting in the ground. The irrigation inspector reserves the right to determine placement of risers versus pop-ups.

**15. Wiring:** All wires will be 14 gauge UF. Station wires will be red. Common wires will be white. Master valve wire will be blue. Anytime the wiring changes direction, such as at an elbow or a tee, allow a loop of at least 12 inches alongside the fitting at that location. Only continuous wire runs are permissible. Wire should follow the main line where possible and lay along a single side not crossing over lateral lines. Wire is to be placed under mainline with 2" of dirt between wire and pipe.

**16. Wire Connectors:** Use only DBY connectors for all field wire splices other than at the valves themselves. Allow at least 36 inches of pigtailed wire at each splice. Use King One Step tan colored connectors for all valve splices. All valve box splices are to be housed in standard (large) Armor rectangular plastic valve boxes. All field splices are to be in 10 inch round Ametek plastic valve boxes or standard, large rectangular Ametek plastic valve boxes at the discretion of the Town's representative.

**17. Backfilling:** Prior to any backfilling of trenches, an inspection by the Owner's irrigation representative must take place and any necessary changes implemented; otherwise manual excavation to enable proper inspection will be necessary. Use clean and approved topsoil to backfill all pipe to a depth. All heads and boxes are to be backfilled to grade with clean topsoil. No rocks greater than 1 inch are allowed. Compact trenches to alleviate settling. Minimal depth of coverage is 12 inches.

**18. Valve sequencing** must be performed by the contractor and in an order approved by the Owner's Irrigation Inspector. At least 12 inches of extra station wiring within the bottom of the pedestal is necessary for each zone and must be of neat and orderly appearance.

**19.** Any deficiencies in coverage noted by the Owner's irrigation inspector will be rectified at the cost of the contractor.

**20. Controller:** An Owner irrigation representative will determine the type of controller to be used. All controllers shall have a concrete pad of 36"x36"x6". Pad will be set at 3" above final grade. Install the controller after the concrete pad is completely cured (two days). Use only appropriately sized stainless steel bolts, washers and nuts to secure the controller to the concrete pad. All wiring is to enter the pedestal via appropriately sized PVC sweep elbows extending at least 1" thru and 6" out from under the pad. Control/master valve wiring, flow meter wiring and 120-V service wiring are to be separated with each having its own access elbow. An additional spare  $\frac{3}{4}$ " sweep elbow for phone service is to be installed as well. All national and local codes must be followed during the installation.

**A. A/C controller** - Only Irritrol MC Plus controllers will be acceptable. Both Mini-click rain and freeze sensors will be installed and placed where they can operate properly. All non-Rain Master controllers must be permanently wired for quick attachment to a Rain Master remote control unit.

**B. Battery and/or Solar Operated Controllers** - Only LEIT controllers will be acceptable. Install rain or freeze sensors on these controllers with SKIT8821-4 installation kit. Install on galvanized thick wall poles and set controller panel to height above finished grade to be determined by Town's representative.

**C. Rain Master:** Only an approved size stainless steel Rain Master Evolution DX-2 controller with a Stainless Steel Pedestal and Heavy Duty Lightning/Surge Protection is permitted. The controller must include all necessary hardware to ensure reliable communication and operation with the Town's central control located at 16801 Westgrove. Installation must include the following Rain Master hardware, purchased only from a certified Rain Master supplier: DX-FLOW sensor board,

DX-PH phone communication option, Data Industrial flow meter (same size as the mainline), and shielded EV-CAB-SEN flow meter cable. It is the irrigation contractor's responsibility to entail the cost of and work in conjunction with South Western Bell Telephone to establish a dedicated phone service and install an interface within the pedestal at each controller location via direct burial cable within 1" PVC conduit. The entire installation must conform to Rain Master specifications and be approved by the Town's irrigation inspector prior to and be inspected during installation. Such specifications will include grounding and pad configurations and distances of separation from water meter to DCA to master valve to flow meter and the first fitting. A functional Mini-click freeze and rain sensor with a Hunter bypass switch must be installed in an approved location and by an approved method. For part numbers and pricing of any Rain Master equipment, contact Ray Schramm of John Deere Landscapes at (214) 347-3628. For technical questions, call John DuBose of RainMaster at (214) 632-2289.

**21. Thrust Blocks:** Place thrust blocks around all main line gasketed connections with the exception of gasketed couplings if deflection is less than five degrees per joint. Place concrete against undisturbed earth and to a height at the top of the pipe and to the bottom of the ditch with no thrust block smaller than three cubic feet in size. Thrust blocks shall be of the size specified by the manufacturer of the gasketed pipe or as large as is necessary to provide bearing against undisturbed earth. Add thrust blocks below mainline shut-off valves 4" and larger as detailed. Do not apply water pressure to the main line piping system until the concrete thrust blocks have "set" at least 48 hours.

**21.** Communication is the key. **If you are unsure, CALL** Ron Lee, the Operations Manager of the Addison Parks Department: Office (972) 450-2863/Cell (972) 672-1817.

**END OF SECTION**

## SECTION 02811

### SKID-N-PUMP™ IRRIGATION PUMP SYSTEM

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Water irrigation pump station mechanical and electrical work.

##### 1.02 RELATED SECTIONS

- A. Division 2 Section - Earthwork
- B. Division 2 Section - Concrete
- C. Division 15 - Mechanical
- D. Division 16 - Electrical

##### 1.03 REFERENCES

- A. Comply with applicable provisions of the latest edition of the following codes and standard specifications:

NEC	National Electrical Code
NFPA	National Fire Protection Association
UBC	Uniform Building Code
UPC	Uniform Plumbing Code
ASTM	American Society for Testing and Materials
ANSI	American National Standards Institute
ASME	American Society of Sanitary Engineering
AWWA	American Water Works Association
CS	Commercial Standards
NEMA	National Electrical Manufacturers Association
NSF	National Sanitation Foundation
UL	Underwriters Laboratories, Inc.
CSA	Canadian Standards Association
EIA	Electronic Industries Association

##### 1.04 WORK INCLUDED

- A. Water pump system including pump, valves, SBR hose, steel shoreline piping, controls and specialties.
- B. Armored underwater power and sensor cable including cable, junction boxes and re-entenable potting compound.
- C. Special tools for operation and maintenance of the equipment provided.
- D. Provide irrigation pump system which will provide a total of 225 GPM at 100 PSI.

##### 1.05 PERSONNEL TRAINING

- A. Make provisions for technical instruction of owner's maintenance personnel, by the equipment supplier's personnel.

### **1.06 QUALITY ASSURANCE**

- A. Irrigation pump system supplier / installer must have a minimum of five (5) years commercial installation prior experience – similar in size and complexity. The supplier / installation company must have bonding capabilities up to one million dollars with an A-Rated Bonding Entity.
- B. For approval as an approved irrigation pump supplier / installer, companies must provide written documentation for installing similar pump system installations, including a list of (5) comparable commercial projects with photos of equipment skid installations, pipe installations, control panel installations, and completed irrigation pump operational photos.
- C. When the specifications and drawings call for described materials, workmanship, or certain construction methods, the pump system supplier / installation company is expected to comply or exceed all requirements – as specified or drawn. Any exceptions to this requirement must be turned in to the architect for approval so the alternate material(s) or installation methods can be approved and provided to all bidders as an addendum to the bid specifications.
- D. Irrigation pump system supplier / installer must be able to provide appropriate insurance for the duration of the project installation, to include, but not be limited to state approved workman's comp insurance and two million dollar general liability insurance.

### **1.07 SITE CONDITIONS**

- A. Take special care to protect existing improvements, existing trees, and vegetation scheduled to remain. Do not begin work until existing improvements and landscape have been adequately protected. Maintain barricades and other protection work throughout the duration of the contract.

### **1.08 SUBMITTALS**

- A. Submit under provisions of Section 01300
- B. Product Data: Provide manufacturer data sheets.
- C. Manufacturer's installation instructions indicating criteria for preparation and application.

## **PART 2 PRODUCTS**

### **2.01 PUMP EQUIPMENT SUPPLIER**

- A. Greenscape Pump Services, Inc.  
1425 Whitlock Lane, Suite 108 • Carrollton, Texas 75006  
Telephone: (972) 446-0037 • Fax: (972) 446-0313  
Contact Persons: Mr. Jayson Bush.

### **2.02 PURPOSE**

- A. To supply and install an irrigation pump station in a non-recreational water supply. The irrigation pump shall be capable of providing 225 gpm at 100 psi to the irrigation system.
- B. The job site will have a 208-volt, three phase power source. All of the equipment and controls provided shall be designed to operate on this power source.

### **2.03 SCOPE**

- A. The pump equipment contractor shall supply new equipment only for this installation. With each bid, the bidding contractor shall supply a similar list of installations (minimum 6) - to include address, site contact, and approximate contract amount.
- B. The general contractor will supply a dedicated 208-volt, 3Ø power source for the water pump equipment operation. The electrical contractor will install wire and conduit between the owner's power source and the pump control panel location.

#### **2.04 SKID ASSEMBLY**

- A. The control skid assembly shall be constructed from a minimum of 1/4" thick by 2" angle iron with 1/4" steel deck plate. Skid assembly shall be constructed as required for proper support of the control panel, control valve, and diaphragm tank. The steel framework for the cage assembly shall be constructed from minimum 1/4" thick by 2" steel angle iron, and shall be constructed with a removable top for service purposes. Lifting eyes shall be attached to the top of the cage for purposes of equipment removal. Lifting eyes installed on the skid base will not be acceptable.
- B. The skid design shall include cross bracing for the purpose of securing the submersible pumps inside the cage assembly. Welding of components shall be in a workmanlike manner to insure that the rack is structurally sound. The cage assembly shall have #9 expanded metal screens on all sides. The completed skid assembly, and support hardware, shall be hot dipped galvanized for final assembly. Cold galvanizing and/or painted pump skids are not approved as an equal.

#### **2.05 FLEXIBLE HOSE**

- A. The SBR (synthetic butyl rubber) hose shall be sized so that velocity of water is equal to or less than 7 feet per second. Size of hose specified shall be the actual inside dimension of the hose, with hose being constructed as a Smooth Bore Hose for maximum flows. High-density polyethylene pipe (HDPE) is not approved as an equal. The SBR hose shall conform to the following specifications:
- B. Standard cover thickness shall be at least 3/32" for all hose up to 20" I.D. The SBR hose shall be black, abrasion and ozone resistant, and corrugated.
- C. The SBR hose shall be manufactured in spiral cord construction, layered with 4 plies of polyester cord to provide strength. A Helix steel wire shall be installed in the hose's carcass to prevent collapse during vacuum service and/or distortion and kinking during severe bending.
- D. The end construction for the SBR hose shall be schedule 40 steel pipe, with ANSI pattern flanges, with the flange connection being rated for 200 psi working pressure.
- E. Flex discharge shall be 14", Temperature Rating: Range = minus 40°F to plus 180°F.
- F. Bolts, etc.: All bolts, gaskets and support material for irrigation pump and cage assembly shall be supplied by manufacturer. All hardware with the exception of flange bolts shall be stainless steel.
- G. High-density Polyethylene pipe is not approved as an equal to the SBR hose.

#### **2.06 SUBMERSIBLE TURBINE PUMP**

- A. The pump shall be designed to pump relatively clean fresh water capable of handling 0.25" solids without damage during operation. The pump and motor shall be designed so that the pump shaft horsepower (BHP) shall not exceed motor rated horsepower throughout the entire operating range of the pump performance curve. The submersible turbine style pump and motor shall conform to the following:
- B. Pump bowls: The pump bowls, suction inlet, and discharge connection shall be of close grain, class 35 cast iron and shall have a minimum tensile strength of 30,000 psi. All castings shall be free from blowholes and shall be accurately machined and fitted to close dimensions.
- C. Pump Impellers: The pump impellers shall be of B1 leaded red brass, accurately machined, finished, and mechanically balanced. Each impeller shall be securely fastened to the impeller shaft with a tapered steel lock collet. Impellers shall be of the enclosed type.
- D. Impeller shaft: The impeller shaft shall be of stainless steel 410 ANSI alloy of not less than 12% chromium content, having a tensile strength of not less than 100,000 psi. "Rustless" iron shall not be considered as equal.
- E. Bowl Bearings: The discharge bearing shall be extra long, bronze constructed, to insure positive shaft alignment and stabilization for extended life. Intermediate bowl bearings shall be supported by a combination of water lubricated, fluted rubber and bronze bearings. The suction bearing shall be a minimum of five (5) shaft diameters in length and shall have a bronze collar designed to prevent abrasives from entering the bearing.
- F. Pump/Motor Coupling: A large stainless steel coupling shall be provided to accurately connect and align the pump and motor. The coupling shall be machined and fitted to close dimensions.
- G. Shroud: Pump shall be equipped with a flow shroud, directing total pump flow past the motor to insure proper motor cooling.

## **2.07 SUBMERSIBLE TURBINE MOTOR**

- A. Construction: The motor shall be a hermetically sealed, water lubricated submersible type motor conforming to NEMA standards. The internal thrust bearing shall be capable of carrying the maximum pump thrust. The motor shall include replaceable motor leads with a positive, water proof connector.
- B. Diaphragm: A large flexible rubber compound shall be statically sealed to the lower motor bracket and will automatically equalize the pressure inside and outside the motor due to fluid expansion during motor operation. It also retains the clean internal fluid in the motor for excellent bearing and motor life.
- C. Motors shall be equipped for the voltage and starting configuration necessary to be compatible with the existing power source and starting requirements, as per local codes.
- D. Couplings shall be bolted to the rotor so as not to allow any uncoupling or slipping during momentary pump upthrust.
- E. The thrust bearing shall have ample capacity to carry the weight of all moving parts, plus the hydraulic thrust of the pump impellers, and have sufficient safety factor. This factor shall be based on continuous duty for five (5) years, operational at 24-hours a day.

## **2.08 UNDERWATER POWER CABLE**



- A. Underwater cable shall be specifically designed for underwater use. The power cable shall be U.L. Listed Interlocked Armored type MC underwater power cable. The conductors shall be flexible, bunch stranded, bare copper, triple insulate to resist moisture, cracking, and softening. The entire cable shall be covered flexible steel armored cover. Power cable shall be able to be furnished in unspliced lengths up to one thousand (1000) feet if necessary.
- B. Submersible pump cable shall be Type MC per Article 334 of the NEC. Individual interior conductors shall be UL Listed Type XHHW -2 (90°C wet or dry) per UL Standard 44. Interlock armor shall be aluminum with PVC UL listed sunlight resistant jacket. Cable shall be rated at 600-volts.
- C. Each cable (power and sensor) shall include a cable strain relief supports, designed to protect the underwater connections in the underwater junction box.

## 2.09 GAUGES

- A. All gauges shall be liquid filled to reduce wear due to vibration. Accuracy shall be within 1%. Gauge diameter shall be at least 2-1/2" minimum. Housing shall be impact resistant stainless steel, with stainless steel internals. Range shall be at least 30% higher than the highest pressure attainable from the pumps at shutoff head conditions. Gauges shall sense control valve inlet and outlet pressures and shall be mounted as described under the main control valve specifications.

## 2.10 VFD PUMP CONTROL PANEL

- A. All Recirculation pump, Irrigation Pump, and False Weir Pump controls to be centrally located in Aluminum NEMA 4 Bison ProFab electrical enclosures.
- B. The variable speed pump controller shall be *iQpump* by Yaskawa Electric America, Inc. The *iQpump* Controller is designed for use with AC induction pump motors incorporating true pump control system logic, and pump terminology embedded within the controller and displayed on the programming operator interface.
- C. *iQpump* shall have a complete integrated pumping macro with its pump specific parameters allowing the operator to setup specific control values for a wide range of pumping applications such as constant pressure, constant flow, and level control. *iQpump* will automatically adjust pump operating conditions, as the process variables change within the defined programmable pump settings while still maintaining optimum pump performance and protection.
- D. The *iQpump* Controller can be configured for Simplex, Duplex, and Triplex pump systems using one master *iQpump* Controller with the ability to add additional pumps on-line.
- E. Standard variable frequency drives (VFD's) NOT incorporating true pump control terminology, pump curve NO Flow & Dead Head detection settings, System Pre-Charge Levels, Independent Thrust Bearing Control, Multiplex Operation, and Multiple pump alarm messages specific to the pump control system and motor shall not be considered equal or acceptable.

## 2.11 RATINGS

- A. VFD must operate, without fault or failure, when voltage varies plus 10% or minus 15% from rating, and frequency varies plus or minus 5% from rating.
- B. Displacement Power Factor: 0.98 over entire range of operating speed and load.

- C. Operating Ambient Temperature: -10 degrees C to 40 degrees C (14 degrees F to 104 degrees F)
- D. Humidity: 0% to 95% non-condensing.
- E. Altitude: to 3,300 feet, higher altitudes achieved by derating.
- F. Minimum Efficiency: 96% at half speed; 98% at full speed.
- G. Starting Torque: 100% starting torque shall be available from 0.5 Hz. to 60 Hz.
- H. Overload capability: 110% of rated FLA (Full Load Amps) for 60 seconds; 180% of rated FLA, instantaneously.
- I. The VFD must meet the requirements for Radio Frequency Interference (RFI) above 7 MHz as specified by FCC regulations, part 15, subpart J, Class A devices.
- J. VFDs must have a minimum short circuit rating of 100K amps RMS without additional input fusing.

## 2.12 DESIGN

- A. VFD shall employ microprocessor based inverter logic, isolated from all power circuits.
- B. VFD shall include surface mount technology with protective coating.
- C. VFD shall employ a PWM (Pulse Width Modulated) power electronic system, consisting of:
  - 1. Input Section:
    - a. VFD input power stage shall convert three-phase AC line power into a fixed DC voltage via a solid state full wave diode rectifier, with MOV (Metal Oxide Varistor) surge protection.
  - 2. Intermediate Section:
    - a. DC bus as a supply to the VFD output Section shall maintain a fixed voltage with filtering and short circuit protection.
    - b. DC bus shall be interfaced with the VFD diagnostic logic circuit, for continuous monitoring and protection of the power components.
    - c. 3 HP to 150 HP @ 208 VAC, 30 HP to 150 HP @ 240 VAC, and 40 HP to 500 HP 480 VAC, VFDs shall include a DC bus reactor to minimize reflected harmonics.
  - 3. Output Section
    - a. Insulated Gate Bipolar Transistors (IGBTs) shall convert DC bus voltage to variable frequency and voltage.
    - b. The VFD shall employ PWM sine coded output technology to power the motor.
- D. The VFD must be selected for operation at carrier frequencies at or above 5 kHz without derating to satisfy the conditions for current, voltage, and horsepower as indicated on the equipment schedule. Exception to this requirement is allowed only for VFDs providing 506 amps or more.
- E. The VFD must have plated bus bar to resist corrosion.
- F. VFD shall have an adjustable carrier frequency: The carrier frequency shall have a minimum of six settings to allow adjustment in the field.
- G. VFD shall have optional protocols for network communications. These protocols shall be accessible via a RS-422/485 communication port.
- H. VFD shall have a quick disconnect, removable control I/O terminal block to simplify control

- wiring procedures.
- I. VFD shall include two independent analog inputs. One shall be 0-10 VDC. The other shall be programmable for either 0-10 VDC or 4-20 mA. Either input shall respond to a programmable bias and gain. 4-20mA signal shall be generated by a Kele PSS2 series 304L / 316L wetted part pressure transducer or approved equal.
  - J. VFD shall include a minimum of seven multi-function digital input terminals, capable of being programmed to determine the function on a change of state. These terminals shall provide up to 30 functions, including, but not limited to:
    1. Hand – Off – Auto operation selection
    2. Detection of external fault condition
    3. Remote Reset
    4. Multi-step speed commands
    5. Run permissive
    6. Floating control
  - K. VFD shall include two 0-10 VDC or 4-20 mA analog output for monitoring, or "speed tracking" the VFD. The analog output signal will be proportional to output frequency, output current, output power, PI (Proportional & Integral control) feedback or DC bus voltage.
  - L. VFD shall provide terminals for remote input contact closure, to allow starting in the automatic mode.
  - M. VFD shall include at least one external fault input, which shall be programmable for a normally open or normally closed contact. These terminals can be used for connection of firestats, freezestats, high pressure limits or similar safety devices.
  - N. VFD shall include two form "A" contacts and one form "C" contact, capable of being programmed to determine conditions that must be met in order for them to change state. These output relay contacts shall be rated for at least 5A at 120 VAC and shall provide up to 18 functions, including, but not limited to:
    1. Pump Fault
    2. Low and High Pressure detection
    3. Pump Over Cycling detection
    4. Loss of Prime detection.
    5. Drive Fault
    6. Over/Under Torque detection
    7. Not Maintaining Set Point detection.
  - O. VFD shall include a power loss ride through of 2 seconds.
  - P. VFD shall have DC injection braking capability.
  - Q. VFD shall have a motor preheat function to prevent moisture accumulation in an idle motor.
  - R. VFD shall include diagnostic fault indication in selected language, last 10 faults storage and heatsink cooling fan operating hours.
  - S. VFD shall have a digital operator with dedicated Hand-Off-Auto keys with program copy and storage functions to simplify set up of multiple drives. The digital operator shall be interchangeable for all drive ratings.
  - T. VFD shall include a front mounted, sealed keypad operator, with an English language illuminated LCD display. The operator will provide complete programming, program copying, operating, monitoring, and diagnostic capability. Keys provided shall include industry standard commands for Hand, Off, and Auto functions.

- U. VFD plain language display shall provide readouts of; output frequency in hertz, PI feedback in percent, pump speed in RPM, set point and feedback level in programmable engineering units (PSI, GPM ,etc.) output voltage in volts, output current in amps, output power in kilowatts, D.C. bus voltage in volts, interface terminal status, heatsink temperature and fault conditions. All displays shall be viewed in an easy-to-read illuminated LCD.
- V. VFD unit shall include the following meters to estimate use of energy:
  - 1. Elapsed Time Meter
  - 2. Kilowatt Meter
  - 3. Kilowatt Hour Meter
- W. VFD shall include PI control logic, to provide closed loop setpoint control capability, from a feedback signal, eliminating the need for closed loop output signals from a building automation system. The PI controller shall have a differential feedback capability for closed loop control of pumps for pressure, flow or temperature regulation in response to dual feedback signals.
- X. An energy saving function shall be available in both open loop (follower mode) and closed loop (PI) control, providing significant energy savings while minimizing operating hours on driven equipment. When the sleep function senses a minimal deviation of a feedback signal from setpoint, or low demand in open loop control, the system reacts by stopping the driven equipment. Upon receiving an increase in speed command signal deviation, the drive and equipment resume normal operation.
- Y. VFD shall include loss of input signal protection, with a selectable response strategy including speed default to a percent of the most recent speed.
- Z. VFD shall include electronic thermal overload protection for both the drive and motor. The electronic thermal motor overload shall be approved by UL. If the electronic thermal motor overload is not approved by UL, a separate UL approved thermal overload relay shall be provided in the VFD enclosure.
- AA. VFD shall include factory settings for all parameters, and the capability for those settings to be reset.
- BB. VFD shall include user parameter initialization capability to re-establish project specific parameters
- CC. VFD shall include the capability to adjust the following functions, while the VFD is running:
  - 1. Set Point command input.
  - 2. Acceleration adjustment from 0 to 6000 seconds.
  - 3. Deceleration adjustment from 0 to 6000 seconds.
  - 4. Analog monitor display.
  - 5. Removal of digital operator.

### **2.13 *iQpump* SOFTWARE FEATURES**

- A. Pump specific firmware shall have embedded within the *iQpump* controller. These pump specific software functions and settings shall be standard as minimum. All control features, Alarms, and Faults shall be displayed in intuitive system pump terminology on the digital operator. Parameter codes with abbreviations are not acceptable.
- B. Hand/Off/Auto Run operation from digital operator without stopping (bumpless transfer). Operator to display current operational mode. Example: Off Mode, Hand Mode, Hand Mode Reference, and Automatic Mode.
- C. Digital operator can be configured to lock out "Hand" with only off and auto run enabled.
- D. Auto Restart on complete power loss. If in Auto Mode without external run control for

start/stop, the pump system will automatically restart to maintain set point and cycle through all safety & restart conditions.

- E. Programmable Engineering units (PSI, GPM, LPH) for set point, feedback, and parameter scaling. It is not acceptable to use percent of VFD parameters for pump level settings.
- F. Programmable start levels, sleep levels, stop levels with engineering units specific to pump application. Example: PSI, GPM, LPH, etc.
- G. Programmable scaling for feedback levels with feedback transducer loss protection based on level and delay time. Both of these functions shall be independent.
- H. Quick Start Menu for pump settings and startup.
- I. System Pre-Charge: Programmable settings in pump engineering units that allows for charging of the pump system prior to automatic mode. Dedicated pre-charge system level settings with programmable timers. PI control is turned off and will enable automatically once operation is completed.
- J. Thrust Bearing: Programmable operation that will allow the pump motor to rapidly accelerate to a fixed speed with independent timers. PI control is turned off and will enable automatically once operation is completed.
- K. Programmable Low and High Pressure feedback settings with timers.
- L. Programmable pump over cycling timer.
- M. Programmable low water & high water input settings.
- N. Programmable Pump Motor heating level when stopped to control motor condensation.
- O. Programmable No Flow or Dead Head Pump Curve protection allowing for either settings in Hz, Engineering units (PSI, GPM, etc) or motor RPM.
- P. Duplex Operation from master *iQpump* controller to independently operate up to three (3) pumps. System master controller to have independent control settings in engineering units for pump system to turn on and off. System stabilization to also be included.
- Q. Dedicated English Pump Alarms & Messages: Flashing LED or abbreviated codes are not acceptable:
  - 1. Low Feedback
  - 2. High Feedback
  - 3. Low Water
  - 4. Pump Over Cycling Detection
  - 5. No Flow Detection
  - 6. Loss of Prime Detection
  - 7. Pump Fault
  - 8. Motor Thermostat Fault
  - 9. Pre-Charge Mode Active
  - 10. Thrust Bearing Active
  - 11. Start Mode Active
  - 12. Sleep Mode Active
  - 13. Feedback Loss Detection

## 2.14 AC Communication Tools

- A. *iQpump* as standard is supplied with a pump controller SCADA PC program that allows the users to program pump parameter settings, drive commissioning, and diagnose system conditions.
- B. As standard The PC program should have the following functions:
- C. Online PID tuner with graphical representation
- D. System trending recorder (Oscilloscope) that allows a minimum of 6 signals to be graphed with a playback mode.
- E. Run Status Page with pump visual graphics allowing for all pump functions such as, set points, feedback levels, faults, alarms, and Multiplex operation to be displayed with actual running data.
- F. Programming parameter page for all pump specific parameters allowing for pre-setup, online changes, and complete upload/download of settings.
- G. Pump Setup Wizard to be a graphical interface configured to ask questions to the operator for pump parameter settings based on pump application.
- H. Pump Simulator with graphical interface allowing for training of engineers, service and start up technicians that will emulate the actual pump running conditions based on pump parameters settings, set point and feedback levels.
- I. Program shall be able to communicate to pump controller via RS232/485, and Ethernet TCP/IP.
- J. PC tool shall be automatically updated via the internet.

## **2.15 TESTING and QUALITY CONTROL**

- A. In-circuit testing of all printed circuit boards shall be conducted, to insure the proper mounting and correct value of all components.
- B. All printed circuit boards shall be burned in for 4 hours, at 60 degrees C.
- C. Final printed circuit board assemblies shall be functionally tested, via computerized test equipment. All tests and acceptance criteria shall be preprogrammed. All test results shall be stored as detailed quality assurance data.
- D. All fully assembled controls shall be functionally tested, with fully loaded induction motors. The combined test data shall then be analyzed, to insure adherence to quality assurance specifications.
- E. Inspect and production test, under load, each completed VFD assembly.

## **2.16 ADDITIONAL PUMP STATION EQUIPMENT**

- A. Pump Check Valve: Pump check valves shall be a globe style silent check assembly. The valve bodies shall be cast from grade 35 cast iron or better and shall be free from blow holes, sand holes, and other impurities. Internals shall be machined bronze disc and stem guide and shall be aligned to allow proper seating and full closure before reversal. Seat shall be Buna-N to provide resilient sealing. Valves shall be sized to permit full pump capacity flow without exceeding a pressure drop of 3 psi.

- B. Shoreline Pipe Flanged Adaptors: Steel pipe shoreline piping shall be installed at shores' edge. One end shall be flanged for connection to the SBR flexible hose while the other end shall be customized to connect to the shoreline piping - as required. Thrust arms shall be welded onto the steel pipe assembly so that a concrete thrust block can be poured to secure the steel pipe assembly in place. All connections shall be rated for 30 inches of mercury and/or a working pressure of 200 psi.

## **2.17 PUMP ISOLATION VALVE**

- A. System isolation valve shall be installed on the shoreline pipe, to completely isolate the pumping system from the piping system. Valve shall have one piece body cast from meehanite iron. Stem shall be 416 stainless steel. Disc shall be cadmium plated ductile iron. Stem bushing shall be luberized bronze to prevent stem seizure to body during prolonged periods of non-use. Seat shall be Buna-N elastomer, one piece construction, and shall also form the flange sealing gaskets. Handle shall be ten position lever locking. Valve shall be rated at 150-psi bubble shutoff.
- B. The valve shall be installed with a valve box for access to the operating handle for flow adjustment and pump isolation purposes. A valve key shall also be supplied by the pump station supplier and shall be designed to open and close the gate valve.

## **2.18 HYDROPNEUMATIC TANK**

- A. Diaphragm Tank: The station shall be equipped with a 26 gallon diaphragm tank, rated at 150 psi, and shall be constructed in accordance with ASME code requirements. The tank is to be installed and connected downstream of the main control valve. The tank shall provide reserve draw down to keep the pump from cycling to often during non irrigation periods.

## **2.19 SELF FLUSHING LAKE SCREEN**

- A. Each pump shall be equipped with a rotational self flushing lake screen assembly and hydraulic interface piping / controls. These screens shall be installed in the pump cage on the suction end of each motor shroud. Each screen shall be controlled independently so that they operate only when the corresponding pump and motor are operational. Each automatic self flushing screen shall be equipped with epoxy coated aluminum screen material, equipped with .094" perforations (3/32").

**NOTE:** Final Pump flow requirements must cover the additional water flow and pressure required for proper lake screen rotation and flushing requirements.

## **PART 3 - EXECUTION**

### **3.01 GENERAL INSTALLATION**

- A. Install and connect all equipment in accordance with manufacturer's instructions and recommendations unless otherwise noted. If specified installation is contrary to manufacturer's instructions, cease installation of affected components or systems. Notify the general contractor and do not resume installation without clear instructions from the Architect.
- B. Protect pipes, conduits, and equipment from damage from inclement weather.

### **3.02 PUMP CAGE ASSEMBLY INSTALLATION**

A. General.

1. Installation in strict accordance with manufacturer's recommendations and instructions.
2. Install pump cage with a crane using the lifting eyes provided on the top of the cage assembly.
3. Protect the control panel assembly from flooding. Conduit entries shall be protected from moisture entry prior to connection. If the pump control panel equipment is installed in an area that maybe vandalized, a temporary lock shall be installed by the pump station contractor to prevent damage.

B. Installation Procedure.

1. Excavate to job site conditions to properly locate the shoreline pipe assembly.
2. Place the steel shoreline pipe assembly into the excavation and pour 3000 lb. concrete around the thrust arms to secure the pipe assembly.
3. Make sure the armored cable is not poured into the concrete thrust blocks and secure this cable so the site electrician can make the appropriate connections.
4. Connect piping and the SBR hose.
5. Install backfill material.

C. Backfill Procedure.

1. Backfill steel pipe with rock free excavated materials. Compact backfill in 6" layers providing a minimum of 95% compaction.
2. Excess excavation materials can be relocated to a designated area on job site.

**3.03 CONDUCTOR COLOR CODE**

- A. Color code conductors (600-volts and under) and identify by one color with continuity being maintained throughout the project.
- B. Color Code as follows:
- |           |       |
|-----------|-------|
| Phase "A" | Black |
| Phase "B" | Red   |
| Phase "C" | Blue  |
| "Neutral" | White |
| "Ground"  | Green |

**3.04 CLEAN UP**

- A. Keep site clean daily. Upon completion of work, remove unused equipment and implements of service, and leave the entire area involved in a neat, clean and acceptable condition.
- B. Water pipe lines shall be flushed, when possible, prior to the final pipe connection.

**3.05 TESTS AND ADJUSTMENTS**



- A. General: Test all equipment to show that it complies with specified requirements.
- B. Piping Tests:
  - 1. SBR Hose - use air tests.
  - 2. Field piping - use water test at pump deadhead pressure.
- C. Electrical Tests: Electrical circuits, feeders, and equipment shall be tested for faulty grounds, open circuits, or shorts as per local code requirements. Ground Fault Equipment shall be fully operational.
- D. An authorized service technician from the pump equipment supplies shall provide the startup and calibration for the water pump equipment. Any adjustments or corrections to the equipment shall be made until the equipment is shown to be in proper operating condition.
- E. As soon as the pump system and pipe system has been completed and the mechanical and electrical equipment has been installed and tested, the equipment will be place in operation.
- G. A completed startup procedure sheet shall be signed by an owner's representative, a general contractor's representative, and the pump equipment supplier representative upon completion of the startup and training procedure.

**END OF SECTION**

## SECTION 02812

### SKID-N-PUMP™ RECIRCULATION PUMP SYSTEM

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Water recirculation pump station mechanical and electrical work.

##### 1.02 RELATED SECTIONS

- A. Division 2 Section - Earthwork
- B. Division 2 Section - Concrete
- C. Division 15 - Mechanical
- D. Division 16 - Electrical

##### 1.03 REFERENCES

- A. Comply with applicable provisions of the latest edition of the following codes and standard specifications:

NEC	National Electrical Code
NFPA	National Fire Protection Association
UBC	Uniform Building Code
UPC	Uniform Plumbing Code
ASTM	American Society for Testing and Materials
ANSI	American National Standards Institute
ASME	American Society of Sanitary Engineering
AWWA	American Water Works Association
CS	Commercial Standards
NEMA	National Electrical Manufacturers Association
NSF	National Sanitation Foundation
UL	Underwriters Laboratories, Inc.
CSA	Canadian Standards Association
EIA	Electronic Industries Association

##### 1.04 WORK INCLUDED

- A. Water recirculation pump system including pump, valves, skid assembly, controls and specialties.
- B. Armored underwater power and sensor cable including cable, junction boxes and re-entenable potting compound.
- C. Special tools for operation and maintenance of the equipment provided.
- D. Provide water recirculation pump system which will provide water recirculation to the following locations:
  - 1) Island locations, 8 discharge points, 60 gpm each, 480 gpm
  - 2) North East creek discharge, 1 discharge point, 200 gpm
  - 3) Grotto waterfall and Grotto spouts, 982 gpm providing approximately 1/2" weir flow at waterfall

### **1.05 PERSONNEL TRAINING**

- A. Make provisions for technical instruction of owner's maintenance personnel, by the equipment supplier's personnel.

### **1.06 QUALITY ASSURANCE**

- A. Recirculation pump system supplier / installer must have a minimum of five (5) years commercial installation prior experience – similar in size and complexity. The supplier / installation company must have bonding capabilities up to one million dollars with an A-Rated Bonding Entity.
- B. For approval as an approved recirculation pump supplier / installer, companies must provide written documentation for installing similar pump system installations, including a list of (5) comparable commercial projects with photos of equipment skid installations, pipe installations, control panel installations, and completed recirculation pump operational photos.
- C. When the specifications and drawings call for described materials, workmanship, or certain construction methods, the pump system supplier / installation company is expected to comply or exceed all requirements – as specified or drawn. Any exceptions to this requirement must be turned in to the architect for approval so the alternate material(s) or installation methods can be approved and provided to all bidders as an addendum to the bid specifications.
- D. Recirculation pump system supplier / installer must be able to provide appropriate insurance for the duration of the project installation, to include, but not be limited to state approved workman's comp insurance and two million dollar general liability insurance.

### **1.07 SITE CONDITIONS**

- A. Take special care to protect existing improvements, existing trees, and vegetation scheduled to remain. Do not begin work until existing improvements and landscape have been adequately protected. Maintain barricades and other protection work throughout the duration of the contract.

### **1.08 SUBMITTALS**

- A. Submit under provisions of Section 01300
- B. Product Data: Provide manufacturer data sheets.
- C. Manufacturer's installation instructions indicating criteria for preparation and application.

## **PART 2 - PRODUCTS**

### **2.01 WATER RECIRCULATION PUMP EQUIPMENT SUPPLIER**

- A. Greenscape Pump Services, Inc.  
1425 Whitlock Lane, Suite 108 • Carrollton, Texas 75006  
Telephone: (972) 446-0037 • Fax: (972) 446-0313  
Contact Persons: Mr. Keith Duckett.

### **2.02 PURPOSE**

- A. To supply and install a water recirculation pump station in a non-recreational water supply to provide recirculation to discharge points described in 1.04, D.
- B. The job site will have a 208-volt, three phase power source. All of the equipment and controls provided shall be designed to operate on this power source.

### **2.03 SCOPE**

- A. The pump equipment contractor shall supply new equipment only for this installation. With each bid, the bidding contractor shall supply a similar list of installations (minimum 6) - to include address, site contact, and approximate contract amount.
- B. The general contractor will supply a dedicated 208-volt, 3Ø power source for the water pump equipment operation. The electrical contractor will install wire and conduit between the owner's power source and the pump control panel location.

### **2.04 SKID ASSEMBLY**

- A. The steel framework for the cage assembly shall be constructed from minimum 1/4" thick by 2" steel angle iron, and shall be constructed with a removable top for service purposes. Lifting eyes shall be attached to the top of the cage for purposes of equipment removal. Lifting eyes installed on the skid base will not be acceptable.
- B. The skid design shall include cross bracing for the purpose of securing the submersible pumps inside the cage assembly. Welding of components shall be in a workmanlike manner to insure that the skid is structurally sound. The cage assembly shall have #9 expanded metal screens on all sides. The completed skid assembly, and support hardware, shall be hot dipped galvanized for final assembly. Cold galvanizing and/or painted pump skids are not approved as an equal.

### **2.05 FLEXIBLE HOSE**

- A. The SBR (synthetic butyl rubber) hose shall be sized so that velocity of water is equal to or less than 7 feet per second. Size of hose specified shall be the actual inside dimension of the hose, with hose being constructed as a Smooth Bore Hose for maximum flows. High-density polyethylene pipe (HDPE) is not approved as an equal. The SBR hose shall conform to the following specifications:
- B. Standard cover thickness shall be at least 3/32" for all hose up to 20" I.D. The SBR hose shall be black, abrasion and ozone resistant, and corrugated.
- C. The SBR hose shall be manufactured in spiral cord construction, layered with 4 plies of polyester cord to provide strength. A Helix steel wire shall be installed in the hose's carcass to prevent collapse during vacuum service and/or distortion and kinking during severe bending.
- D. The end construction for the SBR hose shall be schedule 40 steel pipe, with ANSI pattern flanges, with the flange connection being rated for 200 psi working pressure.
- E. Flex discharge shall be 14", Temperature Rating: Range = minus 40°F to plus 180°F.
- F. Bolts, etc.: All bolts, gaskets and support material for irrigation pump and cage assembly shall be supplied by manufacturer. All hardware with the exception of flange bolts shall be stainless steel.

- G. High-density Polyethylene pipe is not approved as an equal to the SBR hose.

## **2.06 SUBMERSIBLE TURBINE PUMP**

- A. The pump shall be designed to pump relatively clean fresh water capable of handling 0.25" solids without damage during operation. The pump and motor shall be designed so that the pump shaft horsepower (BHP) shall not exceed motor rated horsepower throughout the entire operating range of the pump performance curve. The submersible turbine style pump and motor shall conform to the following:
- B. Pump bowls: The pump bowls, suction inlet, and discharge connection shall be of close grain, class 35 cast iron and shall have a minimum tensile strength of 30,000 psi. All castings shall be free from blowholes and shall be accurately machined and fitted to close dimensions.
- C. Pump Impellers: The pump impellers shall be of B1 leaded red brass, accurately machined, finished, and mechanically balanced. Each impeller shall be securely fastened to the impeller shaft with a tapered steel lock collet. Impellers shall be of the enclosed type.
- D. Impeller shaft: The impeller shaft shall be of stainless steel 410 ANSI alloy of not less than 12% chromium content, having a tensile strength of not less than 100,000 psi. "Rustless" iron shall not be considered as equal.
- E. Bowl Bearings: The discharge bearing shall be extra long, bronze constructed, to insure positive shaft alignment and stabilization for extended life. Intermediate bowl bearings shall be supported by a combination of water lubricated, fluted rubber and bronze bearings. The suction bearing shall be a minimum of five (5) shaft diameters in length and shall have a bronze collar designed to prevent abrasives from entering the bearing.
- F. Pump/Motor Coupling: A large stainless steel coupling shall be provided to accurately connect and align the pump and motor. The coupling shall be machined and fitted to close dimensions.
- G. Shroud: Pump shall be equipped with a flow shroud, directing total pump flow past the motor to insure proper motor cooling.

## **2.07 SUBMERSIBLE TURBINE MOTOR**

- A. Construction: The motor shall be a hermetically sealed, water lubricated submersible type motor conforming to NEMA standards. The internal thrust bearing shall be capable of carrying the maximum pump thrust. The motor shall include replaceable motor leads with a positive, water proof connector.
- B. Diaphragm: A large flexible rubber compound shall be statically sealed to the lower motor bracket and will automatically equalize the pressure inside and outside the motor due to fluid expansion during motor operation. It also retains the clean internal fluid in the motor for excellent bearing and motor life.
- C. Motors shall be equipped for the voltage and starting configuration necessary to be compatible with the existing power source and starting requirements, as per local codes.
- D. Couplings shall be bolted to the rotor so as not to allow any uncoupling or slipping during momentary pump upthrust.

- E. The thrust bearing shall have ample capacity to carry the weight of all moving parts, plus the hydraulic thrust of the pump impellers, and have sufficient safety factor. This factor shall be based on continuous duty for five (5) years, operational at 24-hours a day.

## **2.08 UNDERWATER POWER CABLE**

- A. From a shoreline junction box to the submersible pump system underwater power cable shall be used. Underwater cable shall be specifically designed for underwater use. The power cable shall be U.L. Listed Interlocked Armored type MC underwater power cable. The conductors shall be flexible, bunch stranded, bare copper, triple insulate to resist moisture, cracking, and softening. The entire cable shall be covered flexible steel armored cover. Power cable shall be able to be furnished in unspliced lengths up to one thousand (1000) feet if necessary.
- B. Submersible pump cable shall be Type MC per Article 334 of the NEC. Individual interior conductors shall be UL Listed Type XHHW -2 (90°C wet or dry) per UL Standard 44. Interlock armor shall be aluminum with PVC UL listed sunlight resistant jacket. Cable shall be rated at 600-volts.
- C. Each cable (power and sensor) shall include a cable strain relief supports, designed to protect the underwater connections in the underwater junction box.

## **2.09 STATION PIPING**

- A. Separate pump discharge piping shall be constructed from ASTM A120, ASTM A53, or API 5L steel pipe. Piping 6" in diameter or smaller shall be constructed from schedule 40 steel pipe or heavier, and piping 8" and larger shall be constructed from schedule 30 pipe or heavier.
- B. All piping shall be sized so that the average velocity does not exceed 4.8 feet per second, and at no point exceed 9.5 feet per second.
- C. Welded steel fittings shall meet the following standards: ANSI B16.9, ASTM A234 and shall be schedule 40 or heavier. Flanged steel fittings shall meet the following standards: ANSI B16.5, ASTM A181 and A105 and shall be 150 lb. All discharge piping shall be hot dipped galvanized. Cold galvanizing or painting is not acceptable.

## **2.10 DISPLAY NOZZLE**

- A. Display nozzles shall be a smooth bore design effect with be adjustable swivel to allow for minor spray pattern changes. Nozzle shall produce a smooth arching spray pattern into the Grotto waterfall basin. Nozzle shall be machined cast brass and bronze construction. The nozzle pod assembly shall include a 2" NPT connection for the pump discharge pipe interface.

## **2.11 PUMP CONTROL PANEL**

- A. All Recirculation pump, Irrigation Pump, and False Weir Pump controls to be centrally located in Aluminum NEMA 4 Bison ProFab electrical enclosures.

- B. Control panel shall be housed in NEMA 4 enclosure and shall provide for water recirculation pump startup and shutdown with the appropriate safety features for pump / motor operation. Running time meters shall display, in hours and tenths, the total time of each motor. Hour meters shall not be resettable, to insure continuous time monitoring. All indicating lights, reset buttons, and selector switches, shall be mounted in enclosure door.
- C. Power for the controls shall be 120 volts, single-phase for system operation. Power shall be provided by pulling one leg to ground of the incoming power. Appropriate size circuit breakers shall provide short circuit protection for the controls.
- D. Each pump motor shall include a hand / off / automatic select switch for the appropriate pump / motor control. All components shall be labeled for proper identification and shall be accessible from the front of the enclosure for ease in maintenance and adjustment. Complete electrical schematics shall be attached to the inside of the door for future service. All components used shall be readily available from major metropolitan vendors.
- E. The panel face switches and lights shall include:
  - 1. Individual pump run lights
  - 2. Individual pump hand/off/auto switches
  - 3. Low water level safety
  - 4. Push button reset

Panel shall include the following safety circuits:

- 1. Phase failure or loss safety circuit shall retire the water recirculation pump station if it experiences a loss of one leg of power as monitored at load side of the motor overload monitor. Phase failure circuit shall have indicating light and manual reset button. Automatic reset of the phase protection circuit shall not be permitted for safety reasons.
  - 2. Low water circuit shall shutdown water recirculation pump system in the event a low water condition in the supply lake occurs. The indicating light mounted in the enclosure door shall signal low-level shutdown, and shall have a red lens. The irrigation pump shall not operate until the safety has been manually reset and the lake level has returned to a safe operating condition.
  - 3. All electrical equipment shall be protected by a secondary lightning arrestor to suppress surges on incoming power. Lightning arrestor shall have a maximum clamping voltage of 1500 VRMS or less, with an unlimited power rating. Response time at terminal shall be one (1) microsecond per ten (10) kilovolts. Extreme duty discharge shall be twenty (20) kiloamps on an 8 by 20 microsecond wave shape. Minimum break over voltage shall be 750 VRMS at one (1) kiloamp on an 8 by 20 microsecond waveshape.
  - 4. Controls shall include a Ground Fault Monitor suitable for 208 volt three phase motor operation monitoring. Ground fault circuit shall shut down the pump system in the event of a ground vault status. It shall include an external measuring current transformer. The ground fault device shall have a minimum response value range of 6 mA – 600 mA with a response time of less than or equal to 20 milliseconds. Ground fault device shall be Bender RCM470 series or approved equal.
- F. Motor starting equipment
    - 1. A branched fused main disconnect shall be provided to completely isolate all controls, and motor starting equipment from incoming power. The disconnect shall be sized so that it is not loaded beyond 80% of its capacity.

2. All motor starting equipment shall be located in the NEMA 4 enclosure. Pump motor starters shall meet I.E.C. standards and shall be rated for a minimum of 1,250,000 operations. Motor overload relays shall be I.E.C. rated class 10 ambient compensated. Fuses shall supply short circuit protection to each motor, and shall not be rated at less than fault current available to the motor.

G. Power Requirements: 208 volt (± 5%), 3  $\phi$ , 60 Hertz

H. Motor Wiring (located between control panel & each motor)

1. Motor wiring shall conform to National Electric Code Standards. All wiring from the control panel to lakes edge shall be installed in liquid-tight conduit with copper conductors rated not less than 600 volts AC and of proper size to carry the full load amperage of the motors without exceeding 70% capacity of the conductor. A grounding cable shall be included in each liquid-tight connector.

## **2.10 SELF FLUSHING LAKE SCREEN**

- A. The water recirculation pump shall be equipped with a rotational self flushing lake screen assembly and hydraulic interface piping. This screen shall be installed in the pump cage on the suction end of the motor shroud. This screen shall include direct plumbing from the pump discharge so that it operates any time the pump and motor are operational. Each automatic self flushing screen shall be equipped with epoxy coated aluminum screen material, equipped with .094" perforations (3/32").

## **2.11 LIGHT PACKAGE**

- A. The 120 volt light set shall include twenty five (25) cast bronze light housings with 250 watt lamps. The light housings shall include neoprene gaskets, tempered lenses, stainless steel lens protectors and stainless steel attachment brackets. Each light fixture shall be equipped with enough #16-3ST submersible light cable, with a ground wire positively grounded inside the fixture, so the light can be removed from the water for service. Each light fixture shall be tested to hold 10 psi of air pressure with the fixture submerged in water.
- B. Fountain light circuits shall be provided from an alternate power source at the Grotto waterfall location. Operation shall be controlled by a photo cell on/off or time clock circuit. Refer to electrical plans for lighting control.

## **PART 3 - EXECUTION**

### **3.01 GENERAL INSTALLATION**

- A. Install and connect all equipment in accordance with manufacturer's instructions and recommendations unless otherwise noted. If specified installation is contrary to manufacturer's instructions, cease installation of affected components or systems. Notify the general contractor and do not resume installation without clear instructions from the Architect.
- B. Protect pipes, conduits, and equipment from damage from inclement weather.

### **3.02 PUMP CAGE ASSEMBLY INSTALLATION**



- A. Installation in strict accordance with manufacturer's recommendations and instructions.
- B. Install pump cage with a crane using the lifting eyes provided on the top of the cage assembly.
- C. Protect the control panel assembly from flooding. Conduit entries shall be protected from moisture entry prior to connection. If the pump control panel equipment is installed in an area that maybe vandalized, a temporary lock shall be installed by the pump station contractor to prevent damage.
- D. Excavate to job site conditions to properly locate the shoreline pipe assembly.
- E. Place the steel shoreline pipe assembly into the excavation and pour 3000 lb. concrete around the thrust arms to secure the pipe assembly.
- F. Make sure the armored cable is not poured into the concrete thrust blocks and secure this cable so the site electrician can make the appropriate connections.
- G. Connect piping and the SBR hose.
- H. Install backfill material.
- I. Backfill steel pipe with rock free excavated materials. Compact backfill in 6" layers providing a minimum of 95% compaction.
- J. Excess excavation materials can be relocated to a designated area on job site.

### **3.03 CONDUCTOR COLOR CODE**

- A. Color code conductors (600-volts and under) and identify by one color with continuity being maintained throughout the project.
- B. Color Code as follows:

Phase "A"	Black
Phase "B"	Red
Phase "C"	Blue
"Neutral"	White
"Ground"	Green

### **3.04 CLEAN UP**

- A. Keep site clean daily. Upon completion of work, remove unused equipment and implements of service, and leave the entire area involved in a neat, clean and acceptable condition.

### **3.05 TESTS AND ADJUSTMENTS**

- A. General: Test all equipment to show that it complies with specified requirements.

- B. Electrical Tests: Electrical circuits, feeders, and equipment shall be tested for faulty grounds, open circuits, or shorts as per local code requirements. Ground Fault Equipment shall be fully operational.
- C. An authorized service technician from the pump equipment supplies shall provide the startup and calibration for the water pump equipment. Any adjustments or corrections to the equipment shall be made until the equipment is shown to be in proper operating condition.
- D. As soon as the pump system and electrical equipment has been installed and tested, the equipment will be place in operation.
- E. A completed startup procedure sheet shall be signed by an owner's representative, a general contractor's representative, and the pump equipment supplier representative upon completion of the startup and training procedure.

**END OF SECTION**

## SECTION 02813

### FALSE WEIR RECIRCULATION PUMP SYSTEM

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Water recirculation pump station mechanical and electrical work.

##### 1.02 RELATED SECTIONS

- A. Division 2 Section - Earthwork
- B. Division 2 Section - Concrete
- C. Division 15 - Mechanical
- D. Division 16 - Electrical

##### 1.03 REFERENCES

- A. Comply with applicable provisions of the latest edition of the following codes and standard specifications:

NEC	National Electrical Code
NFPA	National Fire Protection Association
UBC	Uniform Building Code
UPC	Uniform Plumbing Code
ASTM	American Society for Testing and Materials
ANSI	American National Standards Institute
ASME	American Society of Sanitary Engineering
AWWA	American Water Works Association
CS	Commercial Standards
NEMA	National Electrical Manufacturers Association
NSF	National Sanitation Foundation
UL	Underwriters Laboratories, Inc.
CSA	Canadian Standards Association
EIA	Electronic Industries Association

##### 1.04 WORK INCLUDED

- A. Water recirculation pump system including pump, valves, skid assembly, controls and specialties.
- B. Underwater power and sensor cable including cable, junction boxes and re-enterable potting compound.
- C. Special tools for operation and maintenance of the equipment provided.
- D. Provide water recirculation pump system which will provide water recirculation to the following locations: 1) False weir, 361 GPM, 36 TDH.

### **1.05 PERSONNEL TRAINING**

- A. Make provisions for technical instruction of owner's maintenance personnel, by the equipment supplier's personnel.

### **1.06 QUALITY ASSURANCE**

- A. Recirculation pump system supplier / installer must have a minimum of five (5) years commercial installation prior experience – similar in size and complexity. The supplier / installation company must have bonding capabilities up to one million dollars with an A-Rated Bonding Entity.
- B. For approval as an approved recirculation pump supplier / installer, companies must provide written documentation for installing similar pump system installations, including a list of (5) comparable commercial projects with photos of equipment skid installations, pipe installations, control panel installations, and completed recirculation pump operational photos.
- C. When the specifications and drawings call for described materials, workmanship, or certain construction methods, the pump system supplier / installation company is expected to comply or exceed all requirements – as specified or drawn. Any exceptions to this requirement must be turned in to the architect for approval so the alternate material(s) or installation methods can be approved and provided to all bidders as an addendum to the bid specifications.
- D. Recirculation pump system supplier / installer must be able to provide appropriate insurance for the duration of the project installation, to include, but not be limited to state approved workman's comp insurance and two million dollar general liability insurance.

### **1.07 SITE CONDITIONS**

- A. Take special care to protect existing improvements, existing trees, and vegetation scheduled to remain. Do not begin work until existing improvements and landscape have been adequately protected. Maintain barricades and other protection work throughout the duration of the contract.

### **1.08 SUBMITTALS**

- A. Submit under provisions of Section 01300
- B. Product Data: Provide manufacturer data sheets.
- C. Manufacturer's installation instructions indicating criteria for preparation and application.

## **PART 2 - PRODUCTS**

### **2.02 PIPE AND FITTINGS**

- A. All pipe and fittings between the water fall pumping system and the upper pond discharge location shall be identified by the manufacturer to indicate material, class or type, size and pressure rating.
- B. Pipe: Standard schedule 40 or 80, where specified, conforming to ASTM-D-1785 and CS-207-60.
- C. Fittings: Standard schedule 40 or 80, where specified.

- D. Schedule 40, socket welded connections shall conform to ASTM-D-2466, threaded connections may not be used.
- E. Schedule 80, socket welded connections shall conform to ASTM-D-2467, threaded connections shall conform to ASTM-D-2462.
- F. Solvent cement shall conform to ASTM-D-2564.

## **2.02 VALVES**

- A. Gate Valves: (1/2" – 3") 125 lb. cast bronze with threaded connections, solid wedge plate and a non-rising stainless steel stem. Above 3" shall be cast – iron, resilient wedge, non-rising stem, epoxy coated. Watts series 406 or equal.
- B. PVC valves: ASTM D2464, ANSI B1.20.1 NPT true union ball valves approved for potable water use by the NSF.

## **2.03 ACCESSORIES**

- A. Potting compound – 3M Scotchcast 2114.
- B. Junction boxes – PVC boxes with neoprene gaskets, size as noted.

## **2.04 PUMPS**

- A. The pump shall be designed to pump raw, unscreened storm water and other fibrous fluids containing 2" solids without damage during operation.
- B. The pump and motor shall be designed so that the pump shaft horsepower (BHP) shall not exceed motor rated horsepower throughout the entire operating range of the
- C. pump performance curve. The submersible trash style pump and motor shall conform to the following:
- D. Pump casing: The pump casing, impeller, motor frame and discharge elbow
- E. shall be manufactured from gray cast iron. Internal and external surfaces coming into contact with the fluids shall be protected with one coat of Zinc-chromate
- F. primer and all external surfaces shall be protected by one coat of Acrylic-alkyd Resin Enamel that will resist the corrosive effects of the water supply.
- G. Pump Bolts: All exposed nuts and bolts shall be stainless steel.
- H. Impellers: Impellers shall be of the mixed flow, enclosed, multi-vane design and shall be equipped with back pump-out vanes to prevent entry of foreign material into the seal area. The impeller shall be slip fit to the shaft and shall be key driven. All units shall be equipped with a replaceable 304 stainless steel wear ring.
- I. Shaft seals: The pumping unit shall be supplied with dual tandem mechanical seals. The oil filled seal chamber shall be equipped with a built-in device to prevent over filling and an anti-vortexing vane to insure proper lubrication of both seal faces. The dual tandem mechanical seals shall be comprised of two separate sets of seal faces. Each pair to be held in contact by a separate spring and shall also be equipped with a third, renewable exclusionary seal between the casing and the back of the impeller to further prevent entrance of foreign materials into the lower seal area. Lower seal faces shall be tungsten carbide running against tungsten carbide. The upper

mechanical seal faces shall be ceramic running against a stationary carbon seat.  
Mechanical seal hardware shall be all stainless steel.

#### **2.05 SUBMERSIBLE TRASH STYLE MOTOR:**

- A. The motor shall be a hermetically sealed, oil lubricated repairable style motor and shall be a NEMA MG-1, Design Type B equivalent. The motor shall have a 1.0 service factor and shall be rated for 20 starts per hour. Motor shall be air filled with class F insulated, moisture resistant copper windings.
- B. Motors shall be equipped for the voltage and starting configuration necessary to be compatible with the existing power source and starting requirements - as per local codes.
- C. Motor shaft shall be 420 stainless steel and shall be supported by two permanently lubricated, ball bearings, with a B-10 life of 50,000 hours.
- D. All motors shall be equipped with built-in thermal overload protection and shall be rated for continuous duty.
- E. The motor cable connection shall be composed of a one piece, vulcanized, three-way mechanical sealing connector with a thickly molded shoulder with increasing cable diameters to resist fatigue from bending forces. The cable entrance shall also incorporate a limited tightening plate with built in strain relief. The cable entry shall prevent water from leaking into the motor due to capillary action, even if the cable is cut or damaged.

#### **2.06 PUMP CONTROL PANEL**

- A. All Recirculation pump, Irrigation Pump, and False Weir Pump controls to be centrally located in Aluminum NEMA 4 Bison ProFab electrical enclosures.
- B. Control panel shall be housed in NEMA 4 enclosure and shall be located as indicated in the plans. Panel shall provide time pump startup and shutdown, with the appropriate safety features for pump/motor operation. Running time meters shall display, in hours and tenths, the total time of each motor. Hour meter shall not be resettable, to insure continuous time monitoring. All indicating lights, reset buttons, selector switches, and hour meters shall be mounted in enclosure door.
- C. A branched fused main disconnect shall be provided to completely isolate all controls, and motor starting equipment from incoming power. The disconnect shall be sized so that it is not loaded beyond 80% of its capacity.
- D. All motor starting equipment shall be located in the NEMA 4 enclosure. Pump motor starters shall meet I.E.C. standards and shall be rated for a minimum of 1,250,000 operations. Motor overload relays shall be I.E.C. rated class 10 ambient compensated. Fuses shall supply short circuit protection to each motor, and shall not be rated at less than fault current available to the motor.
- E. Motor starting equipment shall be as manufactured by Allen-Bradley or approved equal.
- F. Control components shall be protected by a time delay secondary fuse with at least 10,000 AIC. All 120-volt signals issuing from the control panel to operate equipment supplied by others shall be fused with a time delay fuse having 10,000 minimum AIC, and a nominal value substantially less than the transformer secondary fuse to prevent its blowing.

- G. Control cabinet components shall be U. L. Listed, CSA Certified devices.
- H. The water pump control panel shall be equipped with a 120-volt programmable time clock capable of providing pump start up and shut down with at programmed times. The transfer pump control panel shall be equipped with a hand/off/automatic switch so that the pump can be operated in the automatic or manual position - or so it can be turned off for an indefinite period of time.
- I. All components shall be labeled for proper identification and shall be accessible from the front of the enclosure for ease in maintenance and adjustment. Complete electrical schematics shall be attached to the inside of the door for future service. All components used shall be readily available from major metropolitan vendors.
- J. The panel face switches and lights shall include:
  - 1. Individual pump run lights.
  - 2. Low level shutdown indicating light.
  - 3. Individual pump on/off switches.
  - 4. Push button reset.

**2.07 PANEL SHALL INCLUDE THE FOLLOWING SAFETY CIRCUITS:**

- A. Low water circuit shall shutdown pumping system in the event a low water condition in the supply lake occurs. The indicating light mounted in the enclosure door shall signal low-level shutdown, and shall have a red lens. The transfer pump shall not operate until the safety has been manually reset and the lake level has returned to a safe operating condition.
- B. Phase failure safety circuit shall retire the pumping station if it experiences the loss of one phase as monitored at the motor starter overload relay. The phase monitor shall have a time delay to allow for transient low voltage during motor starting, to allow maximum motor protection minimum class 10 trip protection. Phase failure manual reset button. Automatic reset of the phase protection circuit shall not be permitted for safety reasons.
- C. All electrical equipment shall be protected by a secondary lightning arrester to suppress surges on incoming power. Lightning arrester shall have a maximum clamping voltage of 1500 VRMS or less, with an unlimited power rating. Response time at terminal shall be one (1) microsecond per ten (10) kilovolts. Extreme duty discharge shall be twenty (20) kiloamps on an 8 by 20 microsecond wave shape. Minimum break over voltage shall be 750 VRMS at one (1) kiloamp on an 8 by 20 microsecond waveshape.

**2.08 ADDITIONAL PUMP EQUIPMENT:**

- A. Pump Check Valve: Pump check valves shall be a low head loss, swing type check valves. Valve body and trim shall be 316 stainless steel with watertight PTFE seat. Valve shall be Titan model CV 32-SS or approved equal.
- B. Throttling valve: A throttling valve shall be located on each discharge line down stream of the pumps. Valve shall be installed so as to properly calibrate water flow and pump operation. Gate valve shall be of the type described in section 2.2 Valves.

EQUIPMENT LIST: Refer to drawing equipment legends for equipment not included herein.

## **PART 3 - EXECUTION**

### **3.01 GENERAL INSTALLATION**

- A. Provide equipment in accordance with materials list including manufacturer's instructions and recommendations unless otherwise noted. If specified installation is contrary to manufacturer's instructions, cease installation of affected components or systems. Notify Architect and do not resume installation without clear instructions from Architect.
- B. Protect pipes, conduits, and equipment from damage from inclement weather.
- C. Parts to be cast in concrete shall be located as detailed on the drawings and rigidly supported to resist loads imposed during concrete placement.

### **3.02 PIPE INSTALLATION**

- A. Install piping straight and true without loops or traps.
- B. Make pipe runs as direct as possible using a minimum number of fittings.
- C. Slope piping to the pump for drainage. If piping can not be sloped to pump, make provision for the complete draining of each pipe line by connecting minimum a 1-1/2" drain line and valve to lowest point in pipe run. Set valve in approved valve box in location approved by Architect.
- D. Pump suction piping shall be a straight run into the pump free of pipe bends or tees for a minimum of ten pipe diameters preceding the pump's suction connection unless otherwise indicated on the drawings.
- E. Cut pipe and tubing ends square and remove rough edges and burrs.
- F. Cut pipe to measurements established at the site. Work into place without springing or forcing. Keep pipe elevated and free of debris.
- G. Provide flanges or unions as indicated and as necessary to allow removal and reinstallation of any item of equipment or accessory without cutting, welding or soldering.
- H. Complete connections between dissimilar metals with dielectric fittings.
- I. Arrange exposed piping straight, parallel and perpendicular to the walls of the structure unless otherwise shown on the drawings.
- J. Protect domestic water lines connected to recirculation system by a backflow preventer approved for application. Unless otherwise provided, include a pressure regulator which limits supply pressure to a maximum 50 psi. Coordinate work with appropriate trade.
- K. Underground:
  - 1. Two inch (2") and smaller--Schedule 40 PVC with Schedule 40 solvent welded fittings.
  - 2. Larger Than Two Inch (2")--Schedule 80 PVC with Schedule 40 solvent welded fittings.
  - 3. Excavate trenching for underground piping to required depths providing sufficient slope for proper pipe fall and adequate space at both sides and bottom of trench to facilitate pipe installation. Provide min. 2' of cover unless noted otherwise.



4. Compact trenches to prevent after settling. Compact in 6" lifts to a minimum density as specified in Section 02200 Earthwork.
  5. Backfill soil removed to a height of 12" above top of pipe.
- L. Penetrations:
1. Complete core drilling for pipe penetrations at locations detailed and in a manner approved by the Architect.
  2. Provide a PVC sleeve or core drilled hole for every pipe passing through a concrete wall or floor.
  3. Include a waterstop or membrane clamp for every pipe or sleeve penetrating an exterior concrete wall or floor or the recirculation wall or floor, whichever is appropriate to the waterproofing method and as shown on the drawings. Leave penetrations watertight.
  4. Thermal expansion: Provide swing joints, turns, expansion loops or long offsets wherever shown on drawings or whenever necessary to allow for proper expansion and contraction of piping.

### **3.03 UNDERWATER LIGHT FIXTURE**

- A. Secure underwater light flexible cords to junction boxes using U.L. approved compression-type strain relief seals approved for application.
- B. Exposed underwater flexible cords may not exceed 10 feet in length.
- C. Protect underwater lighting circuits operating above 15 volts with a Class "A" ground fault circuit interrupter (GFCI).
- D. Allow sufficient flexible cord to allow underwater light fixtures to be removed from the water for relamping and normal maintenance.

### **3.04 UNDERWATER JUNCTION BOX**

- A. Seal underwater junction boxes and conduit openings after wiring as follows:
- B. Make sure wiring connections are grouped in center of box away from box walls and recessed below opening.
- C. Fill junction box completely with potting compound following procedures recommended by manufacturer.

### **3.05 CONDUIT**

- A. Install wiring in conduit properly sealed watertight.
- B. Applications (Unless otherwise indicated on drawings):
- C. Conduit located in equipment room or exposed to sunlight shall be steel.
- D. Buried conduit and conduit completely encased in concrete shall be PVC.
- E. Conceal conduit located in finished areas unless otherwise indicated on drawings.

- F. Cut ends of conduit square and carefully ream to remove rough edges.
- G. Seal ends of conduit during construction to prevent entry of moisture or contaminants.
- H. Provide bushings to protect conductors from abrasion where conduit enters a box or other fitting.
- I. Provide fillings with accessible covers where junctions, bends, or offsets are required on exposed runs of conduit. Bends around corners of beams, walls or equipment shall not be permitted.
- J. Do not use threadless couplings or connectors with conduit installed in wet locations or where buried in concrete or other fill. Threads shall be NPT (tapered pipe threads) run up tight with Teflon tape or sealant. Running threads shall not be permitted.
- K. Bend conduit so that conduit is not damaged and such that the inside diameter is not effectively reduced. No more than the equivalent of two (2) 90 degree bends shall be used on any single run of conduit between accessible outlets and other fittings.
- L. Provide dielectric fittings for connections made between dissimilar metals.
- M. Seal conduit after conductor installation to prevent entry of moisture.
- N. Securely support concealed and exposed conduits.

### **3.06 WIRING**

- A. Install conductors in conduit after conduit has been installed and moisture and debris have been removed from conduit, junction boxes and other conduit fittings.
- B. Install conductors connected to equipment having a tendency to cause noise or vibration in flexible conduit not to exceed four feet (4') in length. Cover all flexible conduit subject to moisture with watertight plastic and make all connections with watertight fittings.
- C. Install only THHN or XHHW as listed stranded type copper conductors with waterproof insulation between underwater junction boxes and recirculation control panel. Do not install solid copper conductors.
- D. Do not use cleaning agents or lubricants that might have a deteriorating effect on conductor coverings.
- E. Make electrical connections to mechanical equipment as shown on the drawings.
- F. Connect conductors to terminals using approved connectors. Wires in panel cabinets, pull boxes, and wiring gutters shall be neatly grouped and fanned out to the terminals.
- G. Protect conductors from damage caused by further mechanical work completed after conductors have been installed. Replace damaged conductors.

### **3.07 CONDUCTOR COLOR CODING**

- A. Color code conductors (600 volts and under) and identify by one color with continuity being maintained throughout the project.

- B. Color code as follows:
  - 1. Phase "A" - Black
  - 2. Phase "B" - Red
  - 3. Phase "C" - Blue
  - 4. "Neutral" - White
  - 5. "Ground" - Green, Green with Yellow Stripe, or Bare

### **3.08 CLEAN UP**

- A. Keep site clean daily. Upon completion of the work, remove unused equipment and implements of service, and leave the entire area involved in a neat, clean, and acceptable condition.
- B. Soiled, abraded or discolored surfaces of decorative recirculation work shall be cleaned, polished and left free from blemishes or defects.
- C. Water pipe lines shall be flushed free of debris as follows:
- D. Completely drain recirculation piping and equipment.
- E. Remove construction debris and thoroughly sweep pools clean.
- F. Fill the system to the required capacity.
- G. Circulate the water throughout the system for one hour, using the display pump. Do not allow cloudy water to pass through the filter tank.
- H. Drain pool, piping, and equipment and remove debris, which may have collected in suction and discharge strainers.

### **3.09 TESTS AND ADJUSTMENTS**

- A. Piping test:
  - 1. Provide temporary piping, pumps, and gauges necessary to conduct the specified tests.
  - 2. Conduct tests before concealment of work and before coating, paint, or wrap is applied.
  - 3. Use water as test medium. Do not test piping with air or any other compressible gas. Vent air from piping prior to testing.
  - 4. Replace or repair leaking parts. Repeat test until criteria are met.
  - 5. Do not subject equipment or piping to a test pressure greater than the pressure rating of the equipment or pipe.
  - 6. Test underground piping as follows:
  - 7. Pressurize underground piping (except for drain system) to 30 psi, or as required by local code, prior to backfilling.
  - 8. Pressurize underground drain piping beneath the equipment space to 15 psi, or as required by local code, prior to backfilling.
  - 9. The completed piping systems shall be tested as follows:

10. Conduct each test for minimum continuous duration of eight (8) hours.
11. Hydrostatically pressure test storm and sanitary drain piping at 15 psi.
12. Hydrostatically pressure test other piping and equipment at 30 psi.
13. Do not subject equipment within vault to pressures greater than 30 psi during pressure testing of piping.
14. Log pressure readings for tests required at the beginning and end of each test. Note the location and end of each test. Note the location and cause of failures and method of repair on a daily log. Submit copy of log with project close-out documents.

B. Electrical Tests:

1. Electrical circuits, feeders, and equipment shall be tested and proven free of faulty grounds, open circuits, or shorts, as required by local codes.
2. Make the recirculation operational using an authorized technician from the equipment supplier and make tests, adjustments, and corrections, until it is shown to be in proper operating condition. Provide start-up chemicals as recommended by the equipment manufacturer.

**3.10 THIRTY-DAY OPERATION PERIOD**

- A. As soon as the recirculation structure has been completed and mechanical and electrical equipment has been installed and tested, the recirculation may be placed in operation.
- B. Prior to acceptance of the installation by Owner, demonstrate a concurrent thirty-day (30), fully automatic, uninterrupted daily operation of not less than twelve (12) hours, nor more than twenty (20) hours for recirculation systems provided under this Section.
- C. Supervise the operation of the equipment and be responsible for the proper operation and maintenance thereof and make no claim against Owner for any damage to the equipment during such operation. Make such changes, adjustments, or replacements of equipment as may be required to make the installation comply with the Specifications, or to replace defective parts or materials.
- D. The cost of electricity, water and normal operational supplies during the thirty (30) day operation period will be paid by Owner. The Contractor shall pay for operating costs resulting from system deficiencies.

**END OF SECTION**

## **SECTION 02814**

### **ARCHITECTURAL WATER FEATURES**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. This Section includes the water feature installation of the mechanical and electrical equipment and supplementary items necessary to complete work required for installation in accord with provisions of the Contract Documents.

##### **1.02 RELATED SECTIONS**

- A. Division 2 Section - Earthwork
- B. Division 2 Section - Concrete
- C. Division 15 - Mechanical
- D. Division 16 - Electrical

##### **1.03 REFERENCES**

- A. Comply with applicable provisions of the latest edition of the following codes and standard specifications.
  - NEC National Electrical Code
  - NFPA National Fire Protection Association
  - UBC Uniform Building Code
  - UPC Uniform Plumbing Code
  - ASTM American Society for Testing and Materials
  - ANSI American National Standards Institute
  - ASME American Society of Mechanical Engineering
  - ASSE American Society of Sanitary Engineering
  - AWWA American Water Works Association
  - CS Commercial Standards
  - NEMA National Electrical Manufacturers Association
  - NSF National Sanitation Foundation

##### **1.04 WORK INCLUDED**

- A. Fountain display system including pumps, valves, vaults, piping and specialties.
- B. Fountain filtration system including filter, media, valves, piping and specialties.
- C. Fountain plumbing and electrical services including water, sewer and power supply to designated points of connection with site utilities.
- D. Special tools for operation and maintenance of the equipment provided under this Section.
- E. Chlorinator/Brominator with a 30-day supply of sanitizing pellets and pH adjustment solution.

##### **1.05 PERSONNEL TRAINING**

- A. Make provisions for technical instruction of owner's maintenance personnel, by the equipment supplier's personnel.

## **1.06 QUALITY ASSURANCE**

- A. Irrigation pump system supplier / installer must have a minimum of five (5) years commercial installation prior experience – similar in size and complexity. The supplier / installation company must have bonding capabilities up to one million dollars with an A-Rated Bonding Entity.
- B. For approval as an approved irrigation pump supplier / installer, companies must provide written documentation for installing similar pump system installations, including a list of (5) comparable commercial projects with photos of equipment skid installations, pipe installations, control panel installations, and completed irrigation pump operational photos.
- C. When the specifications and drawings call for described materials, workmanship, or certain construction methods, the pump system supplier / installation company is expected to comply or exceed all requirements – as specified or drawn. Any exceptions to this requirement must be turned in to the architect for approval so the alternate material(s) or installation methods can be approved and provided to all bidders as an addendum to the bid specifications.
- D. Irrigation pump system supplier / installer must be able to provide appropriate insurance for the duration of the project installation, to include, but not be limited to state approved workman's comp insurance and two million dollar general liability insurance.

## **1.07 SITE CONDITIONS**

- A. Take special care to protect existing improvements, existing trees, and vegetation scheduled to remain. Do not begin work until existing improvements and landscape have been adequately protected. Maintain barricades and other protection work throughout the duration of the contract.

## **1.08 SUBMITTALS**

- A. Submit under provisions of Section 01300
- B. Product Data: Provide manufacturer data sheets.
- C. Manufacturer's installation instructions indicating criteria for preparation and application.

## **PART 2 - PRODUCTS**

### **2.01 FOUNTAIN EQUIPMENT SUPPLIER/INSTALLER**

- A. As approved by the Town of Addison

### **2.02 PIPE AND PIPE FITTINGS**

- A. General:
  - 1. All pipe and fittings between the equipment room and the fountain shall be identified by the manufacturer to indicate material, class or type, size and pressure rating.
- B. Brass Pipe and Fittings:
  - 1. Pipe: Standard weight, conforming to ASTM B-43, threaded ends.
  - 2. Fittings: Class 125 cast bronze threaded conforming to ASTM B-62 and ANSI B16.15.

C. PVC Pipe and Fittings:

1. Pipe: Standard schedule 40 or 80, where specified, conforming to ASTM-D-1785 and CS-207-60.
2. Fittings: Standard schedule 40 or 80, where specified.
  - a. Schedule 40, socket welded connections shall conform to ASTM-D-2466, threaded connections may not be used.
  - b. Schedule 80, socket welded connections shall conform to ASTM-D-2467, threaded connections shall conform to ASTM-D-2462.
  - c. Solvent cement shall conform to ASTM-D-2564.

**2.03 EQUIPMENT LIST**

A. Pumps (horizontal centrifugal)

1. The pump casting shall be ASTM 48, class 30 cast iron capable of hydrostatic test at 150 % of maximum discharge pressure and have both suction and hub replaceable wear ring. All mating parts shall have a register fit to ensure alignment. All wetted parts be are to be coated with Tefcoted protective coating.
2. The impeller shall be enclosed, single piece bronze casting completely machined on all outside surfaces and statically balanced at time of pump assembly. The impeller shall be keyed to the shaft and securely fastened with a vibration resistant lock screw and washer.
3. The packing box shall contain a mechanical seal for the specific application.

B. Motors

1. The close coupled centrifugal motors shall have open-drip proof enclosure in compliance with NEMA standard MG 1-1.25. Motor shall be continuously rated in accordance with NEMA standard MG 1, and shall be NEMA electrical design B with
2. 1.15 minimum service factor. Insulation shall be class F and have a temperature rise in accordance with NEMA standard MG 1 over a maximum ambient temperature of 104 degrees Fahrenheit (40 degrees Celsius).
3. Motor shall be wound for the starting configuration necessary to be compatible with 480 volt, three phase, 60 Hertz across the line starting. Stator frame and end brackets shall be machined from rigid gray iron castings, and the housing in the end brackets for the bearings shall be precision bored to provide correct fit for the bearings. Cast iron conduit box shall be weatherproof type, gaskets fitted at all joints, and shall be tapped for ease of conduit connection.
4. The motor shall be of United States manufacture, closed coupled, open drip proof type with rodent screens on all ventilating passages. The motor bearings shall be selected to withstand thrust loads and have a minimum life of 5 years continuous operation.

5. The motor shaft shall be high strength steel protected by a bronze shaft sleeve secured to the shaft to prevent rotation. The maximum allowable no-load shaft run out shall be .002 inches.
6. The impeller shall not contact the suction or hub wear ring under any operating load condition.
7. The pump and motor shall be connected by an ASTM 48, Class 30 cast-iron bracket incorporating a full isolating shield with dual slingers to prevent moisture from entering the front motor bearing. Ample access shall be provided for ease of a mechanical seal replacement.

#### 2.04 VALVES

- A. Ball Valves: (1/2" – 2") 125 lb. cast bronze with polished brass or stainless steel ball, Teflon seats, and infinite position handles.
- B. Butterfly Valves: (3" – 10") Lug type with cast iron body, aluminum bronze disc, stainless steel stem, Buna-N seat/liner and lever locking handle.
- C. Gate Valves: (1/2" – 3") 125 lb. cast bronze with threaded connections, solid wedge plate and a non-rising stainless steel stem.
- D. Globe Valves:
  1. (1/2" – 3") 125 lb. cast bronze swing-check with treaded connections and a Buna-N seat.
  2. (3" and larger) wafer style for flanged installation, cast iron or ductile body, 31 stainless steel disk and shaft, Buna-N seat and internal stainless steel spring.

#### E. FILTRATION

1. Pump intake basket strainers shall be installed as indicated in the water feature plans. Basket strainer body shall be stainless steel with clear cover. Basket shall be accessed through a removable top cover plate for easy cleaning. Basket strainer shall be Neptune Benson or approved substitution.
2. A cartridge or sand filter shall be installed as indicated in the water feature plans. Filter housing shall be non corrosive construction.
3. Chemical Treatment System: An erosion feed type brominator/chlorinator shall be installed as indicated in the plans. Feeder shall be constructed from non corrosive thermoplastic with removable access lid. Completely enclosed system with no escaping gases to reduce ventilation requirements. Adjustable feed system to provide 0.1 to 1.75 lbs. per day chlorine or bromine application. Units designed for 3" tablet refills. Feeder unit shall be Rainbow Lifeguard Series 300 inline unit or approved substitution.
4. Interactive Feature: Shall include a UV sterilizer capable of treating 37440 gallons of water in an 8 hour period. Wetted body shall be a UV inhibited PVC housing with 2" inlet/outlet fittings. UV unit shall include a pressure switch to prevent operation when water is not flowing. A clear viewing tail piece shall be included to verify lamp ON condition. The UV lamp shall be rated at 9,000 hours of continuous use and shall be fully replaceable without requiring special tools.



## **2.06 FOUNTAIN COMPONENTS**

- A. Components and quantities: Refer to drawing equipment legends.

## **2.07 WATERSTOPS**

- A. Bronze or Schedule 80 PVC with waterstop plates for new cast-in-place concrete penetrations.
- B. Link Seal interlocking synthetic rubber links sized per manufacturer to fit cored openings through concrete walls or floors.

## **2.08 BACKFLOW DEVICE**

- A. Bronze construction double gate and check valve assembly – FEBCO #805 or approved device per local codes.

## **2.09 ACCESSORIES**

- A. Potting compound – 3M Scotchcast 2114.
- B. Junction boxes – Brass boxes with neoprene gaskets, size as noted. Include internal grounding lugs and silicone bronze hardware. Fit with watertight cord entrance seals.

## **2.10 FOUNTAIN CONTROLS**

### **A. Control Panel**

1. Control panel shall be housed in NEMA 4 enclosure and shall be located as indicated in the plans. Panel shall provide time pump startup and shutdown, with the appropriate safety features for pump/motor operation. Running time meters shall display, in hours and tenths, the total time of each motor. Hour meter shall not be resettable, to insure continuous time monitoring. All indicating lights, reset buttons, selector switches, and hour meters shall be mounted in enclosure door.
2. A branched fused main disconnect shall be provided to completely isolate all controls, and motor starting equipment from incoming power. The disconnect shall be sized so that it is not loaded beyond 80% of its capacity.
3. All motor starting equipment shall be located in the NEMA 4 enclosure. Pump motor starters shall meet I.E.C. standards and shall be rated for a minimum of 1,250,000 operations. Motor overload relays shall be I.E.C. rated class 10 ambient compensated. Fuses shall supply short circuit protection to each motor, and shall not be rated at less than fault current available to the motor.
4. Motor starting equipment shall be as manufactured by Allen-Bradley or approved equal.
5. Control components shall be protected by a time delay secondary fuse with at least 10,000 AIC. All 120-volt signals issuing from the control panel to operate equipment supplied by others shall be fused with a time delay fuse having 10,000 minimum AIC, and a nominal value substantially less than the transformer secondary fuse to prevent its blowing.
6. Control cabinet components shall be U. L. Listed, CSA Certified devices.

### **B. Pump Controls**

1. The water pump control panel shall be equipped with a 120-volt programmable time clock capable of providing pump start up and shut down along with lighting on/off controls at

programmed times. The display pump control panel shall be equipped with a hand/off/automatic switch so that the pump can be operated in the automatic or manual position - or so it can be turned off for an indefinite period of time.

2. All components shall be labeled for proper identification and shall be accessible from the front of the enclosure for ease in maintenance and adjustment. Complete electrical schematics shall be attached to the inside of the door for future service. All components used shall be readily available from major metropolitan vendors.
  3. The panel face switches and lights shall include:
    - a) Individual pump run lights.
    - b) Low level shutdown indicating light & reset.
    - c) Individual pump on/off switches.
- C. Panel shall include the following safety circuits:
1. Low water circuit shall shutdown pumping system in the event a low water condition in the supply basin occurs. The indicating light mounted in the enclosure door shall signal low-level shutdown, and shall have a red lens. The fountain pump shall not operate until the safety has been manually reset and the water level has returned to a safe operating condition.
  2. Phase failure safety circuit shall retire the pumping station if it experiences the loss of one phase as monitored at the motor starter overload relay. The phase monitor shall have a time delay to allow for transient low voltage during motor starting, to allow maximum motor protection minimum class 10 trip protection. Phase failure manual reset button. Automatic reset of the phase protection circuit shall not be permitted for safety reasons.
  3. All electrical equipment shall be protected by a secondary lightning arrestor to suppress surges on incoming power. Lightning arrestor shall have a maximum clamping voltage of 1500 VRMS or less, with an unlimited power rating. Response time at terminal shall be one (1) microsecond per ten (10) kilovolts. Extreme duty discharge shall be twenty (20) kiloamps on an 8 by 20 microsecond wave shape. Minimum break over voltage shall be 750 VRMS at one (1) kiloamp on an 8 by 20 microsecond waveshape.
  4. A pump suction intake vacuum monitor circuit shall shut down the pump system in the event the pump intake becomes blocked, plugged, or intake strainer becomes too clogged with debris. Vacuum will be monitored between the pump intake and the intake basket strainer. Upon sensing a vacuum condition the pump system will be shut down and a red indicating light on the enclosure door shall be illuminated. The fountain pump shall not operate until the condition has been corrected and the safety has been manually reset.
  5. Controls shall include a Building Information System interface circuit that will provide a safety shutdown signal in the event a phase failure, low water level, or vacuum safety shutdown has occurred. The controls shall provide a 4-20 milliamp output when shutdown occurs to indicate a shutdown condition for interface with the Building Information System. The building owner shall be responsible for appropriate wire and conduit interface for this signal between Building Information System location and the pump system control panel.

## 2.11 EQUIPMENT VAULTS

- A. A Direct Burial Pump Vault shall be provided to house the water feature pump and filtration equipment. Vault shall be heavy duty Fiberglass Reinforced Polymer body with white gel-coat interior and brown gel-coat exterior and access hatch opening with lockable FRP lid.

Furnished with a display pump with suction strainer, cartridge or sand filter, a filter pump, all internally required valves, pipe and fitting (Schedule 80 PVC), fan-forced ventilation system; copper water make-up/fill manifold, 1/3 HP sump pump or floor drain, interior work light in large vaults, access ladder, U.L. 508 listed control panel in a Nema 4 enclosure, containing; main disconnect, motor starter(s), 7 day/24 hour timeclock(s), H.O.A. switches; G.F.C.I. breaker(s), and water level/low level cutoff control. Unit is pre-wired, pre-plumbed (Schedule 80 PVC) and factory tested, prior to shipment. Vaults shall contains a dual-point water treatment controller and acrylic flow cell with pH and ORP electrodes; erosion type bromine feeder and bromine solenoid valve: single head adjustable rate chemical metering pump and appropriate size chemical solution storage tank (for pH solution).

### **PART 3 – EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine surfaces, substrates and conditions for compliance with requirements of other sections in which that related work is specified, and determine if surfaces, substrates and conditions affecting performance of the work of this Section are satisfactory. Do not proceed with work of this Section until unsatisfactory conditions have been corrected in a manner acceptable to the Installer. Starting installation constitutes acceptance of surfaces, substrates and conditions.

#### **3.02 GENERAL INSTALLATION**

- A. Provide equipment in accordance with materials list including manufacturer's instructions and recommendations unless otherwise noted. If specified installation is contrary to manufacturer's instructions, cease installation of affected components or systems. Notify Architect and do not resume installation without clear instructions from Architect.
- B. Protect pipes, conduits, and equipment from damage from inclement weather.
- C. Parts to be cast in concrete shall be located as detailed on the drawings and rigidly supported to resist loads imposed during concrete placement.

#### **3.03 DIRECT-BURIAL VAULT**

- A. General
  - 1. Equipment located in subterranean vault with access hatch as indicated in the drawings.
  - 2. Install in strict accordance with manufacturer's recommendations and instructions.
  - 3. Install vault with crane using the lifting eyes provided in the concrete cast pieces.
  - 4. Protect the vault assembly from flooding. Conduit, piping and vent piping entries shall be protected from moisture entry prior to connection. If the pump and control equipment is installed in the concrete vault, a temporary power line shall be installed by the Owner so that the sump pump can operate.
  - 5. Vault piping and conduit connections shall not be externally loaded or used to support piping or conduit

B. Installation Procedure

1. Excavate around vault in accordance with OSHA standards.
2. Place vault into excavation and waterproof exterior concrete walls to prevent seepage into vault. Chem Tar-LC® shall be applied to all outside surfaces on the concrete vault. Chem Tar-LC® is a two component, 100% solids, coal tar modified, waterproof epoxy system that has excellent penetrating and sealing characteristics with a moderate degree of flexibility. Applicable Standards: Chem Tar-LC® meets or exceeds the requirements of ASTM 881. Color: Black
3. Install drain piping and sump pump, and connect temporary power to sump pump.
4. Connect piping and conduit.
5. Install backfill material.

C. Backfill Procedure

1. Backfill concrete vault with rock free excavated materials. Compact backfill in 6" layers providing a minimum of 95% compaction.
2. Excess excavation materials can be relocated to a designated area on job site.

**3.04 PIPE INSTALLATION**

A. General:

1. Install piping straight and true without loops or traps.
2. Make pipe runs as direct as possible using a minimum number of fittings.
3. Slope piping to the pump for drainage. If piping can not be sloped to pump, make provision for the complete draining of each pipe line by connecting minimum a 1-1/2" drain line and valve to lowest point in pipe run. Set valve in approved valve box in location approved by Architect.
4. Pump suction piping shall be a straight run into the pump free of pipe bends or tees for a minimum of ten pipe diameters preceding the pump's suction connection unless otherwise indicated on the drawings.
5. Cut pipe and tubing ends square and remove rough edges and burrs.
6. Cut pipe to measurements established at the site. Work into place without springing or forcing. Keep pipe elevated and free of debris.
7. Provide flanges or unions as indicated and as necessary to allow removal and reinstallation of any item of equipment or accessory without cutting, welding or soldering.
8. Complete connections between dissimilar metals with dielectric fittings.
9. Arrange exposed piping straight, parallel and perpendicular to the walls of the structure unless otherwise shown on the drawings.

10. Protect domestic water lines connected to fountain system by a backflow preventer approved for application. Unless otherwise provided, include a pressure regulator which limits supply pressure to a maximum 50 psi. Coordinate work with appropriate trade.
- B. Applications (unless indicated otherwise on the drawings):
1. Fountain Pool: Four inch (4") and smaller piping located within the pool basin, or penetrating through pool wall or floor into the basin—Schedule 40 red brass with cast bronze threaded fittings or Type K seamless copper tube of full hard temper with wrought copper or cast bronze solder joint fittings.
  2. Underground:
    - a. Two inch (2") and smaller—Schedule 40 PVC with Schedule 40 solvent welded fittings.
    - b. Larger Than Two Inch (2")--Schedule 40 PVC with Schedule 40 solvent welded fittings.
- C. Underground Piping:
1. Excavate trenching for underground piping to required depths providing sufficient slope for proper pipe fall and adequate space at both sides and bottom of trench to facilitate pipe installation. Provide min. 2' of cover unless noted otherwise.
  2. Compact trenches to prevent aftersettling. Compact in 6" lifts to a minimum density as specified in Section 02200 Earthwork.
  3. Backfill soil removed to a height of 12" above top of pipe.
- D. Penetrations:
1. Complete core drilling for pipe penetrations at locations detailed and in a manner approved by the Architect.
  2. Provide a PVC sleeve or core drilled hole for every pipe passing through a concrete wall or floor.
  3. Include a waterstop or membrane clamp for every pipe or sleeve penetrating an exterior concrete wall or floor or the fountain wall or floor, whichever is appropriate to the waterproofing method and as shown on the drawings. Leave penetrations watertight.
- E. Thermal expansion: Provide swing joints, turns, expansion loops or long offsets wherever shown on drawings or whenever necessary to allow for proper expansion and contraction of piping.

### **3.05 UNDERWATER LIGHT FIXTURE**

- A. Secure underwater light flexible cords to junction boxes using U.L. approved compression-type strain relief seals approved for application.
- B. Exposed underwater flexible cords may not exceed 10 feet in length.

- C. Protect underwater lighting circuits operating above 15 volts with a Class "A" ground fault circuit interrupter (GFCI).
- D. Allow sufficient flexible cord to allow underwater light fixtures to be removed from the water for relamping and normal maintenance.

### **3.06 UNDERWATER JUNCTION BOX**

- A. Seal underwater junction boxes and conduit openings after wiring as follows:
  - 1. Make sure wiring connections are grouped in center of box away from box walls and recessed below opening.
  - 2. Fill junction box completely with potting compound following procedures recommended by manufacturer.

### **3.07 CONDUIT**

- A. Install wiring in conduit properly sealed watertight.
- B. Applications (Unless otherwise indicated on drawings):
  - 1. Conduit located within the pool basin and stub-ups through pool floor or walls into the basin shall be red brass.
  - 2. Conduit located in equipment room or exposed to sunlight shall be steel.
  - 3. Buried conduit and conduit completely encased in concrete shall be PVC.
- C. Conceal conduit located in finished areas unless otherwise indicated on drawings.
- D. Cut ends of conduit square and carefully ream to remove rough edges.
- E. Seal ends of conduit during construction to prevent entry of moisture or contaminants.
- F. Provide bushings to protect conductors from abrasion where conduit enters a box or other fitting.
- G. Provide fillings with accessible covers where junctions, bends, or offsets are required on exposed runs of conduit. Bends around corners of beams, walls or equipment shall not be permitted.
- H. Do not use threadless couplings or connectors with conduit installed in wet locations or where buried in concrete or other fill. Threads shall be NPT (tapered pipe threads) run up tight with Teflon tape or sealant. Running threads shall not be permitted.
- I. Bend conduit so that conduit is not damaged and such that the inside diameter is not effectively reduced. No more than the equivalent of two (2) 90 degree bends shall be used on any single run of conduit between accessible outlets and other fittings.
- J. Provide dielectric fittings for connections made between dissimilar metals.
- K. Seal conduit after conductor installation to prevent entry of moisture.
- L. Securely support concealed and exposed conduits.

### **3.08 WIRING**

- A. Install conductors in conduit after conduit has been installed and moisture and debris have been removed from conduit, junction boxes and other conduit fittings.
- B. Install conductors connected to equipment having a tendency to cause noise or vibration in flexible conduit not to exceed four feet (4') in length. Cover all flexible conduit subject to moisture with watertight plastic and make all connections with watertight fittings.
- C. Install only THWN or XHHN, as specified, stranded type copper conductors with waterproof insulation between underwater junction boxes and fountain control panel. Do not install solid copper conductors.
- D. Do not use cleaning agents or lubricants that might have a deteriorating effect on conductor coverings.
- E. Make electrical connections to mechanical equipment as shown on the drawings.
- F. Connect conductors to terminals using approved connectors. Wires in panel cabinets, pull boxes, and wiring gutters shall be neatly grouped and fanned out to the terminals.
- G. Protect conductors from damage caused by further mechanical work completed after conductors have been installed. Replace damaged conductors.

### **3.09 CONDUCTOR COLOR CODING**

- A. Color code conductors (600 volts and under) and identify by one color with continuity being maintained throughout the project.
- B. Color code as follows:
  - Phase "A" - Black
  - Phase "B" - Red
  - Phase "C" - Blue
  - "Neutral" - White
  - "Ground" - Green, Green with Yellow Stripe, or Bare

### **3.10 CLEAN UP**

- A. Keep site clean daily. Upon completion of the work, remove unused equipment and implements of service, and leave the entire area involved in a neat, clean, and acceptable condition.
- B. Soiled, abraded or discolored surfaces of decorative fountain work shall be cleaned, polished and left free from blemishes or defects.
- C. Water pipe lines shall be flushed free of debris as follows:
  - 1. Completely drain fountain piping and equipment.
  - 2. Remove construction debris and thoroughly sweep pools clean.
  - 3. Fill the system to the required capacity.
  - 4. Circulate the water throughout the system for one hour, using the display pump. Do not allow cloudy water to pass through the filter tank.

5. Drain pool, piping, and equipment and remove debris, which may have collected in suction and discharge strainers.

### **3.11 TESTS AND ADJUSTMENTS**

- A. General: Test equipment to show that it complies with specified requirements.
- B. Piping Tests:
  1. Provide temporary piping, pumps, and gauges necessary to conduct the specified tests.
  2. Conduct tests before concealment of work and before coating, paint, or wrap is applied.
  3. Use water as test medium. Do not test piping with air or any other compressible gas. Vent air from piping prior to testing.
  4. Replace or repair leaking parts. Repeat test until criteria are met.
  5. Do not subject equipment or piping to a test pressure greater than the pressure rating of the equipment or pipe.
  6. Test underground piping as follows:
    - a. Pressurize underground piping (except for drain system) to 50 psi, or as required by local code, prior to backfilling.
    - b. Pressurize underground drain piping beneath the equipment space to 15 psi, or as required by local code, prior to backfilling.
  7. The completed piping systems shall be tested as follows:
    - a. Conduct each test for minimum continuous duration of eight (8) hours.
    - b. Hydrostatically pressure test storm and sanitary drain piping at 15 psi.
    - c. Hydrostatically pressure test other piping and equipment at 50 psi.
    - d. Do not subject equipment within vault to pressures greater than 50 psi during pressure testing of piping.
  8. Log pressure readings for tests required at the beginning and end of each test. Note the location and end of each test. Note the location and cause of failures and method of repair on a daily log. Submit copy of log with project close-out documents.
- C. Electrical Tests:
  1. Electrical circuits, feeders, and equipment shall be tested and proven free of faulty grounds, open circuits, or shorts, as required by local codes.
- D. Make the fountain operational using an authorized technician from the equipment supplier and make tests, adjustments, and corrections, until it is shown to be in proper operating condition. Provide start-up chemicals as recommended by the equipment manufacturer.

**END OF SECTION**



## SECTION 02921

### SEEDING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Hydroseeding, mulching and fertilizer.

##### 1.02 RELATED REQUIREMENTS

- A. Reference Civil Engineer and Structural Engineer for grading, subsoil preparation, erosion prevention, fill and backfill and all other related information.
- B. Section 02935 - Plant Maintenance: Post-occupancy maintenance.

##### 1.03 SUBMITTALS

- A. See General Requirements for submittal procedures.
- B. Topsoil samples.
- C. Seed supplier certification of species. Identify source location.

##### 1.04 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer composition.
- B. Seed mixture must comply with all Texas State Certification seed standards.

##### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

##### 1.06 WARRANTY

- A. The contractor warranties all seeded area to be installed according to specifications, until accepted by Owner's Representative.
- B. Disclaimer - Acts of God and other conditions beyond the landscape contractor's control such as vandalism shall not be the responsibility of the landscape contractor.

#### PART 2 PRODUCTS

##### 2.01 SEED MIXTURE

- A. Seed Mixture:
  - 1. Sideoats Grama - *Bouteloua curtipendula*: 34.38 percent.
  - 2. Inland Sea Oats - *Chasmanthium latifolium*: 15.63 percent.
  - 3. Prairie Wildrye - *Elymus canadensis*: 14.84 percent.
  - 4. Purpletop - *Tridens flavus*: 14.06 percent.
  - 5. Virginia Wildrye - *Elymus virginicus*: 13.28 percent.
  - 6. Plains Bristlegrass - *Setaria vulpiseta* : 7.81 percent.

## 2.02 SOIL MATERIALS

- A. Topsoil: Fertile soil, typical for locality, capable of sustaining vigorous plant growth; free of subsoil, or impurities, plants, weeds, roots, and stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth; pH value of minimum 5.5 and maximum 7.4.
  - 1. Seeding Area Topsoil Source: Living Earth Mixed Soil with Compost or equal.
- B. Topsoil: Reference LA drawings for areas to receive topsoil.

## 2.03 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer: Granular, non-burning; recommended for grass, with not less than fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, to the following proportions:
  - 1. Nitrogen: 10 percent.
  - 2. Phosphoric Acid: 10 percent.
  - 3. Soluble Potash: 10 percent.
- C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- D. Erosion Fabric: Reference Civil Engineer.
- E. Herbicide: EPA registered and approved, of type recommended by manufacturer.
- F. Layout Stakes: Softwood lumber, chisel pointed.
- G. Layout String: Inorganic fiber.

## 2.04 TESTS

- A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- B. Submit minimum 10 oz (280 g) sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- C. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this Section.

### 3.02 PREPARATION

- A. Reference the Civil Engineer's documents for all subgrade requirements.

### 3.03 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches (50 mm) of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

### **3.04 HYDROSEEDING**

- A. Apply seeded slurry with a hydraulic seeder at a rate of 1 lb per 4300 sq ft evenly in two intersecting directions.
- B. Do not hydroseed area in excess of that which can be mulched on same day.
- C. Immediately following seeding, apply mulch to a thickness of 1/8 inches (3 mm). Maintain clear of shrubs and trees.
- D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches (100 mm) of soil.
- E. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches (100 by 100 mm).

### **3.05 CLEANUP AND PROTECTION**

- A. During landscaping, keep pavements clean and work area in an orderly condition.
- B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.
- C. Identify seeded areas with stakes and string around area periphery. Set string height to 18 inches. Space stakes at 72 inches.

### **3.06 MAINTENANCE**

- A. See Section 02935 - Plant Maintenance for post-occupancy maintenance.

**END OF SECTION**

## **SECTION 02923**

### **SODDING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Fertilizing.
- C. Sod installation.

##### **1.02 RELATED REQUIREMENTS**

- A. Reference Civil Engineer and Structural Engineer for grading, subsoil preparation, erosion prevention, fill and backfill and all other related information.
- B. Section 02935 - Plant Maintenance: Post-occupancy maintenance.

##### **1.03 REFERENCE STANDARDS**

- A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding; Turfgrass Producers International; 2006.

##### **1.04 SUBMITTALS**

- A. See General Requirements for submittal procedures.
- B. Certification: Submit certification of grass species and location of sod source.

##### **1.05 QUALITY ASSURANCE**

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of Texas.
- B. Installer Qualifications: Company approved by the sod producer.

##### **1.06 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of fertilizer mixture.

##### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver sod on pallets. Protect exposed roots from dehydration.
- B. Do not deliver more sod than can be laid within 24 hours.

##### **1.08 WARRANTY**

- A. Special Warranty: Warrant the sod for a period of 1 year after the date of Final Project Acceptance, against defects including death and unsatisfactory growth, except for defects resulting from a lack of adequate maintenance, neglect, or abuse by owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.
- B. Disclaimer - Acts of God and other conditions beyond the landscape contractor's control such as vandalism shall not be the responsibility of the landscape contractor.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Sod: TPI, Certified Turfgrass Sod quality; cultivated grass sod; type indicated in plant schedule on Drawings; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft. Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.
  - 1. Thickness: "Thick" sod, minimum 1 inch and maximum 1 1/2 inch topsoil base with clean cut edges.
  - 2. Cut sod in area not exceeding 1 sq yd (1 sq m).
  - 3. Machine cut sod and load on pallets in accordance with TPI Guidelines.
- B. Topsoil: Fertile soil, typical for locality, capable of sustaining vigorous plant growth; free of subsoil, or impurities, plants, weeds and roots, and stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth; pH value of minimum 5.5 and maximum 7.4.
  - 1. Seeding Area Topsoil Source: Living Earth Mixed Soil with Compost or equal.
- C. Topsoil: Reference LA drawings for areas to receive topsoil.
- D. Fertilizer: Granular, non-burning; recommended for grass, with not less than fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, to the following proportions:
  - 1. Nitrogen: 5 percent.
  - 2. Phosphoric Acid: 10 percent.
  - 3. Soluble Potash: 10 percent.
- E. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

### **2.02 ACCESSORIES**

- A. Wood Pegs: Softwood, sufficient size and length to ensure anchorage of sod on slope.
- B. Herbicide: EPA registered and approved, of type recommended by manufacturer.

### **2.03 SOURCE QUALITY CONTROL**

- A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- B. Submit minimum 10 oz sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- C. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this section.

### **3.02 PREPARATION**

- A. Reference the Civil Engineer's documents for all subgrade requirements.
- B. Install edging at periphery of seeded areas per LA drawings to consistent depth.

### **3.03 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

### **3.04 LAYING SOD**

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod immediately after delivery to site to prevent deterioration.
- C. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- D. Where new sod adjoins existing grass areas, align top surfaces.
- E. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1/2 inch below top of hard surface.
- F. On slopes 4 inches per foot and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.
- G. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.
- H. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

### **3.05 MAINTENANCE**

- A. See Section 02935 - Plant Maintenance for post-occupancy maintenance.

**END OF SECTION**

## **SECTION 02930**

### **EXTERIOR PLANTS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Topsoil bedding.
- C. New trees, plants, and ground cover.
- D. Tree Pruning.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 02935 - Plant Maintenance: Post-occupancy maintenance.

##### **1.03 REFERENCE STANDARDS**

- A. ANSI A300 Part 1 - American National Standard for Tree Care Operations -- Tree, Shrub and Other Woody Plant Maintenance -- Standard Practices; 2001.

##### **1.04 SUBMITTALS**

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Maintenance Data: Include cutting and trimming method; types, application frequency, and recommended coverage of fertilizer.
- C. Submit list of plant life sources. Product certificates signed by manufacturers certifying that their products comply with specified requirements.
- D. Maintenance Contract.

##### **1.05 QUALITY ASSURANCE**

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years documented experience.
- B. Installer Qualifications: Company specializing in installing and planting the plants with 5 years experience.
- C. Tree Pruner Qualifications: Company specializing in pruning trees with proof of Arborist Certification.
- D. Tree Pruning: NAA - Pruning Standards for Shade Trees.
- E. Maintenance Services: Performed by installer.

##### **1.06 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of plants, fertilizer and herbicide mixture.
- C. Plant Materials: Certified by federal department of agriculture; free of disease or hazardous insects.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- B. Protect and maintain plant life until planted.
- C. Deliver plant life materials immediately prior to placement. Keep plants moist.

### **1.08 FIELD CONDITIONS**

- A. Do not install plant life when ambient temperatures may drop below 35 degrees F (2 degrees C) or rise above 90 degrees F (32 degrees C).
- B. Do not install plant life when wind velocity exceeds 30 mph (48 k/hr).

### **1.09 WARRANTY**

- A. See General Requirements for additional warranty requirements.
- B. Plants shall be guaranteed for a period of one year after the date of acceptance by the Owner except in cases where damage occurs due to acts of God. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size, and color. Replace dead plants and all plants not in a vigorous, thriving condition, as determined by the Town of Addison during and at the end of the guarantee period, without cost to the Owner, as soon as weather conditions permit and within the specified planting period.
- C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.
- D. Warranty shall begin upon acceptance of the project or at Substantial Completion.

## **PART 2 PRODUCTS**

### **2.01 TREES, PLANTS, AND GROUND COVER**

- A. Trees, Plants, and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

### **2.02 SOIL MATERIALS**

- A. Topsoil: Fertile, soil, typical for locality, capable of sustaining vigorous plant growth; free of subsoil, or impurities, plants, weeds and roots; minimum pH value of 5.5 and maximum 7.4.

### **2.03 SOIL AMENDMENT MATERIALS**

- A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve. Provide lime in the form of dolomitic limestone.
- B. Aluminum Sulfate: Commercial grade, unadulterated.
- C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus or reed-sedge peat.
- F. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.



- G. Manure: Well-rotten, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding material; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
- H. Fertilizer: Containing not less than fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated in analysis.
- I. Water: Clean, fresh, and free of substances or matter that could inhibit vigorous growth of plants.
- J. Herbicide: EPA registered and approved, of type recommended by manufacturer.

#### **2.04 MULCH MATERIALS**

- A. Mulching Material: Hardwood mulch twice ground bark, free of growth or germination inhibiting ingredients.

#### **2.05 ACCESSORIES**

- A. Trunk-Wrap Tape (use only if necessary): Two layers of crinkled paper cemented together with bituminous material, 4 inches wide minimum, with stretch factor of 33 percent.
- B. Location Stake: New, green T-posts, 2" by 2" inches, by 18"-24" in length.
- C. Guy Stake: Mild steel angle, galvanized, pointed end.
- D. Cable, Wire, Eye Bolts and Turnbuckles: Non-corrosive, of sufficient strength to withstand wind and water pressure and resulting movement of plant life.
- E. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.
- F. Square Paver Grates: See section[] 02783 - Concrete Pavers.

#### **2.06 SOURCE QUALITY CONTROL**

- A. Existing Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.
  - 1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities on nitrogen, phosphorous, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce satisfactory topsoil.
- B. Provide testing of imported topsoil.
  - 1. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt and organic matter; pH value.
  - 2. Submit minimum 10 oz (280 g) sample of topsoil proposed. Forward sample to testing laboratory in sealed containers to prevent contamination.
  - 3. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that prepared subsoil and planters are ready to receive work.
- B. Saturate soil with water to test drainage.
- C. Verify that required underground utilities are available, in proper location, and ready for use.

### **3.02 PREPARATION OF SUBSOIL**

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots, sods, stones, clay lumps and any other extraneous materials harmful to plant growth. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches (75 mm) where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Mix soil amendments in shrub and ground cover beds according to the EarthKind Landscape Management program for clay soils. Incorporate 3 inches of finished compost and 3 inches of expanded shale, or 6 inches of Soil Building Systems "Gumbo Buster", or equal. Apply 3 inches of twice ground hardwood mulch after planting is completed.
- E. For tree pit or trench backfill, reserve subsoil (unless material contains rock) removed from tree pit excavations and reuse as tree backfill. Use native soil only for tree backfill. No tree backfill shall contain soil amendments.

### **3.03 EXCAVATION FOR TREES**

- A. Pits and Trenches: Excavate with vertical sides and with bottom of excavation resembling a raised pedestal. Do not excavate using auger as this will seal sides of tree pit and prevent drainage. Scarify all sides of the tree pit to promote drainage.
  - 1. Container Grown Trees and Shrubs: Excavate approximately 2-3 times as wide as ball diameter and equal to ball depth. Pit depth to be coordinated with surrounding finish grade. Refer to tree and shrub planting details.
- B. Reserve subsoil removed from tree pit excavations. Mix with amended topsoil to produce planting soil.
- C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
  - 1. Hardpan Layer: Drill 6-inch diameter holes into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.
  - 2. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree pits.
  - 3. Percolation Test: Fill all excavations with water and wait 24 hours to allow water to drain. If percolation does not occur within 24 hours, stop work and consult Owner and Landscape Architect immediately. If water percolates out in 24 hours or less, begin positioning trees and shrubs.

### **3.04 PLACING TOPSOIL**

- A. Spread topsoil to a minimum depth of 4 inches (100 mm) over area to be planted. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches (150 mm).

### **3.05 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after initial raking of topsoil.

- C. Mix thoroughly into upper 2 inches (50 mm) of topsoil.
- D. Lightly water to aid the dissipation of fertilizer.

### **3.06 PLANTING**

- A. Time of Planting:
  - 1. Evergreen material: Plant evergreen materials between September 1 and December 1 or in spring before new growth begins. If Owner requires planting at any other times, plants shall be sprayed with anti-desiccant prior to digging operations, weather dependent.
  - 2. Deciduous materials: Plant deciduous materials in a dormant condition. If deciduous trees are planted in-leaf, they shall be sprayed with an anti-desiccant prior to digging operation.
- B. Planting shall be performed only by experienced workmen familiar with planting procedures under supervision of a qualified supervisor.
- C. Lay out individual tree locations according to Landscape Architect's drawings. Mark all tree locations with 18"-24" high tree stakes. All stakes to be set plumb with finished grade. If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until Owner's Representative has selected alternate plant locations.
- D. No trees shall be planted without Landscape Architect's acceptance and formal approval of preliminary staked layout.
- E. Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in beds. Provide shrub pits at least twice as wide as the root system and 24" greater for trees. Depth of pit shall be no greater than the root ball depth. Scarify bottom and sides of the pit. Remove excess excavated materials from the site.
- F. Place plants as indicated on landscape drawings for review and final orientation by Landscape Architect.
- G. Set plants and trees vertical.
- H. Remove non-biodegradable root containers.
- I. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches (150 mm) under each plant. Set plant material no lower than the finish grade or 2"-3" above finished grade. Remove burlap, ropes, and wires, from the root ball.
- J. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch (150 mm) layers. Maintain plant life in vertical position.
- K. Saturate soil with water when the pit or bed is half full of topsoil and again when full.
- L. Mulch planting pits and beds with mulching material 3" deep immediately after planting. After watering, rake mulch to provide a uniform finished surface.

### **3.07 PLANT RELOCATION AND RE-PLANTING**

- A. Relocate plants as indicated by Landscape Architect.
- B. Replant plants in pits or beds, partly filled with prepared topsoil mixture, at a minimum depth of 6 inches (150 mm) under each plant. Remove burlap, ropes, and wires, from the root ball.
- C. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch (150 mm) layers. Maintain plant materials in vertical position.
- D. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

### **3.08 INSTALLATION OF ACCESSORIES**

- A. Place grates at base of trees where indicated on drawings.

### **3.09 PLANT SUPPORT**

- A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:
  - 1. Tree Caliper: 1 inch (25 mm); Tree Support Method: 1 stake with one tie
  - 2. Tree Caliper: 1 to 2 inches (25 to 50 mm); Tree Support Method: 2 stakes with two ties
  - 3. Tree Caliper: 2 to 4 inches (50 to 100 mm); Tree Support Method: 3 guy wires with eye bolts and turn buckles
  - 4. Tree Caliper: Over 4 inches (100 mm); Tree Support Method: 4 guy wires with eye bolts and turn buckles

### **3.10 TREE PRUNING**

- A. Perform pruning of trees as recommended in ANSI A300.
- B. Prune newly planted trees as required to remove dead, broken, and split branches.

### **3.11 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 01400.
- B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

### **3.12 MAINTENANCE**

- A. See Section 02935 - Plant Maintenance for post-occupancy maintenance.

### **3.13 SCHEDULE - PLANT LIST**

- A. Reference LA drawings for complete plant listings.

**END OF SECTION**

## SECTION 02935

### PLANT MAINTENANCE

#### PART1 GENERAL

##### 1.01 STATEMENT OF INTENT

The Maintenance Contractor is hereby made aware that both the Owner and the Contractor anticipate that the landscape and irrigation maintenance at this site shall be of very high quality. All work to be performed within the scope of these specifications shall be strictly managed, executed and performed by experienced personnel using only sound horticultural and irrigation practices.

##### 1.02 SCOPE OF WORK

- A. The Landscape and Irrigation Maintenance specifications shall include the complete care as defined within these specifications, of all planted trees, shrubs, turf, natural grasses, groundcover, and irrigation areas within the limits of work for the following general areas:
1. Vitruvian Park South of Ponte Bridge;
  2. Vitruvian Park North of Ponte Bridge;
  3. Vitruvian Way Streetscape;
  4. Ponte Avenue Streetscape;
  5. Vitruvian Park Parking Area.

**NOTE: REPAIR AND MAINTENANCE OF PLANTER FENCING, TREE WELL ELECTRICAL OUTLETS, AND LIGHTING ARE NOT INCLUDED IN THE SCOPE OF SERVICES FOR THIS CONTRACT.**

- B. The Contractor shall provide all materials, equipment and labor required and/or inferred to perform all tasks identified within these specifications.
- C. The work under this contract includes watering, fertilization, pruning, spraying pesticides, weeding, herbicide applications, bed cultivation, edge trenching, mowing, edging, line trimming, irrigation checks and repairs in all landscape areas listed in section 1.2 – A., litter removal (including dog waste), overseeding, and aerification of all turf areas bi-monthly during the growing season. The naturalized area (natural grasses) shall be mowed quarterly to 8”.
- D. This landscape maintenance contract is a one-year contract and shall commence upon Final Completion and acceptance of the entire project and continue for 365 days. The contract shall be renewable for (5) five additional one year periods per contract if agreed to by both parties.

##### 1.03 GUARANTEE

- A. The Contractor shall replace, at Contractor's expense, all plant material, that, in the opinion of the Owner, fails to maintain a healthy, vigorous condition **as a result of the Contractor's failure to perform the work specified herein.**
- B. It is the responsibility of the Contractor to notify the Town of Addison Parks Department of any conditions beyond the control of the Contractor or scope of work of these specifications that may result in the damage and/or loss of plant material. This responsibility includes, but is not limited to notifying the owner of the following:
1. Damage by others to the irrigation system.
  2. Vandalism and/or other abuse of the property those results in damage to the plant material.

3. Areas of the site that continually hold water or are excessively wet. Areas of the site that appear too dry.

(Note: The contractor shall be responsible for notifying the Town of Addison Parks Department verbally immediately upon observation, and in writing on a weekly basis of conditions where the site is too wet or dry. This shall also apply to damaged irrigation and vandalism.)

The Contractor shall list any such items on the Landscape Management Report, along with recommended solutions and related cost. Failure of Contractor to report such items shall cause Contractor to incur full responsibility and cost for repair of such items. The required Landscape Management Report is included with these specifications.

#### 1.04 SCHEDULING

##### Timing

1. The Town of Addison shall determine scheduling of maintenance visits based on input from the contractor. The Town of Addison shall be contacted 48 hours ahead of time when service cannot be performed on schedule and an alternate time shall be determined.
2. The Town of Addison may at any time request alterations to the general maintenance service provided that the Contractor can accomplish the request without additional equipment, labor or man-hours.

#### 1.05 LANDSCAPE MAINTENANCE INSPECTION

##### A. Weekly Inspections by the Contractor

The Contractor shall be responsible for a weekly inspection of the entire property in the company of a Town of Addison designated representative and for the performance of all items required and referred to in these specifications.

##### B. Monthly Inspections by the Town of Addison

The Town shall perform monthly inspections with the contractor to review compliance with the specifications and to identify problem areas.

##### C. Landscape Maintenance Report

The Contractor shall be responsible for notifying the Town of Addison via the Landscape Maintenance Report of any problems. This worksheet must be left at the offices of the Town of Addison Parks Department on the day of the maintenance. Faxed Copies with a signature are acceptable (Fax 972/450-2834). **The Contractor shall not be paid for work reflected on that week's maintenance visit if these forms are not received by the Town.** These forms are very important in protecting both the Owner and Contractor when discrepancies arise. Any items not called to the attention of the Owner that result in any damage to the property shall fall under the liability of the Contractor. The Contractor shall use the form provided in this specification.

##### D. Frequency Chart

All items listed on the Maintenance Frequency Chart must be executed as specified unless an alternate schedule is approved by the Town in writing. If the Contractor does not perform any item listed, that item shall then be deducted from that month's billing.

## 1.06 ADDITIONAL REQUIRED CONTRACTOR REPORTING

### A. Pesticide Application Reports

Written notification and posting of Chemical Application, by law, must occur within (48) hours of application. All such notifications must conform to the State of Texas Structural Pest Control Board (SPCB) requirements.

A completed Chemical Application Report shall be submitted to the Town within forty-eight hours (48) hours following all pesticide or fertilizer applications. This report shall contain pertinent weather conditions, exact time of application, chemicals and dilution rates used, as well as, the signature of the applicator involved. Pesticide applications shall comply with all laws and regulations of the State of Texas Structural Pest Control Board.

For fertilization reporting, always include the total number of pounds of fertilizer applied and indicate an approximate percentage of completion, if activity is not completed within a single day.

### B. Irrigation Reports

All irrigation system inspections shall include an Irrigation Report submitted to the Town of Addison within twenty-four (24) hours following the completion of each inspection. This report shall contain the following information:

1. Inspection date and duration, in time, of the inspection.
2. List by controller and zone number repairs made or problems found.
3. Status of controller program after completion (on, off, rain mode, etc.). **All controller programming shall be done by and coordinated through a Town of Addison Parks Irrigation technician.**
4. Repairs or replacement performed due to Contractor damage.

### C. Required Notifications

The Contractor shall notify the Town of Addison by phone at least forty eight (48) hours in advance of the performance of the following activities:

1. Pesticide or fertilizer applications.
2. Seasonal color changes.
3. Irrigation system inspections.

### D. Situations requiring immediate notification to the Town of Addison by the Contractor include:

1. All situations concerning safety, health or property damages.
2. All situations involving issues with electric or water utilities where an immediate response is needed.
3. Changes to the Contractor's schedule.

## 1.7 CONTRACTOR'S GENERAL PERFORMANCE

### A. Personnel Requirements

1. All maintenance personnel shall be uniformed and generally neat in appearance.
2. An English-speaking foreman must be present on site at all times
3. Appropriate safety equipment shall be utilized at all times.
4. All lunch and break periods taken by maintenance personnel shall be within areas approved by the Town.
5. While on site, all personnel must behave in a professional manner.
6. Contractor shall have emergency response personnel available 24 hours per day, seven days per week. Contractor shall provide Owner with "after hour" contact names and numbers.

### B. Maintenance and Support Equipment

1. Only the appropriate equipment, in proper working order, shall be utilized for maintenance operations.
2. Repair, servicing or fueling of equipment is not permitted within landscape areas.
3. Equipment shall be operated in a safe and effective manner at all times.
4. Mower blades shall be sharp and set to the proper heights.
5. Equipment shall be cleaned before and after use in the naturalized area.

## PART 2 PRODUCTS

### 2.01 FERTILIZER: SHRUBBERY, GROUNDCOVER, VINES, AND ORNAMENTAL TREES

- A. Fertility Applications: Shrubs shall be maintained and fertilized to be healthy and vigorous. Fertility is scheduled for three (3) applications per year and as necessary in between scheduled applications to maintain health and vigor. The contractor shall use only the highest-grade slow release fertilizer with a high micro nutrient package. Coverage shall include 1 lb. of nitrogen per 1000 sq. ft.
- B. Fertilizer: The contractor shall use Lesco brand fertilizer or its equivalent that has a full minor nutrient package. 15-5-10 element percentage (3-1-2 ratio) with a minimum 7% sulfur and 4% iron plus trace elements. Nitrogen source to be at least 50% slow release urea formaldehyde (UF) or sulfur coated urea (SCU). The Contractor shall return empty bags of fertilizer to verify quantities applied.
- C. Seasonal Color and bulbs shall be fertilized using blood meal at recommended rates.

### 2.02 HERBICIDES

- A. Turf areas, ornamental beds and Bosque Park (mulched area) weed control to include:
  1. Post-emergent weed control: As needed.



2. Pre-emergent weed control: The Contractor shall control weeds with a year-round pre-emergent program.
3. Pre-emergent application shall not be combined with fertilization unless approved by the Town of Addison.
4. All herbicides must be approved for use by the Town of Addison.

## 2.3 PESTICIDES

- A. Provide as needed for safe control of insect and/or disease problems.
- B. All pesticides must be approved for use by the Town of Addison.

## 2.4 MULCH

- A. Landscape Beds: Twice ground premium grade shredded hardwood bark mulch as supplied by Living Earth Technology Co., or approved equal. Apply 1 time per year in March/April and additional applications monthly as needed to touch up areas. Maintain mulch (2) two inches thick at all times. **The Town of Addison shall inspect the quality of the mulch prior to distribution.**
- B. Trenching of curbs and sidewalks prior to mulching will take place, which is to include all hard surfaces.

## PART 3 EXECUTION

### 3.01 IRRIGATION SYSTEM AND WATERING

- A. Irrigation System Inspection and Maintenance:
  1. Inspection by the Town's representative and the contractor's **licensed irrigation technician** shall be performed on all zones of irrigation in accordance with the annual schedule of activities. Controllers shall be manually operated and a visual inspection performed to verify proper operation of all system components.
  2. Maintenance and repair activities to be performed as needed include:
    - a. Head height adjustments.
    - b. Head repair, including nipples, and replacements.
    - c. Unclogging, adjustment and replacement of nozzles.
    - d. Adjustments to flow control devices on electric valves
    - e. Replacement of damaged and missing valve box covers and lids.
    - f. Adjustments to irrigation controller settings or programs (coordinated with the Town).
    - g. Elimination of any pests such as ants, spiders or mice from controller cabinets and valve, DCA and meter boxes.
    - h. Repair lateral lines and fittings
    - i. Repair mainline piping, valves, and wiring not outlined in 'a-g' above based upon a time and materials basis. Note: No mark up of wholesale prices of materials is allowed – SEE BID FORM.
  3. Only irrigation repairs of the highest quality will be accepted. This includes renovation of disturbed landscape/turf areas to their existing condition.

4. Repairs found to be needed outside the scope of inspection, maintenance, and repairs shall be reported to the Town of Addison immediately. A cost estimate for such repairs must be supplied to the Town's representative for approval prior to commencement of work.
  5. All damages to irrigation system components caused by the Contractor's operations shall be repaired immediately.
  6. All repair work must be performed by an individual licensed in the State of Texas as a repair technician or irrigator.
- B. Irrigation System - Controller Programming:
1. The Contractor shall make recommendations for controller programming as conditions warrant.
  2. Controller programs shall take into consideration specific site conditions as well as seasonal needs and anticipated weather conditions.
  3. Landscape areas should receive an inch to an inch and one half of water, including rain, per week. Precipitation rate of the sprinkler heads is as follows:
    - a. Rotary heads approximately 1/3 I.P.H.
    - b. Spray heads approximately 1 I.P.H.
  4. The Contractor shall provide the Owner with written documentation of initial irrigation program, updating this program when changes are made.
  5. The Contractor is responsible for coordinating, with the Town of Addison representative, all required manual operations of irrigation controllers, such as turning off controllers prior to freezing or rainy periods, as well as the adjustments required in conjunction with chemical and fertilization applications. A rainy period will be defined as one (1) day of continuous rain or two inches (1") of rainfall within 24 hours and freezing conditions shall be actual or forecasted temperatures of 40 degrees or less.
- C. Tree Watering:
1. Hand water trees as needed. Water those trees showing heat or drought stress. Be alert to over watering and discontinue applications if required.
  2. Areas needing supplemental hand watering due to irrigation malfunction or extreme drought conditions shall be watered by the Contractor on an as needed basis.
- D. Shrub and Groundcover Watering:
1. Monitor and notify the Town's representative, in writing, of needed adjustments.

### **3.02 FERTILIZER**

A. Trees:

1. Fertilize all trees two (2) times per year in September and March according to the following specifications:

- a. One 40-pound bag of ARBOR-GREEN fertilizer as manufactured by Lesco, Inc., per 200 gallons of water,
  - b. One gallon of Chelated Micro-Mix, as manufactured by Lesco, Inc., per 200 gallons of water. The two products shall be mixed together in a tank no smaller than 200-gallon capacity. The tank shall have mechanical agitation. The pump shall be able to supply a minimum operating pressure of 150 psi.
  - c. The solution shall be applied to the trees at a rate of one gallon per caliper inch. Injections shall be made every 36" equally spaced around the drip line of the tree or according to the manufacturer recommendations.
- B. Shrubs and Groundcover:
1. Fertilize all shrub and groundcover beds in March, June and September with a 3:1:2 ratio fertilizer with iron and sulfur at 1.0 pounds of actual nitrogen per 1000 square feet of application. The Nitrogen source shall be at least 50% slow release urea formaldehyde (UF) or sulfur coated urea (SCU).
- C. Turf
1. Fertilize turf areas in April, June, and August with a 3:1:2 ratio fertilizer with iron and sulfur at 1.0 pounds of actual nitrogen per 1000 square feet of application. The Nitrogen source shall be at least 50% slow release urea formaldehyde (UF) or sulfur coated urea (SCU). **Fertilizer ratios are subject to change and shall be pre-approved by the Town of Addison Parks Department.**

### 3.03 PRUNING

- A. Shade and Ornamental Trees:
1. Tree Care Pruning: Winter pruning shall be done during January. At this time, the contractor shall remove all diseased, dead or dying branches. Additionally, crossing branches not consistent with standard form, low hanging or broken limbs (heading up) posing a safety hazard, and limbs promoting poor light and air penetration shall be removed/thinned by the contractor.  
  
Red Oaks and Live Oaks shall not be pruned during the months of February through July  
  
Pruning techniques shall be in accordance with the latest edition of ***Tree Pruning Guidelines published by the International Society of Arboriculture and the American National Standards (A.N.S.I) A300 – Pruning Standards.***  
  
Broken limbs, dead wood, suckers and watersprouts shall be removed as detected and such removal is authorized at any time. If such removals are on oaks during the months of February through July, a pruning paint must be applied to all cuts.
  2. When pruning, the Contractor shall make no flush cuts or apply pruning paint to cuts.
- B. Shrubs:
1. Prune all shrubs and ground covers as need to encourage healthy growth and to create a natural appearance based upon the plant placement and plant growth. Note: Dwarf Yaupon shrubs within the tree well fencing must be maintained at a height low enough to allow the 12" irrigation pop-up heads to clear the foliage. These shrubs must also be maintained within the confines of the tree fences.

C. Groundcovers:

1. Trim edges of beds and any errant growth as needed during the growing season. DO NOT use line edgers to trim groundcovers. DO NOT trim vertically. Cut at a 45-degree angle.

### 3.04 PESTICIDES

- A. Provide insect, fire ant and disease control on an as needed basis. Pesticides shall be applied by a licensed applicator. Supply the Town with written (48) hour notice prior to any applications. Follow SPCB guidelines.

### 3.05 HERBICIDES

Supply the Town with (48) hour written notice prior to any applications. Follow SPCB guidelines.

**All pesticides and herbicides shall be applied by a Texas Structural Pest Control licensed applicator.**

A. Pre-emergent:

1. The Contractor shall control weeds with a year-round pre-emergent program.

B. Post-emergent:

1. Apply post-emergent herbicide according to label instructions, as needed, to control weeds in beds, lawns, crushed granite, paver, curb lines, and mulched areas. All herbicides to be used must be approved by the Town of Addison.

- C. All liquid herbicide applications shall contain a water-soluble dye (blue or green) used in a strength adequate for visual verification. Care shall be taken to avoid excessive overspray of dyed solutions onto walks, curbs, walls, signs or other features. Any overspray shall be removed from these areas immediately.

- D. All post-emergent herbicides shall be applied with a suitable surfactant additive mixed uniformly in solution.

- E. Use chemical and/or mechanical means to maintain all pavement lines and cracks in a weed-free condition.

### 3.06 FIRE ANT CONTROL

All beds and mulch areas shall receive one spring application of 'Logic' and one summer application of 'Amdro' as a preventative treatment for fire ants. Use Orthene for individual mound treatment on an as-needed basis.

### 3.07 MULCHING/TRENCHING

- A. Mulch all shrub beds to maintain a 2-inch depth of shredded hardwood bark mulch and/or cedar mulch. Shrub bed mulching shall occur in early spring (March - April). Mulch is to be spread such that none of the previously laid mulch is visible. Mulch shall be maintained so that no bare areas of soil are visible at any time.

### **3.08 WEEDING/CULTIVATING**

Remove weeds as needed to maintain all areas in a weed free condition. Cultivate beds only prior to application of pre-emergent herbicide. DO NOT cultivate beds after pre-emergent herbicide has been applied.

### **3.09 LITTER CONTROL (Includes Dog Waste)**

The contractor shall be responsible for picking up trash (including dog waste) during each site visit.

### **3.10 WINTER OVERSEEDING**

- A. The Contractor shall be responsible for overseeding with an approved blend of perennial rye grass seed. Overseeding shall be performed during the third week of September.

### **3.11 MOWING**

- A. The contractor shall be responsible for mowing general turf areas.
- B. The contractor shall be responsible for mowing the naturalized grass area to a height of eight inches (8") approximately four (4) times during the year. Mowing in this area shall be done with equipment thoroughly cleaned before and after use.

### **3.12 TURF AERIFICATION**

- A. All turf areas shall be aerified monthly during the growing season (4 times per year) utilizing walk-behind core-type units.

### **3.13 FLOOD AREA MAINTENANCE**

- A. After any rain event, the contractor shall visit the site within 24 hours to inspect for any damage and/or debris.
- B. All necessary flood-related maintenance shall be noted on the Landscape Management Report
- C. The contractor shall be responsible for notifying the Town of Addison Parks Department verbally upon observation of any significant damage.

**PLANT MAINTENANCE**

**PLANT AND IRRIGATION MAINTENANCE  
LANDSCAPE MANAGEMENT  
FREQUENCY CHART**

**GENERAL SITE MAINTENANCE**

**FREQUENCY PER YEAR**

- |    |                                    |                                                              |
|----|------------------------------------|--------------------------------------------------------------|
| A. | Trash, pet waste, debris removal * | Each visit                                                   |
| B. | Major leaf removal (Bosque Park)   | November, December (once per month)                          |
| C. | Grounds Inspections                | 12                                                           |
| D. | Turf Aerification                  | Bi-monthly during the growing season (4 times )<br>per year) |

**SHRUB AND GROUNDCOVER CARE**

**FREQUENCY PER YEAR**

- |    |                             |                              |
|----|-----------------------------|------------------------------|
| A. | Weed/Insect control         | Minimal weekly and as needed |
| B. | Ground cover control/edging | Monthly and/or as needed     |
| C. | Pruning/Trimming            | Monthly and/or as needed     |
| D. | Mulch Application           | 1                            |
| E. | Fertilizer applications     | 3                            |
| F. | Pre-emergent                | 2                            |

**TREE CARE**

**FREQUENCY PER YEAR**

- |    |                                  |             |
|----|----------------------------------|-------------|
| A. | Pruning: sucker and watersprouts | As needed   |
| B. | Pruning: winter pruning          | 1 (January) |
| C. | Mulch application                | 1           |
| D. | Fertilizer applications          | 2           |
| E. | Remove dead or broken limbs      | As needed   |

**OVERSEEDING**

**FREQUENCY PER YEAR**

- |    |                                                     |                                       |
|----|-----------------------------------------------------|---------------------------------------|
| A. | Overseeding with Perennial Rye<br>General turf area | 1 (3 <sup>rd</sup> week of September) |
|----|-----------------------------------------------------|---------------------------------------|

**MOWING**

**FREQUENCY PER YEAR**

- |    |                                                     |    |
|----|-----------------------------------------------------|----|
| A. | Mowing, edging, line trimming,<br>General turf area | 33 |
| B. | Mowing<br>Naturalized area                          | 4  |

**IRRIGATION**

**FREQUENCY PER YEAR**

- |    |                                 |           |
|----|---------------------------------|-----------|
| A. | Irrigation Inspections          | 12        |
| B. | Irrigation Maintenance & Repair | As needed |

**END OF SECTION**

**SECTION 03100**  
**CONCRETE FORMWORK**

**PART 1 – GENERAL**

**1.01 WORK INCLUDED**

- A. Furnish and install all formwork required for cast-in-place concrete as indicated on the drawings and specified herein.

**1.02 RELATED WORK**

- A. Section 03200 – Reinforcement Steel
- B. Section 03310 – Portland Cement Concrete

**1.03 REGULATORY REQUIREMENTS**

- A. Design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard ACI 347, "Recommended Practice for Concrete Formwork."

**1.04 QUALITY ASSURANCE**

- A. Design of formwork is the Contractor's responsibility.

**1.05 JOB CONDITIONS**

- A. Protection: Use all means necessary to protect formwork materials before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.

**PART 2 – PRODUCTS**

**2.01 MATERIALS**

- A. Forms
  - 1. Wood: Provide Douglas Fir or Southern Yellow Pine Plyform Plywood for exposed concrete surfaces and No. 2 Southern Yellow Pine shiplap boards or Plyform Plywood for concealed surfaces.
  - 2. Steel: As required.
- B. Form Coatings:
  - 1. Exposed Concrete: E.A. Thompson Chemical Co. "Waterseal", Rex-Spanall "Super Rex-Coat", Sonneborn Building Products "Form Saver", or approved equal.
  - 2. Unexposed Concrete: Oil wood forms with a paraffin base oil, construct mill oiled material, or wet thoroughly and immediately before placing concrete.
- C. Form Ties (Break-Back Type): All metal appliances used inside of the forms to hold them in correct alignment shall be removed to a depth of at least one inch from the surface of the concrete. For exposed concrete surfaces, wooden or plastic cones (3/4 inch diameter maximum) shall be used on ties to insure proper break-back and to facilitate patching.

## **PART 3 – EXECUTION**

### **3.01 INSTALLATION**

- A. General: Construct, erect, support, and remove forms and related structures in compliance with ACI 347. Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste. Maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure.
- B. Cleaning and tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Tighten forms after concrete placement if required to eliminate mortar leaks.
- C. Embedded Items: Set all required embedded items before the concrete is placed.
- D. Formcoatings: Apply in accordance with manufacturer's instructions.

### **3.02 REMOVAL OF FORMS**

- A. Formwork not supporting weight of concrete may be removed after cumulatively curing at not less than 50 degrees F. for 24 hours after placing concrete, provided concrete is sufficiently hard and will not be damaged by form removal operations.

**END OF SECTION**



**SECTION 03200**  
**REINFORCING STEEL**

**PART 1 – GENERAL**

**1.01 WORK INCLUDED**

- A. Furnish and install all concrete reinforcement as indicated on the drawings and specified herein.

**1.02 RELATED WORK**

- A. Section 03100 – Concrete Formwork
- B. Section 03310 – Portland Cement Concrete

**1.03 REFERENCES**

- A. American Concrete Institute (ACI 315) – Manual of Standard Practice for Detailing Reinforcing Concrete Structures.
- B. Concrete Reinforcing Steel Institute (CRSI) – Manual of Standard Practice.

**1.04 SUBMITTALS**

- A. Shop Drawings: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures” showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement.
- B. Submit mill test certificates of supplied reinforcement indicating physical and chemical analysis.

**PART 2 – PRODUCTS**

**2.01 MATERIALS**

- A. Reinforcing Steel Bars: Domestic deformed type, ASTM A615, Grade 60.
- B. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations. Wood, brick, and other devices will not be acceptable.

**PART 3 – EXECUTION**

**3.01 INSTALLATION**

- A. General: Comply with the specified codes and standards, approved shop drawings and Concrete Reinforcing Steel Institute’s recommended practice for “Placing Reinforcing Bars,” for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, grease and other materials which reduce or destroy bond with concrete.
- C. Accurately form bar reinforcement to dimensions indicated. Bend stirrup and tie bars around a pin of diameter not less than two times bar diameter. Bend other bars around a pin of diameter not less than six times bar diameter. Bend bars cold. Do not straighten or rebend in a manner that will injure material. After fabrication bundle and tag with identifying metal tags securely wired in place.

- D. Accurately position and secure metal reinforcement against displacement with annealed iron wire ties, suitable clips at intersections, metal supports, chairs and hangers.
- E. Avoid splices of bar reinforcement at points of maximum stress. All splices shall conform to the requirements of Chapter 12, ACI 318-83, but shall in no case be less than 36 bar diameters unless otherwise noted on plans. Stagger splices of adjacent bars and provide corner bars corresponding in size and number to adjacent bars.

**END OF SECTION**

## **SECTION 03300**

### **PORTLAND CEMENT CONCRETE**

#### **PART 1 – GENERAL**

##### **1.01 SCOPE**

- A. The requirements of this section shall govern for all materials used for storage, handling, measuring, proportioning, mixing or combining such materials in producing Portland cement concrete.
- B. This section shall govern unless the approving authority requires a more stringent specification.
- C. If the approving authority for this contract is the Texas State Department of Highways and Public Transportation, the latest edition of the "Standard Specifications for Construction of Highways, Streets and Bridges," shall govern all Portland cement concrete on this project.

##### **1.02 RELATED WORK**

- A. Section 02511 – Portland Cement Concrete Pavement
- B. Section 03100 – Concrete Formwork
- C. Section 03200 – Reinforcement Steel

#### **PART 2 – PRODUCTS**

##### **2.01 CEMENT**

- A. Portland cement shall be either Type I, II, or III, conforming to ASTM C150.
- B. Either Type I or II Portland cement may be used unless Type II is specified on the plans or elsewhere in the Contract Documents. Type III Portland cement may be used when the anticipated air temperature for the succeeding 12 hours will not exceed 60 degrees F. Type III may be used in all precast prestressed concrete, except in piling, when Type II cement is required for substructure concrete.
- C. Type II cement with a maximum of 5 percent tricalcium aluminate shall be used for exposure to sewage.
- D. Only one brand of Portland cement shall be used in any on structure without written permission of the Owner. If more than one brand is used, the resulting concrete must be uniform in color.
- E. Portland cement shall be sampled and tested in accordance with ASTM C183, C184, C187, C190 and C191 as appropriate.

##### **2.02 WATER**

- A. Water used in mixing or curing shall be as clean and free of oil, salt, acid, alkali, sugar, vegetable or other substances injurious to the finished product as possible. Water known to be of potable quantity may used without testing. Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass or other foreign materials.

##### **2.03 ADMIXTURES**

- A. The use of any material added to the concrete mix shall be approved by the Engineer. The Contractor shall submit a certificate indicating that the material to be furnished meets all the requirements indicated below for the admixtures for which approvals are desired. In addition, the Engineer may require the Contractor to submit complete test data from an approved

laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests will be made of samples taken by the Owner's Representative from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved. All admixtures used in the concrete mix shall be compatible with one another.

1. Air Entraining Admixtures: The admixture shall be an approved substance meeting the requirements of ASTM. Air entraining admixtures shall be added to the mixer in the amount necessary to produce the specified air content.
2. Water Reducing, Set Controlled Admixtures: During hot weather concreting operations or normal operations, in order to maintain specified slump and required workability, the Contractor shall make provisions for use of a water reducing admixture or a water reducing and retarding admixture. The water reducing admixture shall conform to requirements of ASTM C494, Type A and added Type F, and water reducing and retarding admixtures shall conform to the requirements of ASTM C494, Type D and Type G. Water reducing or water reducing and retarding admixtures shall be added at the mixer separately from the air entraining admixtures in accordance with manufacturer's printed instructions.

## 2.04 COARSE AGGREGATES

- A. Coarse aggregates shall consist of durable particles of gravel, crushed blast furnace slag, crushed stone or combination thereof; free from frozen materials or injurious amounts of salt, alkali, vegetable matter or other objectionable material either free or as an adherent coating; and its quality shall be reasonably uniform throughout. It shall not contain more than 0.25 percent by weight of clay lumps, or more than 1.0 percent by weight of shale, or more than 5 percent by weight of laminated and/or friable particles. Unless specified elsewhere herein, coarse aggregates shall meet the requirements of ASTM C33.
- B. Permissible sizes and gradations shall be governed by Table 1, except when exposed aggregate surfaces are required. Coarse aggregate gradation will be specified on the plans.

Table 1

### COURSE AGGREGATE GRADATION CHART

- C. The aggregate shall be washed. The loss by decantation plus the allowable weight of clay lumps shall not exceed one percent. In the case of aggregates made primarily from the crushing of stone if the material finer than the 200 sieve is definitely established to be the dust of fracture, essentially free from clay or shale, the percent may be increased to 1.5.
- D. When the coarse aggregate is subjected to five alterations of the sodium sulfate soundness test, the weighed loss shall not exceed 12 percent.
- E. Where the coarse aggregate is delivered on the job in two or more sized or types, each type and/or size shall be batched and weighed separately.
- F. All aggregates shall be handled and stored in such a manner as to prevent size segregation and contamination by foreign substances. When segregation is apparent, the aggregate shall be re-mixed. At the time of its use, the aggregate shall be free from frozen materials and aggregate containing foreign materials will be rejected. Coarse aggregate that contains more than 0.5 percent free moisture by weight shall be stockpiled for at least 24 hours prior to use.
- G. Adequate storage facilities shall be provided for all approved materials. The intermixing of non-approved materials, with approved materials either in stockpiles or in bins, will not be permitted. Aggregates from different sources shall be stored in different stockpiles.
- H. Aggregates shall be stockpiled in such a manner as to prevent segregation and maintain as nearly as possible a uniform condition of moisture.
- I. Each aggregate stockpile shall be reworked with suitable equipment at such times as

required to re-mix the material to provide uniformity of the stockpile.

- J. Coarse aggregates will be dumped in traps and stockpiled with stacker conveyers. At no time shall the aggregate be pushed with a bulldozer or front-end loader.

## **2.05 FINE AGGREGATES**

- A. Fine aggregates shall consist of clean, hard, durable and uncoated particles of natural or manufactured sand or a combination thereof with or without a mineral filler. It shall be free from frozen materials or injurious amounts of salt, alkali, vegetable matter or other objectionable materials, and it shall not contain more than 0.5 percent by weight of clay lumps.
- B. The fine aggregates shall produce a mortar having a tensile strength equal to or greater than that of Ottawa sand mortar.
- C. The acid insoluble residue of fine aggregates used in slab concrete subject to direct traffic shall be not less than 2.8 percent by weight.
- D. The fine aggregate of combinations of aggregates, including mineral filler, shall conform to the following gradation requirements for aggregate grade number 1.
- E. Notes on Fine Aggregate gradation:
  - a. Where manufactured sand is used in lieu of natural sand, the percent retained on the No. 200 sieve shall be 94 to 100.
  - b. Where the sand equivalent value is greater than 85, the retainage on the No. 50 sieve may be 65 to 94.
- F. The sand equivalent shall not be less than 80 when subjected to the Sand Equivalent Test as performed by the Texas State Highway Department using Test Method TEX-203-F.
- G. For all classed of concrete, the fineness modulus for fine aggregates shall be between 2.30 and 3.10 for Grade 1. The fineness modulus by weight retained on the following sieves and dividing by 100:
  - a. Sieve No. 4
  - b. Sieve No. 8
  - c. Sieve No. 16
  - d. Sieve No. 30
  - e. Sieve No. 50
  - f. Sieve No. 100

## **2.06 MINERAL FILLER**

- A. Mineral filler shall consist of stone dust, clean crushed sand or other approved inert material.

## **2.07 MORTAR (Grout)**

- A. Mortar for the repair of concrete shall consist of one part cement, two parts finely graded sand and enough water to make the mixture plastic. When required to prevent color difference, white cement shall be added to produce the color required. When required, latex adhesive shall be added to the mortar.

## **PART 3 – EXECUTION**

### **3.01 STORAGE OF MATERIALS**

- A. Storage of Cement:
  - 1. All cement shall be stored in well ventilated, weatherproof buildings or approved bins which will protect from dampness or absorption of moisture. Storage of facilities shall be ample, and each shipment of packaged cement shall be kept separated to provide easy access for identification and inspection.
  - 2. The Owner may permit small quantities of sacked cement to be stored in the open on a raised platform and under waterproof covering for a maximum of 48 hours.
- B. Storage of Aggregates:
  - 1. The method of handling and storing concrete aggregates shall prevent contamination with foreign materials. If the aggregates are stored on the ground, each site for the stockpiles shall be clear of all vegetation and shall be level. The bottom 6-inch layer of aggregate shall not be disturbed or used without recleaning.
  - 2. When conditions require the use of two or more sizes of aggregates, they shall be separated to prevent intermixing. Here space is limited; stockpiles shall be separated by physical barriers.
  - 3. Methods of handling aggregates during stockpiling and subsequent use shall be such that segregation will be minimized. Unless authorized by the Owner, all aggregates shall be stockpiled at least 24 hours to reduce the free moisture content.

### **3.02 CLASSIFICATION AND MIX DESIGN**

- A. It shall be the responsibility of the Contractor to furnish the mix design, using a coarse aggregate factor acceptable to the Owner, for the class(es) of concrete specified, and to conform with the requirements contained herein. The Contractor shall perform at his own expense the work required to substantiate the design. Complete concrete design data shall be submitted to the Owner for approval.
- B. It shall also be the responsibility of the Contractor to determine and measure batch quantity of each ingredient, including all water, not only for batch designs but for all concrete produced for the project, so that the mix conforms to these specifications and other requirements shown on the plans.
- C. In lieu of the above mix design responsibilities, the Contractor may accept a design furnished by the Owner; however, this will not relieve him of the responsibility of providing concrete meeting the requirements of these specifications.
- D. Trial batches will be made and tested using all the proposed ingredients prior to the placing of concrete, and when the aggregate and/or type, brand or source of cement or admixtures is changed. When the brand and/or source of cement only is changed, the Owner may waive trial batches only if a prior record of satisfactory performance of the cement has been established.
- E. Trial batches shall be made in the mixer to be used on the job. When transit mix concrete is used, the trial designs will be made in a transit mixer representative of the mixers to be used. Batch size shall not be less than 50 percent of its rated mixing capacity.
- F. Mix designs from previous or concurrent jobs may be used without trial batches if it is shown that no substantial change in any of the proposed ingredients has been made.
- G. Water reducing or retarding agents may be used with all classes of concrete, at the option of the Contractor, and will be required for hot weather concreting for cased drilled shafts and for continuous slab placement.
- H. When a retarding admixture is required for hot weather concreting, the amount to be used will be as required in paragraph 2.3 A., ADMIXTURES, subject to change by the owner when required. When used in continuous slab placement, the amount to be used will be established by several trial batches, with varying retarder content, and simulating the placing conditions to be

encountered. When water reducing or retarding agents are used, at the option of the Contractor, reduced dosage of the admixture will be permitted.

- I. Entrained air will be required in accordance with Tables 4 and 5. The concrete shall be designed to entrain 5 percent air when Grade 1 or 2 coarse aggregate is used; 6 percent when Grade 3 or 4 coarse aggregate is used; and 7 percent for Grade 5, 6, or 7, unless otherwise specified by the Owner. Concrete as placed in the structure shall contain the proper amount as required herein with a tolerance of  $\pm 1 \frac{1}{2}$  percentage points. Occasional variations beyond this tolerance will not be cause for rejection. When the quantity of entrained air is found to be more than 3 percentage points over those values given herein, additional test beams or cylinders will be made. If these beams or cylinders pass the minimum flexural or compressive requirements, the concrete will not be rejected because of the variation in air content.
- J. The consistency of the concrete as placed should allow the completion of all finishing operations without the addition of water to the surface. When field conditions are such that additional moisture is needed for the final concrete surface finishing operation, the required water shall be applied to the surface by fog spray only, and shall be held to a minimum. The concrete shall be workable, cohesive, possess satisfactory finishing qualities and of the stiffest consistency that can be placed and vibrated into a homogeneous mass. Excessive bleeding shall be avoided. Slump requirements will be as specified in Table 2.

### **3.03 QUALITY OF CONCRETE**

- A. The concrete shall be uniform, workable and of a consistency acceptable to the owner. The cement content, maximum allowable water/cement ratio, the desired and maximum slumps, the proper amount of entrained air and the strength requirements for all classes of concrete shall conform to the requirements of these specifications. It shall be the responsibility of the Contractor to provide concrete meeting these requirements.
- B. During the progress of the work, and approved testing laboratory will cast test cylinders or beams, perform slump and entrained air tests, and will make temperature checks as required to insure compliance with the specifications.
- C. A strength test shall be defined as the average of the breaking strength of two cylinders or two beams as the case may be. Specimen will be tested in accordance with ASTM C39 or STM C293.
- D. If the required strength or consistency of the class of concrete being produced cannot be secured with the minimum cement specified or without exceeding the maximum water/cement ratio, the Contractor will be required to furnish different aggregates, use a water reducing agent, an air entraining agent or increase the cement content in order to provide concrete meeting these specifications.
- E. All test specimens, beams or cylinders representing tests for removal of forms and/or falsework shall be cured using the same methods and under the same conditions as the concrete represented.
- F. "Design strength" beams and cylinders shall be cured in accordance with ASTM C31.
- G. The Contractor shall provide and maintain curing facilities for the purpose of curing test specimens. Provision shall be made to maintain the water in the curing tank at temperatures between 70 degrees F and 90 degrees F.
- H. When control of concrete quality is by 28-day compressive tests, job control will be by 7-day compressive tests, which are shown to provide the required 28-day strength, based on results from trial batches. Thereafter, if the required 7-day strength is not secured with the quantity of cement specified in Tables 3 or 4, changes in the batch design will be made as specified in this article.

### **3.04 MIXING**

A. Mixing Conditions:

1. The concrete shall be mixed in quantities required for immediate use. Any concrete which is not in place within the limits outlined in paragraph 3.5 shall not be used. Retempering of concrete will not be permitted.
2. In threatening weather, which may result in conditions that will adversely affect the quality of the concrete to be placed, the Engineer may order postponement of the work. Where work has been started and changes in weather conditions require protective measures, the Contractor shall furnish adequate to protect the concrete against damage from rainfall or freezing temperatures. If necessary to continue operations during rainfall, the Contractor shall also provide protective coverings for the material stockpiles. Aggregate stockpiles need to be covered only to the extent necessary to control the moisture conditions in the aggregates to adequately control the consistency of the concrete.

B. Mixing and Mixing Equipment:

1. General: All equipment, tools and machinery used for handling materials and performing any part of the work shall be maintained in such condition to insure completion of the work underway without excessive delays for repairs or equipment.
  - a. The mixing shall be done in a mixer of approved type and size that will produce uniform distribution of the material throughout the mass, and shall be capable of producing concrete meeting the requirements of these specifications.
  - b. The mixer shall have a plate affixed showing the manufacturer's recommended operating data, and it shall be operated within the speed and capacity limits stated thereon unless otherwise directed by the Owner.
  - c. The absolute volume of the concrete batch shall not exceed the rated capacity of the mixer.
  - d. The mixing equipment shall be capable of producing sufficient concrete to provide the quantities required.
  - e. The entire contents of the drum shall be discharged before any materials are placed therein for the succeeding batch.
  - f. Improperly mixed concrete shall not be placed in the structure.
  - g. Mixers shall be subject to daily examination for changes in condition due to accumulations of hardened concrete and/or blade wear. Any hardened concrete shall be removed before the mixer will be permitted for use. A copy of the manufacturer's design showing dimensions and arrangement of blades shall be made available upon request of the owner.
  - h. Delivery of concrete to the site of the work and its discharge from the mixer, agitator or non-agitating equipment shall be in accordance with the requirements of paragraph 3.5.
2. Batch Mixers:
  - a. The mixer may be batched by either the volumetric method or by weighing, and shall be equipped with a suitable timing device which shall lock the discharging mechanism and signal when the specified time of mixing has elapsed.
  - b. An adequate water supply and suitable metering devices shall be provided.
  - c. The first batch of concrete materials placed in the mixer for each placement shall contain an extra quantity of sand, cement and water sufficient to coat the inside surface of the drum.
  - d. After all the required materials are in the mixer, the concrete shall be mixed not less than 50 seconds nor more than 90 seconds measured from the time the last material enters



the mixer to the time discharge of the concrete begins unless otherwise specified by the engineer.

C. Proportioning and Mixing Equipment:

1. For all miscellaneous concrete placements, a mobile, continuous, volumetric mixer or a volumetric or weight batch mixer of the rotating, paddle type may be used.
2. When approved or when specified for use, these mixers may be used for other types of concrete construction, including structural concrete, if the number of mixers furnished will supply the amount of concrete required for the particular operation in question.
3. These mixers shall be designed to receive all the concrete ingredients, including admixtures, required by the mix design in a continuous uniform rate and mix them to the required consistency before discharging. They may be of the volumetric or weight batch design. The mixers shall have adequate water supply and metering devices.
4. For continuous volumetric mixers, the materials delivered during a revolution of the driving mechanism or in a selected time interval, will be considered a batch and the proportion of each ingredient will be calculated in the same manner as for a batch type plant.
5. The mixing time shall be in accordance with the recommendations of the manufacturer of the mixer unless otherwise revised by the Owner.
6. Calibration of these mixers will be required.

### 3.05 PLACING CONCRETE

A. Placing Concrete - General:

1. The minimum temperature of all concrete at the time of placement shall be not less than 50 degrees F.
2. The maximum temperature of cast-in-place concrete in bridge slabs and top slab of direct traffic structures shall not exceed 85 degrees when placed. Concrete diaphragms, parapets, concrete portions of railing, curbs and sidewalks, unless monolithically placed with the slab, will not be subject to the above maximum.
3. For continuous placement of the deck on continuous steel unites, the initial set of the concrete shall be retarded sufficiently to insure that it remains plastic in not less than threes pans immediately preceding the one being placed. For simple spans, retardation shall be required only if necessary.
4. The consistency of the concrete as placed should allow the completion of all finishing operations without the addition of water to the surface. When conditions are such that additional moisture is needed for finishing, the required water shall be applied to the surface by fog spray only and shall be held to a minimum amount. Fog spray for this purpose may be applied with hand operated fogging equipment.
5. The maximum time interval between the addition of cement to the batch and the placing of concrete in the forms shall not exceed the following:
6. The use of an approved retarding agent in the concrete will permit the extension of each of the above temperature-time maximums by 30 minutes for bridge decks, top slabs of direct traffic culverts and cased drilled shafts, and one hour for all other concrete except that the maximum time shall not exceed 30 minutes for non-agitated concrete.
7. From the time of initial strike off of the concrete until finishing is completed and required interim curing is in place, the unformed surfaces of slab concrete in bridge decks and top slabs of direct traffic culverts shall be fogged when necessary to replace water loss due to evaporation.

8. Fogging equipment shall be capable of applying water in the form of a fine mist, not a spray. It may be water pumped under adequate high pressure; either system in combination with a suitable atomizing nozzle. The equipment shall be sufficiently portable for use in the direction of any prevailing wind. It shall be adaptable for intermittent use as directed to prevent excessive wetting of the concrete.
9. A screed may be placed directly on adjacent previously placed slabs for checking and grading of a slab to be placed after they have aged not less than 24 hours. Actual screeding there from may be done after they have aged at least 48 hours.
10. Interim curing will be required for slab concrete in bridge decks and top slabs of direct traffic culverts immediately upon completion of final finish. Type 1 membrane curing compound (resin base only) will be required. Water curing will be required in accordance with paragraph 3.7, CURING CONCRETE, and shall be commenced as soon as possible without damaging the surface finish.
11. The Contractor shall give the Owner sufficient advance notice before placing concrete in any unit of the structure to permit the inspection of forms, reinforcing steel placement and other preparations.
12. Concrete placement will not be permitted when impending weather conditions will impair the quality of the finished work. If rainfall should occur after placing operations are started, the Contractor shall provide ample covering to protect the work. If conditions of wind, humidity and temperature are such that concrete cannot be placed without cracking, concrete placement shall be done in the early morning or at night. When concrete mixing, placing and finishing are done in other than daylight hours, provisions will be made to adequately light the entire placement site.
13. The method of handling, placing and consolidation of concrete shall minimize segregation and displacement of the reinforcement, and produce a uniformly dense and compact mass. Concrete shall not have a free fall of more than five feet, except in the case of thin walls, such as in culverts. Any hardened concrete spatter ahead of the plastic concrete shall be removed.
14. The method and equipment used to transport concrete to the forms shall be capable of maintaining the rate of placement required. Concrete may be transported by buckets, chutes, buggies, belt conveyors, pumps or other acceptable methods.
15. When belt conveyors or pumps are used, sampling for testing will be done at the discharge end. Concrete transported by conveyors shall be protected from sun and wind, if necessary, to provide loss of slump and workability. Pipes through which concrete is pumped shall be shaded and/or wrapped with wet burlap, if necessary, to prevent loss of slump and workability. Concrete shall not be transported through aluminum pipes, tubes or other aluminum equipment.
16. Chutes, troughs, conveyors or pipes shall be arranged and used so that the concrete ingredients will not be separated. When steep slopes are necessary, the chutes shall be equipped with baffle boards or made in short lengths that reverse the direction of movement or the chute ends shall terminate in vertical downspouts. Open troughs and chute ends shall extend, if necessary, down inside the forms or through holes left in them. All transporting equipment shall be kept clean and free from hardened concrete coatings. Water used for cleaning shall be discharged clear of the concrete.
17. Each part of the forms shall be filled by depositing concrete as near its final position as possible. The coarse aggregate shall be worked back from the face and the concrete forced under and around the reinforcement bars without displacing them. Depositing large quantities at one point and running or working it along the forms will not be allowed. Concrete shall be deposited in the forms in layers of suitable depth, but not more than 35 inches in thickness, unless otherwise directed by the Owner.
18. An approved retarding agent shall be used to control stress cracks and/or cold joints in mass

placements where differential settlement and/or setting time may induce stress cracking, such as on falsework, in deep girder stems, etc.

19. Openings in forms shall be provided, if needed, for the removal of laitance or foreign matter of any kind. All forms shall be wetted thoroughly before the concrete is placed therein.
  20. All concrete shall be well consolidated and the mortar flushed to the form surfaces by continuous working with immersion type vibrators. Vibrators which operate by attachment to forms or reinforcement will not be permitted except on steel forms. At least one standby vibrator shall be provided for emergency use in addition to the ones required for placement.
  21. The concrete shall be vibrated immediately after deposit. Prior to the beginning of work, a systematic spacing of the points of vibration shall be established to insure complete consolidation and thorough working of the concrete around the reinforcement, embedded fixtures and into the corners and angles of the forms. Immersion type vibrators shall be inserted vertically at points 18 to 30 inches apart and slowly withdrawn. The vibrator may be inserted in a sloping or horizontal position in shallow slabs. The entire depth of each lift shall be vibrated allowing the vibrator to penetrate several inches into the preceding lift. Concrete along construction joints shall be thoroughly consolidated by operating the vibrator along and close to, but not against, the surface. The vibration shall continue until thorough consolidation and complete embedment of reinforcement and fixtures is produced but not long enough to cause segregation. Vibration may be supplemented by hand spading or rodding if necessary to ensure the flushing of mortar to the surface of all forms.
  22. Holes for anchor bolts in piers, abutments, bents or pedestals may be drilled or formed by the insertion of oiled wooden plugs or metal sleeves in the plastic concrete. Formed holes shall be large enough to permit horizontal adjustments of bolts. The bolts shall be carefully set in mortar. In lieu of the above, anchor bolts may be set to exact locations when the concrete is placed.
  23. Slab concrete shall be mixed in a plant located off the structure. Carting or wheeling concrete batches over completed slabs will not be permitted until they have aged at least four full curing days. If carts are used, timber planking will be required for the remainder of the curing period. Carts shall be equipped with pneumatic tires. Curing operations shall not be interrupted for the purpose of wheeling concrete over finished slabs.
  24. After concrete has taken its initial set, at least one curing day shall elapse before placing strain on projecting reinforcement to prevent damage to the concrete.
  25. The storing of reinforcing or structural steel on completed roadway slabs generally shall be avoided, and when permitted, shall be limited to quantities and distribution that will not induce excessive stresses.
- B. Placing Concrete in Cold Weather:
1. General: The Contractor is responsible for the protection of concrete placed under any and all weather conditions. Permission given by the Owner for placing during cold weather will in no way relieve the Contractor of the responsibility for producing concrete equal in quality to that placed under normal conditions. Should concrete placed under such conditions prove unsatisfactory, it shall be removed and replaced.
  2. Cast-in-Place Concrete: Concrete may be placed when the atmospheric temperature is not less than 35 degrees F. Concrete shall not be placed in contact with any material coated with frost or having a temperature less than 32 degrees F.
  3. Aggregates shall be free from ice, frost and frozen lumps. When required, in order to produce the minimum specified concrete temperature, the aggregate and/or the water shall be heated uniformly in accordance with the following:
    - a. The water temperature shall not exceed 180 degrees F and/or the aggregate temperature shall not exceed 150 degrees F. The heating apparatus shall heat the mass of aggregate

uniformly. The temperature of the mixture of aggregates and water shall be between 50 degrees F and 85 degrees F before introduction of the cement.

b. All concrete shall be effectively protected as follows:

1. The temperature of slab concrete of all unformed surfaces shall be maintained at 50 degrees F or above for a period of 72 hours from time of placement and above 40 degrees F for an additional 72 hours.
2. The temperature at the surface of all concrete in bents, piers, culvert walls, retaining walls, parapets, wingwalls, bottom of slabs and other similar formed concrete shall be maintained at 40 degrees or above for a period of 72 hours from time of placement.
3. The temperature of all concrete, including the bottom slabs of culverts placed on or in the ground, shall be maintained above 32 degrees for a period of 72 hours from time of placement.
4. The temperature of slab concrete of all unformed surfaces shall be maintained at 50 degrees F or above for a period of 72 hours from time III. Protection shall consist of providing additional covering, insulated forms or other means, and if necessary, supplementing such covering with artificial heating. Curing, as specified under paragraph 3.7, shall be provided during this period until all requirements for curing have been satisfied.
5. When impending weather conditions indicate the possibility of the need for such temperature protection, all necessary heating and covering material shall be on hand ready for use before permission is granted to begin placement.
6. Sufficient extra test specimen will be made and cured with the placement to ascertain the condition of the concrete as placed prior to form removal and acceptance.

c. Precast Concrete: A fabricating plant for precast products, which has adequate protection from cold weather in the form of permanent or portable framework and covering, which protects the concrete when placed in the forms and is equipped with approved steam curing facilities, may place concrete under any low temperature conditions provided:

- a. The framework and covering are placed and heat is provided for the concrete, and the forms within one hour after the concrete is placed. This shall not be construed to be one hour after the last concrete is placed, but that no concrete shall remain unprotected longer than one hour.
- b. Steam heat shall keep the air surrounding the concrete between 50 degrees F and 85 degrees F for a minimum of three hours prior to beginning the temperature rise which is required for steam curing.
- c. For fabricating plants without the above facilities and for job site precast products, the requirements of paragraph 3.5 B will apply.

C. Placing Concrete in Hot Weather: Unless otherwise directed by the Engineer, when the temperature of the air is above 85 degrees F, an approved retarding agent will be required in all concrete used in superstructures and top slabs of direct traffic culverts. An approved retarding agent will be required in all cased drilled shafts regardless of temperature.

D. Placing Concrete in Water:

1. Concrete shall be deposited in water only when specified on the plans or with written permission of the Owner. The forms or cofferdams shall be sufficiently tight to prevent any water current passing through the space in which the concrete is being deposited. Pumping will not be permitted during the concrete placing nor until it has set for at least 36 hours.
2. The concrete shall be placed with a tremie, closed bottom-dump bucket or other approved

method, and shall not be permitted to fall freely through the water nor shall it be disturbed after it has been placed. Its surface shall be kept approximately level during placement.

3. The tremie shall consist of a water-tight tube 14 inches or less in diameter. It shall be constructed so that the bottom can be sealed and opened after it is in place and fully charged with concrete. It shall be supported so that it can be easily moved horizontally to cover all the work area and vertically to control the concrete flow. The lower end of the tremie shall be submerged in the concrete at all times.
4. Bottom-dump buckets used for underwater placing shall have a capacity of not less than One-half cubic yard. It shall be lowered gradually and carefully until it rests upon the concrete already placed and raised very slowly during the upward travel; the intent being to maintain still water at the point of discharge and to avoid agitating the mixture.
5. The placing operations shall be continuous until the work is complete. Unless otherwise specified, all concrete placed under water, except concrete, shall contain an additional sack of cement per cubic yard.

E. Placing Concrete in Superstructure:

1. Unless otherwise specified on the plans, simple span bridge slabs shall be placed without transverse construction joints by using either a mechanical longitudinal screed or a self-propelled transverse finishing machine. For small placement of for unusual conditions, the Owner may waive the mechanical screed requirement and permit the use of manually operated screeding equipment. The screed shall be adequately supported on a header or rail system sufficiently stable to withstand the longitudinal or lateral thrust of the equipment. Unless otherwise shown on the plans, temporary intermediate headers will be permitted for placements exceeding 50 feet in length for the longitudinal screed provided the rate of placement is rapid enough to prevent a cold joint, and these headers are designed for early removal to permit satisfactory consolidation and finish of the concrete at their locations.
2. Unless otherwise specified on the plans, slabs on continuous units shall be placed in one continuous operation without transverse construction joints using a mechanical longitudinal screed or a self-propelled transverse finishing machine. For unusual conditions, such as widening, variable cross slopes or transitions, the Owner may waive the mechanical screed requirement and permit the use of manually operated screeding equipment. Rails for transverse finishing machines supported from the beams or girders shall be installed so they may be removed without damage to the slab. Bond between removable supports and the concrete shall be prevented in a manner acceptable to the Owner. Rail support parts that remain embedded in the slab shall not project above the upper mat of reinforcing steel.
3. For continuous placements (slab on steel or prestressed members, continuous slab and girder units or continuous slab spans), a minimum rate of placement may be specified on the plans. For simple span units, a minimum rate of placement for a particular unit may be specified on the plans. If not so specified, the Contractor shall satisfy the Owner that the equipment furnished is capable of placing, finishing and curing the slab at an acceptable table rate to insure compliance with the specifications.
4. The profile gradeline may require adjustment, due to variation in beam camber and other factors, to obtain the required cover over the slab reinforcement. Beams shall be set in a sufficient number of spans so that when adjustment is necessary, the profile gradeline can be adjusted over suitable increments so that the revised gradeline will produce a smooth riding surface.
5. One or more passes shall be made with the screed over the bridge deck segment prior to the placement of concrete thereon to insure proper operation and maintenance of grades and clearances.
6. Slab concrete shall be deposited between the exterior beam and the adjacent beam prior to placing concrete in the overhang portion of the slab.

7. For transverse slab finishing, concrete shall be placed in longitudinal strips starting at a point in the center of the segment adjacent to one side, except as provided herein, and the strip completed by placing uniformly in both directions toward the ends, except that for spans on a grade of 1.5 percent or more, placing shall start at the lowest end. The width of strips shall be such that the concrete therein will remain plastic until the adjacent strip is placed. Where monolithic curb construction is specified, the concrete shall be placed therein in proper sequence to be monolithic with the adjacent longitudinal strips of the slabs.
  8. Forms for the bottom surface of concrete slabs, girders and overhangs shall be maintained true to the required vertical alignment during concrete placing. An approved system of checking shall be used to detect any vertical movement of the forms or falsework. Unless otherwise provided on the plans, girders, slab and curbs of deck girder spans shall be placed monolithically. The girder stems shall be filled first and the slab concrete placed within the time limits specified in paragraph 3.5 A.5.
  9. Construction joints, when permitted for slab placements on steel and prestress concrete beams, shall be as shown on the plans. Where plans permit segmental placing without specifying a particular order of placement, any logical placing sequence which will not result in the overstressing of any of the supporting members will be permitted subject to the approval of the Owner.
  10. Any falsework under steel girder or truss spans shall be released and the spans swung free on their permanent supports before placing any slab concrete thereon.
  11. When the curb forms are filled, the top of curb and sidewalk section shall be brought to the correct camber and alignment, and finished as described in paragraph 3.6 A. The slab shall be finished as specified in paragraph 3.6 B.
- F. Placing Concrete in Concrete Arches: Concrete shall be placed in arch rings so the loading is kept symmetrical on the falsework. The arch rings and ribs shall be placed in one continuous operation unless otherwise specified or permitted by the Owner. The spandrel walls or columns and the beams shall not be placed until the arch is swung. Floor slab, railing, parapet walls, etc., shall not be placed until all spandrels are complete. Slab placement shall be symmetrical about the transverse centerline so the loading of the arch is kept approximately symmetrical.
- G. Placing Concrete in Box Culverts:
1. In general, construction joints will be permitted only where shown on the plans.
  2. Where the top slab and walls are placed monolithically in culverts more than four feet in clear height, an interval of not less than one nor more than two hours shall elapse before placing the top slab to allow for shrinkage in the wall concrete.
  3. The base slab shall be finished accurately at the proper time to provide a smooth uniform surface. Top slabs that carry direct traffic shall be finished as specified for roadway slabs in paragraph 3.6 B. Top slabs of fill type culverts shall be given a reasonably smooth float finish.
- H. Placing Concrete in Foundations and Substructure:
1. Concrete shall not be placed in footings until the depth and character of the foundation has been inspected by the Owner and permission has been given to proceed.
  2. Placing of concrete footings upon seal courses will be permitted after the cofferdams are free from water and the seal course cleaned. Any necessary pumping or bailing during the concreting operation shall be done from a suitable sump located outside the forms.
  3. All temporary wales or braces inside cofferdams shall be constructed or adjusted as the work proceeds to prevent unauthorized construction joints.
  4. When footings can be placed in a dry excavation without the use of cofferdams, forms may be omitted, if desired by the Contractor and approved by the Owner, and the entire

excavation filled with concrete to the elevation of the top of footing. In this case, measurement for payment will be based on the footing dimensions shown on the plans.

5. Concrete in columns shall be placed monolithically unless otherwise provided. Columns and caps and/or tie beams supported thereon may be placed in the same operation. To allow for shrinkage of the column concrete, it shall be placed to the lower level of the cap or tie beam and placement delayed for not less than one hour nor more than two before proceeding.

### 3.06 TREATMENT AND FINISHES

#### A. Horizontal Surfaces Except Roadway Slabs:

1. All unformed upper surfaces shall be struck off to grade and finished. The use of mortar topping for surfaces under this classification will not be permitted.
2. After the concrete has been struck off, the surface shall be floated with a suitable float. Bridge sidewalks shall be given a wood float or broom finish or may be striped with a brush as specified.
3. The tops of caps and piers between bearing areas shall be sloped slightly from the center toward the edge, and the tops of abutments and transition bents sloped from the backwall to the edge so that water will drain from the surface and shall be given a smooth trowel finish. When required by the plans, the coating of caps and piers shall be done using epoxy material. Unless otherwise noted on the plans, the color shall be concrete gray.

#### B. Roadway Slabs:

1. In all roadway slab-finishing operations, camber for specified vertical curvature and transverse slopes shall be provided.
2. For concrete slab or concrete girder spans cast-in-place on falsework, an additional amount of camber shall be provided to offset the initial and final deflections of the span. The additional amount of camber shall be determined from the dead load deflection diagram shown on the plans. When dead load deflection is not shown on the plans, the additional amount of camber shall be 1/8-inch per ten feet of span length but not to exceed 1/2 inch. For girder spans, the additional camber for initial and final deflections shall be approximately 1/2 inch for 30-foot spans and 3/4 inch for 40-foot spans.
  - a. Roadway slabs supported on prestressed concrete, steel beams or girders shall receive no additional camber, except that for slabs without vertical curvature, the longitudinal camber shall be approximately 1/4-inch.
  - b. As soon as the concrete has been placed and vibrated in a section of sufficient width to permit working, the surface shall be approximately leveled, struck off and screeded carrying a slight excess of concrete ahead of the screed to insure filling of all low spots. The screed shall be designed rigid enough to hold true to shape, and shall have sufficient adjustments to provide for the required camber. A vibrating screed may be used if heavy enough to prevent undue distortion. The screeds shall be provided with a metal edge.
  - c. Longitudinal screeds shall be moved across the concrete with a saw-like motion while their ends rest on headers or templates set true to the roadway grade or on the adjacent finished slab. The surface of the concrete shall be screeded a sufficient number of times and at such intervals to produce a uniform surface, true to grade and free of voids. If necessary, the screeded surface shall be worked to a smooth finish with a long handled wood or metal float, of the proper size, or hand floated from bridges over the slab.
  - d. When required, the Contractor shall perform sufficient checks with a long handled 10-foot straightedge on the plastic concrete to insure that the final surface will be within the tolerances specified below. The check shall be made with the straightedge parallel to the centerline. Each pass thereof shall lap half of the preceding pass. All high spots

shall be removed and all depressions over 1/16 – inch in depth shall be filled with fresh concrete and floated. The checking and floating shall be continued until the surface is true to grade and free of depressions, high spots, voids or rough spots. Rail support holes shall be filled with concrete and finished to match the top of the slab.

- e. Unless otherwise shown on the plans, when no additional wearing course is to be placed upon the concrete slab, the surface shall be finished with adequate equipment to provide the texture specified herein with the grooves or striations of the final finish parallel to the structure centerline; however, the Owner may authorize transverse grooves or striations if desired. It is the intent that the average texture depth be not less than 0.05-inch with a minimum texture depth of 0.04-inch. Should the texture depth fall below that intended, the finishing procedures shall be revised to produce the desired texture.
- f. When required by the plans, the surface shall be given its final texture by saw grooving to meet the above requirements. Saw grooving may be done a minimum of four days after the slab concrete has been placed. If saw grooving is done prior to the completion of curing, the curing shall be continued after sawing to provide the minimum curing time required.
- g. After the concrete slab has attained its final set, the Owner may require that the finished surface be tested with a standard 10-foot straightedge. The straightedge shall be used parallel to the centerline of the structure to bridge any depressions and touch high spots. Ordinates of the irregularities, measured from the face of the straightedge to the surface of the slab, should normally not exceed 1/8-inch making proper allowances for camber, vertical curve and surface texture; however, occasional variations exceeding this will be acceptable if in the opinion of the Engineer it will not produce unacceptable riding qualities.
- h. When directed, irregularities exceeding the above shall be corrected. Areas which are corrected to produce satisfactory riding qualities shall be provided with an acceptable surface texture in a manner approved by the Owner.

### 3.07 CURING CONCRETE

- A. The Contractor shall inform the Owner fully of the methods and procedures proposed for curing; shall provide the proper equipment and materials in adequate amounts; and shall have the proposed method, equipment and materials approved prior to placing concrete.
- B. Inadequate curing and/or facilities therefore shall be cause for the Owner to delay all concrete placement on the job until remedial action is taken.
- C. All concrete shall be cured for a period of four curing days except as noted herein.

#### EXCEPTIONS TO FOUR-DAY CURING

<u>Description</u>	<u>Required During</u>
Upper surfaces of bridge slabs	8 curing days (Type I or III)
and top slabs of direct traffic culverts	10 curing days (Type II)
Concrete piling (non-prestressed)	6 curing days

- D. When the air temperature is expected to drop below 40 degrees F, the concrete shall be covered with polyethylene blankets, mats or other acceptable materials to provide the protection required by paragraph 3.5 B.
- E. A curing day is defined as a calendar day when the temperature, taken in the shade away from artificial heat, is above 50 degrees F for at least 19 hours (or colder days if satisfactory provisions are made to maintain the temperature at all surfaces of the concrete above 40 degrees F for the entire 24 hours). The required curing period shall begin when all concrete therein has attained its initial set.



- F. The following methods are permitted for curing concrete subject to the restrictions of Table 1 and the following requirements for each method of curing:
1. Form Curing: when forms are left in contact with the concrete, other curing methods will not be required except for cold weather protection.
  2. Water Curing: All exposed surfaces of the concrete shall be kept wet continuously for the required curing time. The water used for curing shall meet the requirements for concrete mixing water as specified in paragraph 2.2. Water that stains or leaves an unsightly residue will not be used.
    - a. Wet Mat:
      1. Polyethylene sheeting or burlap polyethylene blankets placed in direct contact with the slab will be required when the air temperature is expected to drop below 40 degrees F during the first 72 hours of the curing period. Wet mats placed in direct contact with the slab will be required when the air temperature is expected to remain above 40 degrees F for the first 72 hours of the curing period. Damp burlap blankets made from 9-ounce stock may be placed on the camp concrete surface for temporary protection prior to the application of the cotton mats which may be placed dry and wetted down after placement.
      2. The mats shall be weighted down adequately to provide continuous contact with all concrete surfaces where possible. The surfaces of the concrete shall be kept wet for the required curing time. Surfaces which cannot be cured by contact shall be enclosed with mats, anchored positively to the forms or to the ground, so that outside air cannot enter the enclosure. Sufficient moisture shall be provided inside the enclosure to keep all surfaces of the concrete wet.
      3. Water Spray: This method shall consist of overlapping sprays or sprinklers that keep all unformed surfaces continuously wet.
      4. Ponding: This method requires the covering of the surfaces with a minimum of 2 inches of clean granular material kept wet at all times or a minimum of one-inch depth of water. Satisfactory provisions shall be made to provide a dam to retain the water or saturated sand.
    - b. Membrane Curing: Unless otherwise provided herein or shown on the plans, either Type 1-D or Type 2 membrane curing compound may be used where permitted, except that Type 1-D (resin base only) will be required for bridge slabs and top slabs of direct traffic culverts.
      1. For substructure concrete, only one type of curing compound will be permitted on any one structure. Material requirements and construction methods shall be as required by this paragraph of the specifications, except as changed herein. Membrane shall be applied in a single, uniform coating at the rate of coverage recommended by the manufacturer and as approved by the Owner, but not less than one gallon per 180 square feet of area. Tests for acceptance shall be at this specified rate.
      2. Membrane curing shall not be applied to dry surfaces but shall be applied just after free moisture has disappeared. Formed surfaces and surfaces which have been given a first rub shall be dampened and shall be moist at the time of application of the membrane.
      3. When membrane is used for complete curing, the film shall remain unbroken for the minimum curing period specified. Membrane which is damaged shall be corrected immediately by reapplication of membrane. Unless otherwise noted herein or on the plans, the choice of membrane type shall be at the option of the Contractor, except that the Owner may require the same curing method for like portions of a single

structure.

**END OF SECTION**

**SECTION 04055**  
**BUILDING MATERIAL**

**PART 1 – GENERAL**

**1.01 SUBMITTALS**

- A. Color sample(s) of each color specified from manufacturer's series.
- B. Full-size unit for verification of color and finish.
- C. Manufacturer's data sheet.

**1.02 QUALITY ASSURANCE**

- A. All high density burnish stone aggregate cement masonry units shall be Sumo Stone™ masonry units manufactured by Texas Building Products.
- B. All units shall conform to paragraph 7.3.1 of ASTM C90.
- C. All units shall conform to strength, absorption, and moisture content per ASTM C140.
- D. All burnished faces shall be factory-ground. No units shall be ground in the field.
- E. Field Mock-ups: Construct a 4' x 4' sample panel at the project site, of each color and size unit to be used in the project. Installation and cleaning methods of these mock-ups shall be the same as will be used on the project.

**1.03 DELIVERY, STORAGE AND HANDLING**

- A. Sumo Stone™ shall be delivered to the project site on wood pallets.
- B. Units on pallets shall be protected by cardboard between layers, covered with a clear plastic.
- C. Protective cover, and shrink-wrapped.
- D. Pallets shall be stored in single-stacks on level ground and covered with waterproof covering (e.g. tarpaulins) to protect the units from inclement weather.
- E. Handle units carefully to avoid breakage and damage.

**PART 2 – PRODUCT**

**2.01 PRODUCT DESCRIPTION**

- A. Sumo Stone™.
- B. "Oversized" 16" x 24" x 4" nominal solid block masonry unit.
- C. Split face and cut face burnished block.
- D. Color - Blanco.

- E. Manufacturer:  
Texas Building Products, Inc.  
3261 Highway 108  
Strawn, Texas 76475  
Phone 800-368-1024  
Fax 254-672-5841  
Website www.texasbuildingproducts.com

## **2.02 MANUFACTURING**

- A. Units are made from natural stone aggregates, coloring agent and cement. Although these materials may vary slightly the manufacturer will minimize these variations to ensure that the product generally maintains a consistency in size, shape, color and texture.
- B. Aggregate shall meet ASTM C-33 and C-331 specifications
- C. Units shall meet ASTM C-129 specification for non-load-bearing masonry units.
- D. Units shall meet the edge and corner chip requirements as described in paragraph 7.3.1 of ASTM C-90.
- E. An integral water repellent shall be used during the manufacturing process.

## **PART 3 – EXECUTION**

### **3.01 INSTALLATION**

- A. Lay units using industry accepted best masonry practices.
- B. Provide adequate lighting for masonry work.
- C. Use powered diamond or abrasive blade tools to make all field cuts in a workmanship like manner.
- D. Inspect all units for chips, cracks or other imperfections and only install quality units that conform to ASTM specs.
- E. Align units level, plumb, and true with uniform tooled 3/8" wide mortar joints on the finished side of the wall.
- F. Take units from two or more pallets at a time during installation to ensure blending.

### **3.02 CLEANING**

- A. During installation keep walls clean using brushes, rags, burlap, etc.
- B. Do not allow excess mortar lumps or smears to harden on the finished surfaces.
- C. Do not use high pressure spray or power wash cleaning methods.
- D. For final wash down, use only "Burnished Masonry Cleaner" by Prosoco, and follow the manufacturer's instructions.

**END OF SECTION**

## **SECTION 05520**

### **HANDRAILS AND RAILINGS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Wall mounted handrails.
- B. Stair railings and guardrails.
- C. Free-standing railings at steps.
- D. Guardrails

##### **1.02 REFERENCE STANDARDS**

- A. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2007.
- B. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.
- C. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- D. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- E. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings; 2002 (Ed. 2004).

##### **1.03 SUBMITTALS**

- A. Reference Civil Engineer's drawings for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Mock-up: Provide per Landscape Architect's detail 4/L1-18.

#### **PART 2 PRODUCTS**

##### **2.01 RAILINGS - GENERAL REQUIREMENTS**

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E 985 and applicable local code.
- B. Design railing assembly, wall rails, and attachments to resist lateral force of 75 lbs (333 N) at any point without damage or permanent set. Test in accordance with ASTM E 935.
- C. Allow for expansion and contraction of members and building movement without damage to connections or members.
- D. Dimensions: See drawings for configurations and heights.
  - 1. Top Rails and Wall Rails: 1-1/2 inches (38 mm) outside diameter, round.
  - 2. Posts: 2-1/2 inches outside diameter, round.
  - 3. Balustrade Frame (sides and bottom): 1 inch by 1/2 inch flat solid bar.
  - 4. Balusters: 1 inch by 3/8 inch flat solid bar.
- E. All open ends to be sealed with plate.

- F. Balustrade Mounting brackets with slotted holes of variable sizes per Landscape Architect's drawings to be made of same materials as railing components, any additional exposed fasteners required to be approved by Landscape Architect.
- G. Handrail Mounting Components per Landscape Architect's drawings to be made of same materials as railing components.
- H. For anchorage to concrete, reference structural engineer's drawings.

## **2.02 STEEL RAILING SYSTEM**

- A. Steel Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.
- B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- C. Exposed Fasteners: Stainless steel hex bolt with mating screw, apply 3M RiteLok TL 22 threadlocker or equivalent per manufacturer's specifications.
- D. Straight Splice Connectors: Steel concealed spigots.
- E. Galvanizing: In accordance with requirements of ASTM A 123/A 123M.
  - 1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

## **2.03 FABRICATION**

- A. Accurately form components to suit specific project conditions and for proper connection to building structure, reference Landscape Architect's drawings.
- B. Fit and shop assemble components in largest practical sizes for delivery to site. Each balustrade panel shall be shop assembled.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
  - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
  - 2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

### **3.02 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Anchor railings securely to structure per Structural Engineer's drawings.

### **3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/8 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/8 inch.
- C. Maximum Out-of-Position: 1/8 inch.

**END OF SECTION**

## **SECTION 07900**

### **JOINT SEALERS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Sealants and joint backing.

##### **1.02 REFERENCE STANDARDS**

- A. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2005.
- B. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2009.
- C. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; [www.aqmd.gov](http://www.aqmd.gov).

##### **1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with other sections referencing this section.

##### **1.04 SUBMITTALS**

- A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.

##### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Engage and installer who has successfully completed within the last 5 years atleast 3 joint sealer applications similar in type and size to that of this Project.
- C. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

##### **1.06 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

##### **1.07 WARRANTY**

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

#### **PART 2 PRODUCTS**

##### **2.01 SEALANTS**

- A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Type 1 - General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
  - 1. Color: color as selected.
  - 2. Applications: Use for:
    - a. Control, expansion, and soft joints in natural stone.



- b. Joints between concrete and other materials.
  - c. Other exterior joints for which no other sealant is indicated.
- C. Type 2 - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
- D. Type 3 - Sealant for Continuous Water Immersion: Polysulfide; ASTM C 920, Grade NS, Class 25, Uses I, M, and A; approved by manufacturer for continuous water immersion; single component.
- 1. Color: Colors as selected by Landscape Architect.
  - 2. Applications: Use for:
    - a. Joints in fountain pool.
- E. Type 4 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, I, M and A; single component.
- 1. Color: Color as selected by Landscape Architect.
  - 2. Applications: Use for:
    - a. Joints in sidewalks and vehicular paving.

## **2.02 ACCESSORIES**

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C 1193.
- C. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
  - 1. Width/depth ratio of 2:1.
  - 2. Neck dimension no greater than 1/3 of the joint width.
  - 3. Surface bond area on each side not less than 75 percent of joint width.

- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.

#### **3.04 CLEANING**

- A. Clean adjacent soiled surfaces.

#### **3.05 PROTECTION**

- A. Protect sealants until cured.

#### **3.06 SCHEDULE**

- A. Exterior Joints for Which No Other Sealant Type is Indicated: Type 1; colors as selected.
- B. Control and Expansion Joints in Paving: Type 4.
- C. Exterior Wall Expansion Joints: Type 1.
- D. Control, Expansion, and Soft Joints in Natural Stone, and Between Natural Stone and Adjacent Work: Type 1.
- E. Control and Expansion Joints at Grotto Fountain Wall and Pool: Type 3.
- F. Lap Joints in Exterior Sheet Metal Work: Type 2.

**END OF SECTION**

## **SECTION 08100**

### **STEEL DOORS AND FRAMES**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

The work under this section shall include the furnishing of the exterior steel door and frame.

##### **1.02 REFERENCES**

Steel Doors and Frames in this section must meet all standards as established by the following listing:

1. Door and Hardware Preparation ANSI 115.
2. Life Safety Codes NFPA-101 (Latest edition).
3. Fire Doors and Windows NFPA-80 (Latest edition).
4. Steel Door Institute ANSI/SDI-100 (Latest edition)
5. UL 10 B Fire test of Door Assemblies and UL10C Standard for Positive Pressure Fire Tests of Door Assemblies

##### **1.04 SUBMITTAL**

- A. Coordinate approved shop drawings with all other trades and manufacturers whose products are used in conjunction with the Steel Doors and Frames under section 08100.
- B. Finish hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. The steel door and frame supplier will furnish to the landscape architect product data and shop drawings.

##### **1.05 QUALITY ASSURANCE**

- A. Provide Steel Doors and Frames complying with the Steel Door Institute recommended specifications for Standard Steel Doors and Frames ANSI/SDI 100 (Latest edition).
- B. Steel Doors and frames shall be manufactured to high quality standards in manufacturing facilities with annual certified conformance to ISO9001.

##### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Doors and frames must be properly marked with door opening mark number to correspond with the schedule.
- B. Deliver all steel doors with corrugated edge protection and palletized to provide protection during transit and job storage.
- C. Inspect doors and frames upon delivery for damage. Minor damage is to be repaired, provided the repair is equal to new work and acceptable to the architect.

- D. Store doors and frames at the job site under cover. Place units on wood sills on the floor in a manner that will prevent rust and damage. Avoid the use of non-vented plastic or canvas shelters, which could create a humidity chamber. If the wrapper on the door becomes wet, remove the carton immediately. Provide a ¼ inch space between stacked doors to promote air circulation.

## **PART 2 PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Ceco Door Products
- B. Curries Company
- C. Other SDI or NAAMM members that conform to the specific requirements of this specification.

### **2.02 HARDWARE LOCATIONS AND GENERAL REINFORCEMENTS**

- A. Locate hardware on doors and frames in accordance with the manufacturer's standard location.
- B. Hardware reinforcements are to be in accordance with the minimum standard gages as listed in SDI-100.
- C. Doors shall be mortised, reinforced and function holes provided at the factory in accordance with the hardware schedule and templates provided by the hardware supplier. Through bolt holes, attachment holes, or drilling and tapping for surface hardware, shall be done by others in the field.

### **2.03 STEEL DOORS**

- A. Material - Exterior Service Door
  - 1. Sheets are to be made of commercial quality hot dipped zinc coated steel that complies with ASTM A924 A60.
  - 2. Vertical edges will join the face sheets by a continuous weld extending the full height of the door. Welds are to be ground smooth and filled to make them invisible and provide a smooth flush surface.
  - 3. Hinge reinforcement to be not less than 7 gage (3/16") plate 1-1/4" X 9".
  - 4. Reinforce the top and bottom of all doors with an inverted continuous steel channel not less than 16 gage, extending the full width of the door and welded to the face sheet. Doors shall have a steel closure channel screwed or welded in place at the top of door so the web of the channel is flush with the top of the face sheets of the door. Plastic fillers are NOT acceptable.
  - 5. Caulk all seams and metal junctions at top of door
  - 6. Doors shall have 20 gage vertical steel stiffeners spanning the full thickness of the interior space between door faces. Stiffeners are spaced not more than 6" on center horizontally, and attached by spot welds spaced not more than 5" on center vertically. Spaces between stiffeners are to be filled with fiberglass insulation (Min. density 0.8#/cubic ft.
  - 7. Acceptable Products:
    - a. Ceco Door Products - Medallion Door
    - b. Curries - 747T Door

### **2.04 STEEL FRAMES**

- A. Materials - Exterior Service Door
  - 1. Frames are to be fabricated of commercial quality hot dipped zinc coated steel that complies

with ASTM designations A924 A60.

2. Frames is to be assembled so that the face miter seam is "closed and tight". Weld the face seam and the full web of the frame corner or intersection. Grind and dress the weld area smooth. Apply a zinc rich primer over the grinding area, and finish with a matching prime paint.
3. Acceptable Manufacturers:
  - a. Ceco Door Products - SQ, or SU series
  - b. Curries Company - M series

**B. Fabrication**

1. All finished work shall be strong and rigid, neat in appearance, square, true and free of defects.
2. Jamb depths, trim, profile and backbends to be as scheduled and shown on approved shop drawings.
3. Hardware reinforcements are to be of the minimum standard gages as listed in ANSI/SDI-100 (Latest edition).
4. Hinge reinforcements to be 7 gage steel.
5. Frames shall be mortised, reinforced, drilled and tapped at the factory for template mortised hardware in accordance with the approved hardware schedule and templates provided by the hardware supplier. Where surface mounted hardware is to be applied, frames shall have reinforcing plates only; all drilling and tapping to be done in the field by others.

**C. Anchors**

1. Floor anchors to be provided at each jamb.
2. Anchors for masonry walls to be of the wire type.
3. Dust boxes/mortar guards to be no less than 26 gage.
4. Frames are to be welded and have a steel spreader during shipping and handling. Spreader bars are for bracing only and are not be used to size and install the frame.
5. Except on weather-stripped frames, punch the stop for 3 silencers on single door and 2 on double door frames.

**2.05 PRIME FINISH**

Doors and frames are to be cleaned, and chemically treated to insure maximum finish paint adhesion. All surfaces of the door and frame exposed to view shall receive a factory applied coat of rust inhibiting primer. The finish to meet the requirements for acceptance stated in ANSI A224.1 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces." The prime finish is not intended to be the final layer of protection from the elements. Field painting using a good grade of paint to be provided in accordance with the recommendations of the door and frame manufacturer. For specialty types of finished coatings, the paint supplier should also be consulted.

**2.06 HARDWARE**

Door hardware shall be selected and approved by Owner to comply with the Town of Addison's approved door hardware standards.

**PART 3 EXECUTION**

**3.01 INSPECTION**

It is the responsibility of the General Contractor to assure that scratches or disfigurements caused in shipping or handling are properly cleaned and touched up with a rust inhibitive primer.

### **3.02 INSTALLATION**

#### **A. Frames**

1. Prior to installation, all frames must be checked for rack, twist and out of square conditions.
2. Place frames prior to enclosing walls. Set frames accurately in position, plumbed and braced securely until permanent anchors are set. Remove shipping bar spreader and insert a wood spreader cut to the opening width, notched to clear the stops.
3. Fill frames in masonry walls with mortar.
4. When temperature conditions necessitate an additive to be used in the plaster or mortar to prevent freezing, the contractor installing the frames shall coat the inside of the frames, in the field, with a corrosion inhibiting bituminous material.
5. SDI-105, "Recommended Erection Instructions for Steel Frames" and SDI-110 "Standard Steel Doors and Frames for Modular Masonry Construction" shall indicate the proper installation procedures.

#### **B. Doors**

1. Install doors plumb and in true alignment in a prepared opening and fasten them to achieve the maximum operational effectiveness and appearance.
2. Proper door clearance must be maintained in accordance with SDI-110.
3. Where necessary, only metal hinge shims are acceptable to maintain clearances.
4. "Installation Guide for Doors and Hardware" published by DHI is recommended for further details.

- C. Hardware must be applied in accordance with hardware manufacturer's templates and instructions.

### **3.03 ADJUST AND CLEAN**

- A. Check and re-adjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper condition.
- B. Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch-up or compatible air-drying primer.

### **3.04 SCHEDULES**

- A. After installation, copies of the door schedules are to be given to the owner when the building is accepted.

**END OF SECTION**

**Division 16 – Electrical  
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<b>16010</b>	<b>General Requirements for Electrical Work</b>
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## SECTION 16010

### GENERAL REQUIREMENTS FOR ELECTRICAL WORK

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. General Requirements for Electrical Work are intended to be complementary to General Requirements of Construction Contract.
- B. Work Included: Provide complete electrical items where shown on Drawings, as specified herein, and as needed for complete and proper installation including, but not necessarily limited to following summary of Work.
  - 1. Electrical work will consist of the installation of pedestrian, roadway/pedestrian and parking lot fixtures and poles. Power for pedestrian and roadway fixtures will be provided by (2) new utility services. Parking lot fixtures will be served from existing Minor parking lot circuits.

##### 1.2 QUALITY ASSURANCE AND APPLICABLE STANDARDS

- A. Use adequate numbers of skilled workers thoroughly trained and experienced in necessary crafts and completely familiar with specified requirements and methods needed for proper performance of Work of this Division. Ensure that there is minimum of one licensed journeyman electrician, on job site whenever Division 16 Work is being performed.
- B. Without additional cost, provide labor and materials as required to complete Work of this Division in accordance with requirements of Governmental Agencies having jurisdiction, regardless of whether materials and associated labor are called for elsewhere in these Contract Documents.
- C. Codes: Electrical work shall conform to requirements and recommendations of latest edition of National Electrical Code and local codes and ordinances. When codes conflict, more stringent requirements shall govern.
- D. Materials incorporated into or used in conjunction with Work provided in this Division shall be change-of-century compliant. Century 1900 and 2000 values shall be processed correctly without abnormally ending and date values processed by applicable software shall contain correct century and include at minimum: date data century recognition, calculations that accommodate same century and multiple century formulas and date values, and date interface values that reflect century. Materials and equipment shall not contain timers, clocks, counters, or other limiting designs or routines that cause items to be erased, inoperable, or otherwise incapable of being used in full manner for which designed after occurrence or lapse of triggering event. Materials and equipment shall be warranted to not cause other materials, equipment, or systems to become erased, contaminated, inoperable, or otherwise incapable of being used in intended manner.
- E. Standards: Specifications and Standards of following organizations are by reference made part of these Specifications. Electrical Work, unless otherwise indicated, shall comply with requirements and recommendations wherever applicable:
  - 1. Association of Edison Illuminating Companies (AEIC)
  - 2. American National Standards Institute (ANSI)



3. American Society for Testing and Materials (ASTM)
4. Certified Ballast Manufacturers (CBM)
5. Electrical Testing Laboratories (ETL)
6. Institute of Electrical and Electronic Engineers (IEEE)
7. Insulated Power Cable Engineers Association (IPCEA)
8. National Bureau of Standards (NBS)
9. National Electrical Contractors Association (NECA)
10. National Electrical Manufacturer's Association (NEMA)
11. National Fire Protection Association (NFPA)
12. Radio-Television Manufacturer's Association (RTMA)
13. Reflector Luminaire Manufacturers (RLM)
14. Underwriters' Laboratories, Inc. (UL)

### 1.3 REQUIREMENTS OF REGULATORY AGENCIES

- A. Requirements and recommendations of latest editions of Occupational Safety and Health Act (OSHA), Americans with Disabilities Act (ADA), and Texas Accessibility Standards (TAS) are by reference made part of these Specifications. Work shall comply with requirements and recommendations wherever applicable.

### 1.4 RELATED WORK SPECIFIED ELSEWHERE

- A. Other Divisions of Contract Documents. Refer to each Division's Specifications and Drawings for requirements.

### 1.5 DEFINITIONS

- A. Terms *furnish*, *install*, and *provide* are used interchangeably and shall mean to furnish and install, complete and ready for intended use.

### 1.6 SUBMITTALS

- A. Comply with pertinent provisions of Division 1.
- B. Submittals required of materials and equipment include following:
  1. Materials list of items proposed to be provided under Division 16.
  2. Manufacturer's specifications and other data needed to prove compliance with specified requirements. Term "Compliance" is understood to mean that Contractor certifies that submitted equipment meets or exceeds Contract Document requirements. Items that do not clearly meet this definition should be identified and explained as required in following paragraph.
  3. Explain with enough detail so that it can easily be determined that item complies with functional intent. List disadvantages or advantages of proposed item versus specified item. Submit technical data sheets and/or pictures and diagrams to support and clarify. Organize in clear and concise format. Substitutions must be approved in writing by Engineer. Engineer's decision shall be final.
  4. Allow minimum of 10 working days for review of each submittal and re-submittal.
  5. Items of equipment that are not accepted in writing as approved equal shall be replaced or revised to comply with Contract Documents at Contractor's expense.

6. The manufacturer's recommended installation procedures shall become basis for accepting or rejecting actual installation procedures used on Work.
  7. Shop drawings shall consist of detailed drawings with dimensions, schedules, weights, capacities, installation details and pertinent information needed to describe the material or equipment.
- C. Submittals required of materials and equipment under this Division include following listed items not supplied by Owner. These submittal requirements are intended to be complimentary to requirements that may be listed in individual sections. In event of conflict, more stringent requirement shall apply.
1. Conductors and Cables
    - a. Submit product data for each specified product.
    - b. Submit tabular list of wire and wiring systems that will be increased in capacity or size to comply with Section 16120 and/or similar requirements shown on Drawings. List shall include size shown on Drawings, proposed increase to comply with Section 16120, and proposed installed length.
  2. Raceways and Boxes
    - a. Submit product data for surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
    - b. Submit Shop Drawings including layout drawings showing components and wiring for nonstandard boxes, enclosures, and cabinets.
  3. Grounding
    - a. Submit product data for grounding rods, connectors and connection materials, and grounding fittings.
  4. Exterior Lighting
    - a. Submit product data describing fixtures, lamps, ballasts, poles, and accessories. Arrange product data for fixtures in order of fixture designation. Include data on features, poles, accessories, and finishes.
    - b. Submit outline drawings indicating dimensions and principal features of fixtures and poles.
    - c. Submit electrical ratings and photometric data including certified results of laboratory tests for fixtures and lamps.
    - d. Submit wind resistance calculations, certified by registered professional engineer.
    - e. Submit Shop Drawings detailing nonstandard fixtures and poles and indicating dimensions, weights, and methods of field assembly, components, and accessories.
    - f. Submit wiring diagrams detailing wiring for control system showing both factory-installed and field-installed wiring for each specific system, which differentiates between factory-installed and field-installed wiring.

- g. Submit anchor-bolt templates, keyed to specific poles and certified by manufacturer.
  - h. Submit maintenance data for products to include in operation and maintenance manual specified in this Section.
  - i. Submit lamp data for each lamp type.
  - j. Submit ballast data.
- 5. Record Documents. Refer to "Project Record Documents" Paragraph of this Section.
  - 6. Operation and Maintenance Data. Refer to "Operation and Maintenance Data" paragraph of this Section.
- D. Resubmittals of rejected submittals shall be limited to one (1) in number. Costs for processing subsequent resubmittals in excess of the first resubmittal, resulting from the Contractor's disregard of Engineer's primary submittal rejection comments, shall be borne by the Contractor. Costs shall be based on Engineer's hourly rates as published in their current professional fee schedules and shall also include reimbursable costs for delivery, mailing, and photocopies at direct cost fifteen percent (15%).

#### 1.7 SUBSTITUTIONS

- A. The Contract Documents list manufacturers' names and catalog numbers followed by phrase "or equivalent" are to establish a standard of quality and utility for the specified items and to provide a dimensional reference to the scaled drawings.
- B. Submittals for "equivalent" items shall include the following data, which is not necessarily required for specified items which list the manufacturer and catalog number:
  - 1. Performance characteristics.
  - 2. Materials.
  - 3. Finish.
  - 4. Certification of conformance with specified codes and standards.
  - 5. Manufacturer's specifications and other data needed to prove compliance with specified requirements. Term "compliance" is understood to mean that the submitted equipment will meet or exceed the Contract Document requirements. Items that do not clearly meet this definition shall be identified and explained as required in following Paragraph.
  - 6. Identify difference between specified equipment and proposed substituted equipment. Explain with enough detail so that /Owner can easily determine that item complies with functional intent. List disadvantages or advantages of proposed item versus specified item. Submit technical data sheets and/or pictures and diagrams to support and clarify. Organize in clear and concise format. Engineer shall approve substitutions in writing. Engineer's decision shall be final.
- C. Submittals of "equivalent" components or systems may be rejected if:

1. Material or equipment would necessitate alteration of mechanical, electrical, architectural, or structural design.
  2. Dimensions vary from specified material or equipment so that accessibility or clearances are impaired or Work of other trades is adversely affected.
- D. Proposed substitutions for materials or equipment must be submitted 10 days prior to final bid date for consideration as approved equals. Otherwise, substitutions will not be permitted. Only prime bidders shall make proposals for substitutions.
- E. No substitution shall be made unless authorized in writing by Architect/Engineer. Should substitution be accepted, and should substitute material prove defective or otherwise unsatisfactory for service intended, and within guarantee period, replace this material or equipment with material or equipment specified, to satisfaction of Engineer and at no cost to Owner.

#### 1.8 ORDINANCES, PERMITS, METERS, UTILITIES AND ROYALTIES

- A. Purchase all necessary permits and licenses necessary for completion of the Work. Pay all lawful fees required and necessary pursuant in obtaining said permits and licenses. Required certificates of approvals and inspections by local governing and regulating authorities.
- B. Pay all fees required for connection of utility power and telephone services required for the Work.
- C. Pay royalty payments or fees required for use of patented equipment or systems. Defend lawsuits or claims for infringement of patent rights and hold Owner and/or Engineer harmless from loss as result of said suits or claims.

#### 1.9 COMPATIBILITY OF EQUIPMENT

- A. Assume full responsibility for satisfactory operation of component parts of electrical systems. Assure compatibility of equipment and performance of integrated systems in accordance with requirements of the Construction Documents. Notify the Engineer before submitting a bid should Specifications or Drawings make acceptance of responsibility impossible, prohibitive, or restrictive. The bid shall be accompanied by a written statement listing any objections or exceptions to the applicable specification section and/or drawing.

#### 1.10 UTILITIES AND TEMPORARY POWER

- A. Verify location and capacity of all existing utility services before starting Work. The locations and sizes of electrical lines are shown in accordance with data secured from Owner's survey. The data shown is offered as estimating guide without guarantee of accuracy.

#### 1.11 EXCAVATION AND BACKFILLING

- A. Perform excavation and backfilling in strict accordance with Section 02161, including trench safety requirements.
- B. Perform excavation and backfilling associated with Work in strict accordance with provisions of these Specifications, including trench safety requirements.

- C. Perform excavation and backfilling necessary for installation of Work. This shall include shoring and pumping in ditches to keep them in dry condition until Work has been installed. Shoring required to protect excavation and safeguard employees shall be properly performed.
- D. Excavations shall be made to proper depth, with allowances made for floor slabs, forms, beams, etc. Ground under conduits shall be well compacted before conduits are installed.
- E. Exterior conduits shall be installed with minimum of 36 inches of cover below finished grade, unless otherwise indicated or required by local ordinances. Exterior conduit shall be installed with minimum of 12 inches of cover below finished paving grade, unless otherwise indicated or required by local ordinances.
- F. Backfilling shall be made with selected soil, free from rocks and debris and shall be pneumatically tamped with 6-inch layers to secure field density ratio of 90 percent as defined by ASTM Designation D698-57T (Proctor Soil Compaction Test).
- G. Excavated materials not suitable and not used in backfill shall be removed from site.
- H. Field verify locations of underground utilities. If existing utilities are damaged, they shall be repaired at no cost to Owner.
- I. Restore all lime stabilization and replace concrete, curbs, paving and other surface improvements cut during excavation to original condition.

#### 1.12 FLASHINGS, SLEEVES, AND INSERTS

- A. Furnish and install flashings where conduits pass through outside walls. Flashings shall be properly formed to fit around conduit and shall be caulked, with 790 Silicone Building Sealant by Dow Corning Corporation, so as to make watertight seal between conduit and building.
- B. Unless otherwise specified, install sleeves for each conduit where it may pass through interior walls or floors. Galvanized 22 gage sheet iron sleeves shall be used. Finish flush with each finished wall surface. In pipe chases, the sleeve shall extend 1-1/2 inches above floor slab and shall be watertight.
- C. Raceways that pass through concrete beams or walls and masonry exterior walls shall be provided with galvanized wrought iron pipe sleeves, unless shown otherwise on drawings. Inside diameter of these sleeves shall be at least 1/2 inch greater than outside diameters of service pipes. After pipes are installed in these sleeves, fill annular space between pipes and sleeves with 790 Silicone Building Sealant by Dow Corning Corporation. Completed installation shall be watertight.
- D. Penetrations through walls, floors and ceilings shall be done in manner to maintain integrity of fire rating of respective wall, floor, or ceiling.
- E. Reference Section 07902 for additional sealant requirements. Where conflicts occur with the specified requirements, the more stringent shall apply.

#### 1.13 CUTTING AND PATCHING

- A. Perform cutting and patching in strict accordance with provisions of these Specifications and following:

1. Coordinate Work to minimize cutting and patching.
  2. Use adequate number of skilled workers who are thoroughly trained and experienced in necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of Work.
- B. Request for Engineer's consent:
1. Prior to cutting which affects structural safety, submit a written request to Engineer for permission to proceed with cutting.
  2. When conditions of Work or schedule require a change of materials or methods for cutting and patching, notify Engineer and secure written permission to proceed with the work.
- C. Perform cutting and demolition using methods that will prevent damage to other portions of Work.
- D. Perform fitting and adjusting to provide a finished installation complying with specified tolerances and finishes.

#### 1.14 SURFACE CONDITIONS

- A. Examine areas and conditions under which Work of this Division will be performed. Work required to correct conditions detrimental to timely and proper completion of Work shall be included as part of Work of this Division. Do not proceed until unsatisfactory conditions are corrected.

#### 1.15 CONSTRUCTION REQUIREMENTS

- A. Drawings show arrangements of Work. Rearrangement of spaces and equipment will be considered when Project conditions make this necessary and/or materials or equipment can be installed to better advantage. Prior to proceeding with Work, coordinate with various trades to prepare and submit five (5) copies of Drawings of proposed arrangement for Engineer's review. Allow minimum of 10 working days for review.
- B. Installation or rearrangement of equipment and space for Contractor's convenience or to accommodate material or equipment substitutions will be considered. Assume responsibility for rearrangement of equipment and space and have Engineer review change before proceeding with Work. Request for changes shall be accompanied by Shop Drawings of affected equipment and space. Identify proposed monetary credits or other benefits. Allow minimum of 10 working days for review.
- C. Properly locate and size all required pipe sleeves and slots, holes, or openings in structure.

#### 1.16 PREPARATION AND COORDINATION

- A. Coordinate the work in strict accordance with the Contract Documents as follows:
- B. Information on the Drawings and in these Specifications is as accurate as could be secured, but absolute accuracy is not guaranteed. The drawings are diagrammatic, and the exact locations, distances, levels, and other conditions shall be governed by actual construction. The drawings and specifications shall be for guidance.

- C. Field verify measurements. No extra compensation will be allowed because of differences between Work shown on Drawings and actual site measurements.

#### 1.17 PROJECT RECORD DOCUMENTS

- A. Provide Project record documents associated with Work in accordance with provisions of these Specifications. Refer to Sections 01700 and 01730 for additional requirements.
- B. Throughout progress of the Work, maintain accurate record of all changes in Contract Documents (Drawings and Specifications). Changes shall include Addendums issued during bidding and location of electrical service lines, receptacles, and outside utilities.
- C. Delegate responsibility for maintenance of record documents to one person on Contractor's staff.
- D. Accuracy of Records
  - 1. Thoroughly coordinate changes within record documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other documents where required to show change properly. Match symbology and format of base documents.
  - 2. Accuracy of records shall be such that future search for items shown in Contract Documents may rely reasonably on information obtained from approved Project record documents.
- E. Maintain a job set of record documents protected from deterioration and from loss and damage until completion of Work. Transfer all recorded data to final Project record documents.
- F. Making Entries on Drawings
  - 1. Using erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
  - 2. Date entries.
  - 3. Call attention to entry by "cloud" drawn around area or areas affected.
  - 4. In event of overlapping changes, use different colors for overlapping changes.
  - 5. Make entries within 24 hours after receipt of information that changes have occurred.
  - 6. Maintain base drawing format and use same symbology.
  - 7. Convert field mark-ups to finished CADD record drawings when required in this Section.
- G. Conversion of Schematic Layouts
  - a. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.

2. Provide CADD electronic files in dwg Format using AutoCAD Release 2000 software. Upon written request, completion of a release form, and payment of the Engineer's standard fee of \$200 plus applicable sales tax for a set-up charge and \$25 per drawing plus applicable sales tax for copies of such files, Engineer will provide AutoCAD Release 2000 electronic files of base Contract Drawings in dwg format on 3-1/2 inch electronic or on compact disc. Engineer will also provide a list of drawing layers and names that shall be maintained.
3. Provide completed record drawings on electronic 3-1/2" disks or CD and one mylar film reproducible of each drawing.
4. Refer to Section 01770 for additional requirements.

H. Final Project Record Documents

1. Provide CADD Electronic files in .dwg format using AutoCAD Release 14 software. Upon written request, Engineer will provide AutoCAD Release 14 electronic files of base Contract Drawings in .dwg format on 3-1/2-inch electronic disks at no cost. Engineer will also provide a list of drawing layers and names that shall be maintained in record set.
2. Provide completed record drawings on electronic 3-1/2-inch disks and one reproducible Mylar film of each drawing.
3. Refer to Section 01720 for additional requirements.

1.18 OPERATION AND MAINTENANCE DATA

- A. Submit two copies of preliminary draft of proposed manual or manuals to Engineer for review and comments. Allow minimum of 10 working days for review. Refer to Sections 0130, 01700 and 01730 for additional requirements.
- B. Submit approved manual to Engineer prior to indoctrination of operation and maintenance personnel.
- C. Where instruction manuals are required for submittal, they shall be prepared in accordance with the following:

**Format:**

Size: 8-1/2-inch by 11-inch

Paper: White bond, at least 20 pound weight

Text: Neatly written or printed

Drawings: 11 inches in height preferable; bind in with text; foldout acceptable; larger drawings acceptable but fold to fit within Manual and provide drawing pocket inside rear cover or bind in with text.

**Flysheets:** Separate each section of Manual with neatly prepared flysheets briefly describing contents of ensuing section; flysheets may be



in color.

**Binding:** Use heavy-duty plastic or fiberboard covers with binding mechanism concealed inside manual; 3-ring binders will be acceptable; binding is subject to **Engineer's** approval.

**Measurements:** Provide measurements in U.S. standard units (e.g., feet, inches, and pounds). Where items may be expected to be measured within 10 years in accordance with metric formulae, provide additional measurements in "International System of Units" (SI).

Provide front and back covers for each manual, using durable material approved by Engineer, and clearly identified on or through cover with at least following information:

#### OPERATING AND MAINTENANCE INSTRUCTIONS

Name and Address of Work

Name of Contractor

General subject of this manual

Space for approval signature of Engineer and approval date[s]

E. Contents: Include at least following:

1. Neatly typewritten index near front of Manual, giving immediate information as to location within manual of emergency information regarding installation.
2. Complete instructions regarding operation and maintenance of equipment involved including lubrication, disassembly, and reassembly.
3. Complete nomenclature of parts of equipment.
4. Complete nomenclature and part number of replaceable parts, name and address of nearest vendor and other data pertinent to procurement procedures.
5. Copy of guarantees and warranties issued.
6. Manufacturer's bulletins, cuts, and descriptive data, where pertinent, clearly indicating precise items included in this installation and deleting, or otherwise clearly indicating, manufacturers' data with which this installation is not concerned.
7. Other data as required in pertinent Sections of these Specifications.

#### 1.19 TESTING AND INSPECTION

- A. Provide personnel and equipment, make required tests, and secure required approvals from Engineer and Governmental Agencies having jurisdiction.
- B. Make written notice to Engineer adequately in advance of each of following stages of construction:
  1. When rough-in is complete, but not covered.

2. At completion of Work of this Division.
  3. In underground condition prior to placing backfill, concrete floor slab, and when associated electrical Work is in place.
- C. When material or workmanship is found to not comply with specified requirements, remove items from job site and replace them with items complying with specified requirements at no additional cost to Owner. This shall be performed within 3 days after receipt of written notice of noncompliance.
  - D. In Engineer's presence, test parts of electrical system and prove that items provided under this Division function electrically in required manner.

#### 1.20 WARRANTY

- A. Warrant equipment and workmanship for period of one year after date of substantial completion and replace or repair faulty equipment or installation at no cost to Owner for service during this period, in accordance with requirements of Division 1.
- B. Warranty shall not void specific warranties issued by manufacturers for greater periods of time or void rights guaranteed to Owner by law.
- C. Warranties shall be in writing in form satisfactory to Owner, and shall be delivered to Owner before final payment is made.

#### 1.21 PROJECT COMPLETION

- A. Upon completion of Work of this Division, thoroughly clean exposed portions of electrical installation, removing traces of soil, labels, grease, oil, and other foreign material, and using only type cleaner recommended by manufacturer of item being cleaned.
- B. Thoroughly indoctrinate Owner's operation and maintenance personnel in contents of operations and maintenance manual required to be submitted as part of this Division of these Specifications.

**END OF SECTION 16010**

**SECTION 16111**  
**RACEWAYS AND FITTINGS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. The General Provisions of the contract, including General and Supplementary Conditions, apply to the Work specified in this Section.

**1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. All other Sections of Division 16.
- B. All other Divisions of the Contract Documents. Refer to each Division's Specifications and Drawings for requirements.

**1.3 SCOPE**

- A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of a complete and operating electrical raceway system, as indicated on the Drawings and as specified.
- B. Work included:
  - 1. Rigid metal conduit and fittings
  - 2. Rigid metal and fittings with PVC coated jacket
  - 3. Non-metallic conduit and fittings

**1.4 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance to the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- C. When requested, provide the Architect with manufacturer's certificates that confirm that materials meet or exceed minimum requirements as specified.

## **PART 2 - PRODUCTS**

### **2.1 CONDUITS AND FITTINGS**

- A. Provide metal conduits, tubing, fittings, and couplings of types, grades, sizes, and weights (wall thicknesses) for each service indicated. Where types and grades are not indicated, provide proper selection determined by installer to fulfill wiring requirements and comply with applicable portions of NEC for raceways.
- B. Rigid Metal Conduit and Fittings
  - 1. Rigid steel conduit: ANSI C80.1
  - 2. Fittings and conduit bodies: ANSI/NEMA FB 1; threaded type, material to match conduit.
- C. Plastic Conduit and Fittings
  - 1. Conduit: NEMA TC 2; Schedule 40 PVC
  - 2. Fittings and Conduit Bodies: NEMA TC 3

### **2.2 CONDUIT SUPPORTS**

- A. Conduit Clamps, Straps, and Supports: Steel or malleable iron

## **PART 3 - EXECUTION**

### **3.1 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT**

- A. Size of conduit shall be as indicated on the drawings or sized for conductor type installed, whichever is larger. Size all conduits in accordance with the NEC. Minimum conduit size shall be  $\frac{3}{4}$  inch.
- B. Arrange conduit to maintain maximum headroom and present a neat appearance.
- C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
- D. Maintain minimum 6-inch clearance between conduit and piping. Maintain 12-inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
- F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps.
- G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

### 3.2 CONDUIT INSTALLATION

- A. Cut conduit square using a saw or pipe cutter; de-burr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp or wet locations.
- D. Install no more than the equivalent of three 90-degree bends between boxes.
- E. Use conduit bodies to make sharp changes in direction, as around beams.
- F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inches in size.
- G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- I. Provide a pull tape for spare empty conduits. The tape shall be fiberglass reinforced polyester tape with distance marking in feet continuous along its length. Furnish T&B or Greenlee products.
- J. Install expansion joints where conduit crosses building expansion joints.
- K. Where conduit penetrates fire-rated walls and floors, provide mechanical firestop fittings with UL listed fire rating equal to wall or floor rating. Seal opening around conduit with UL listed foamed silicone elastomer compound.
- L. Route conduit through roof openings for piping and ductwork where possible; otherwise route through roof jack with pitch pocket.
- M. Maximum size conduit in slabs above grade: 3/4 inch.
- N. Make joints in accordance with manufacturers' written instructions.
- O. Provide plastic warning tape for underground conduit or duct bank installations. Install warning tape directly above conduit one foot below finished grade or as shown on drawings.
- P. Sand for intermediate fill around underground conduits shall be washed sand, suitable for concrete or masonry. Reference Section 16010 for additional backfill and excavation requirements.

### 3.3 CONDUIT INSTALLATION SCHEDULE

- A. Underground installations more than two feet from foundation wall: Schedule 40 plastic conduit.
- B. Installations underground within 2 feet of foundation wall: Rigid steel conduit with PVC jacket.

- C. In slab or concrete above grade: Rigid steel conduit.
- D. Exposed outdoor locations: Rigid steel conduit.
- E. Installations below concrete slab: Schedule 40 PVC conduit.

**END OF SECTION 16111**

## SECTION 16120

### WIRE AND CABLE (600 VOLTS)

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions, apply to the Work specified in this Section.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. All other Sections of Division 16.
- B. All other Divisions of the Contract Documents. Refer to each Division's Specifications and Drawings for requirements, including but not limited to the following:
  - 1. Section 16111 - Raceways and Fittings

##### 1.3 SCOPE

- A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of conductors as indicated on the Drawings and as specified.
- B. Work included:
  - 1. Wiring connections and terminations, 600 Volt rating and below.

##### 1.4 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance to the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- C. When requested, provide the manufacturer's certifications that confirm that materials meet or exceed minimum requirements as specified.

#### PART 2 - PRODUCTS

##### 2.1 CONDUCTORS

- A. Provide conductors made of soft-drawn annealed copper with a conductivity not less than that of 98% pure copper.
- B. Building Wire:
  - 1. Thermoplastic-insulated building wire: NEMA WC 5.

2. Feeders and branch circuits: Copper, stranded conductor, 600-volt insulation, THHN/THWN-2.
3. Control circuits: Copper, stranded conductor 600-volt insulation, THHN/THWN-2.
4. Use the following color code system:

	208Y/120 Volt Systems (NA)	480/240 Volt Systems
Phase A	Black	Brown
Phase B	Red	Orange
Phase C (NA)	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

C. Remote Control and Signal Cable:

1. Control cable for Class 2 or Class 3 remote control and signal circuits: Copper conductor, 300-volt insulation, rated 60-degree C, individual conductors twisted together, shielded, and covered with a PVC jacket; UL listed.
2. Plenum cable for Class 2 or Class 3 remote control and signal circuits: Copper conductor, 300-volt insulation, rated 60-degree C, individual conductors twisted together, shielded, and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

2.2 ACCEPTABLE MANUFACTURERS

A. Provide products by the following manufacturers:

1. Rome
2. Cablec
3. Pirelli
4. Belden
5. Or approved equal

**PART 3 - EXECUTION**

3.1 GENERAL WIRING METHODS (LESS THAN 600 VOLTS)

- A. The minimum wire size shall be 12 AWG for power and lighting circuits, and no smaller than 18 AWG for control wiring. Remote control wiring shall not be less than 14 AWG for installed lengths of 50 feet or less. Remote control conductors shall be increased one size (per NEC Table 310) for each additional 50 feet of length. Increase the raceway system to accommodate the increased wire size.
- B. Provide an equal number of conductors of equal size for each phase of a circuit in same raceway or cable.
- C. Splice only in junction boxes, outlet boxes, pullboxes, or manholes.



- D. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- E. Make conductor lengths for parallel circuits equal.

### 3.2 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL listed wire-pulling lubricant for pulling 4 AWG and larger wires.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.

### 3.3 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible boxes or manholes.
- B. Use solderless pressure connectors with insulating covers for copper wire splices and taps 8 AWG and smaller.
- C. Use split bolt connectors for copper wire splices and taps 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.
- D. Thoroughly clean wires before installing lugs and connectors.
- E. Make splices, taps and terminations to carry full capacity of conductors without perceptible temperature rise.
- F. Terminate spare conductors with electrical tape.

### 3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under applicable provisions of Division 16.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Torque test conductor connections and terminations to manufacturer's recommended values.
- D. Perform continuity tests on all power and equipment branch circuit conductors. Verify proper phasing of all connections.

### 3.5 WIRE AND CABLE INSTALLATION SCHEDULE

- A. All locations: Building wire in raceways.

**END OF SECTION 16120**

## SECTION 16135

### PRECAST ELECTRICAL MANHOLES AND PULLBOXES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions, apply to the Work specified in this Section.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. All other Sections of Division 16.
- B. All other Divisions of the Contract Documents. Refer to each Division's Specifications and Drawings for requirements including the following:
  - 1. Section 16111 – Raceways and Fittings
  - 2. Section 16450 - Grounding

##### 1.3 SCOPE

- A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of precast concrete electrical manholes and pullboxes, as indicated on the Drawings and specified.
- B. Work included:
  - 1. Prefabricated Manholes
  - 2. Manhole Accessories
  - 3. Excavation and Backfill as Required

##### 1.4 REFERENCES

- A. AASHO H-20 *Standard Specification for Highway Bridges*
- B. ANSI/ASTM A153 – *Zinc Coating (Hot-Dip) on Iron and Steel Hardware*
- C. ANSI/ASTM A569 – *Steel, Sheet and Strip, Carbon (0.15 Maximum Percent), Hot-Rolled, Commercial Quality*
- D. ASTM A48 – *Gray Iron Castings*
- E. ASTM A124 – *Zinc (Hot-Galvanized) Coatings and Products Fabricated from Rolled, Pressed, And Forged Steel Shapes, Plates, Bars and Strips*

##### 1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

- B. Without additional cost, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in the Contract Documents.
- C. Manufacturer: Manufacturer shall be company specializing in structures with three (3) years' documented experience.

## 1.6 SUBMITTALS

- A. Product Data: Submit the following:
  - 1. Materials list of items proposed to be provided as part of the Work of this section.
  - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements. Submit shop drawings and product data as follows:
    - a. Materials specifications, dimensions, capacities, sizes and locations of openings, reinforcing details, and accessory locations.
    - b. Product data for manhole accessories.
  - 3. Manufacturer's recommended installation procedures which, when approved, will become the basis for accepting or rejecting actual installation procedures used on the Work. Documentation from the manufacturer, sealed by a professional structural engineer, stating that each manhole or pullbox is properly designed and constructed to meet all requirements of the intended location shall be required.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Strongwell/Quazite
- B. Approved equal

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Excavate, install base material, and compact base material in accordance with manufacturer's instructions.

### 3.2 INSTALLATION – PRECAST MANHOLES

- A. Install and seal precast sections in accordance with manufacturer's instructions.
- B. Install plumb.
- C. Set the top of each pullbox to finished elevation.

### 3.3 INSTALLATION – ACCESSORIES

- A. Install ground rod with top protruding 4 inches (100 mm) above manhole floor.

#### 3.4 COORDINATION OF BOX LOCATIONS

- A. Provide pullboxes as shown on Drawings and as required for splices, taps, wire pulling, equipment connections and code compliance.
- B. Locations shown on Drawings are approximate unless dimensioned.

**END OF SECTION 16135**

## SECTION 16410

### UNDERGROUND ELECTRIC DISTRIBUTION

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions, apply to the Work specified in this section.
- B. Refer to Section 16402 for work relating to utility electric service.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. All other Sections of Division 16.
- B. All other Divisions of the Contract Documents. Refer to each Division's Specifications and Drawings for requirements, including but not limited to the following:
  - 1. Section 16010 - General Requirements for Electrical Work
  - 2. Section 16111 - Raceways and Fittings
  - 3. Section 16120 - Wire and Cable (600Volts)

##### 1.3 SCOPE

- A. Provide and install materials, labor, supervision and services necessary for or incidental to the installation of a complete underground electric service as shown or indicated on the drawings and/or as specified.
- B. Work Included:
  - 1. Conduit
  - 2. Conductors
  - 3. Excavation
  - 4. Pull Boxes

##### 1.4 QUALITY ASSURANCE

- A. When requested, provide the manufacturer's certificates that confirm that materials meet or exceed minimum requirements as specified.
- B. Perform cable pulling calculations for the electrical power and communications systems based on the actual field routing of underground conduit or duct prior to duct or conduit installation. Calculations shall demonstrate that cable pulling tensions and sidewall pressures do not exceed manufacturer's requirements.
- C. Submit calculations to the Engineer for approval. Provide pullboxes as required at no additional cost and where required in locations dictated by the calculations.

#### PART 2 - PRODUCTS

##### 2.1 EQUIPMENT

- A. Conduit: See Section 16111.
- B. Markers: Continuous-printed plastic tape: Reference Section 16195.
- C. Conductors: See Section 16120.
- D. Duct Spacers: Fabricated plastic, UL approved.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Slope service to drainage point.
- B. Terminate conduit in panel with grounding bushing. Make ground connection from bushing to ground bus with ground conductor sized as per drawings.

#### **3.2 CONDUIT**

- A. Adjust final slopes on site to coordinate with existing utilities.
- B. Install on undisturbed soil where possible. Use gravel and sand, placed in 8-inch lifts and compacted for backfill.
- C. Clean and swab ducts/conduits.

**END OF SECTION 16410**

## **SECTION 16450**

### **GROUNDING**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. The general provisions of the Contract, including General and Supplementary Conditions, apply to the work specified in this Section.

##### **1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. All other Sections of Division 16.
- B. All other Divisions of the Contract Documents. Refer to each Division's specifications and drawings for all requirements, including but not limited to the following:
  - 1. Section 16111 - Raceways and Fittings.
  - 2. Section 16120 - Wire and Cable.

##### **1.3 SCOPE**

- A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of electrical systems grounding as shown or indicated on the Drawings and/or as specified.
- B. Work Included:
  - 1. Electrical equipment and raceway grounding and bonding.

##### **1.4 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- C. When requested, provide the Engineer with the manufacturer's certificate that materials meet or exceed minimum requirements as specified.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Provide electrical grounding system indicated with assembly of materials, including but not limited to:
  - 1. Wires and cables.
  - 2. Connectors.
  - 3. Terminals.
  - 4. Ground rods.
  - 5. Bonding jumper braid.
- B. Where materials or components are not indicated, provide products complying with NEC, UL, IEEE, and established industry standards for applications indicated.

### **2.2 GROUND ROD**

- A. Ground Wire Termination: Exothermic connection to 4/0 conductor. U-bolt with pressure plate provided as test point.
- B. Ground Rods: Copper-clad steel, 3/4" diameter, minimum length 8 feet.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install electrical grounding systems in accordance with applicable portions of NEC, with NECA's "Standard of Installation," and in accordance with recognized industry practices to ensure that products comply with requirements and serve intended functions.
- B. Provide a separate, insulated equipment grounding conductor in feeder circuits. Terminate each end on a grounding lug, bus, or bushing.

### **3.2 FIELD QUALITY CONTROL**

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Electrical Tests:
  - 1. Perform fall-of-potential test or alternative in accordance with IEEE Standard 81-1991 on the main grounding electrode or systems.
  - 2. Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.
- C. Test Values:



1. The resistance between the main grounding electrode and ground should be no greater than five ohms. Install additional grounding electrodes, as required, to achieve the specified resistance value.
  2. Investigate point-to-point resistance values which exceed 0.5 ohm. Correct deficiencies at no additional cost. Retest to prove compliance
- D. Provide written certification to the Engineer that the grounding system has been tested and complies with the specified requirements.
- E. Provide test report.

**END OF SECTION 16450**

## SECTION 16503

### POLES AND STANDARDS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions, apply to the Work specified in this Section.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. All other Sections of Division 16.
- B. All other Divisions of the Contract Documents. Refer to each Division's Specifications and Drawings for requirements, including but not limited to the following:
  - 1. Section 16120 - Wires and Cables
  - 2. Section 16450 - Grounding
  - 3. Section 16530 - Site Lighting

##### 1.3 SCOPE

- A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of poles and standards as shown or indicated on the Drawings and/or as specified.
- B. Work Included:
  - 1. Concrete bases and base reinforcement.
  - 2. Anchor bolts.

##### 1.4 SUBMITTALS

- A. Reference Section 16010 for detailed requirements.

##### 1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance to the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- C. When requested, provide the Architect with manufacturer's certificate that materials meet or exceed minimum requirements as specified.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Provide poles and standards as specified on the lighting fixture schedule or an approved equal.

### **2.2 POLES**

- A. Provide poles as specified on the lighting fixture schedule or an approved equal.
- B. Handhole: Complete with removable weatherproof cover installed 18 inches above bottom of pole.
- C. Finish: Factory painted, color selection by architect.

### **2.3 ANCHOR BOLTS**

- A. Provide anchor bolts as recommended by manufacturer. All items to be hot-dipped galvanized.
- B. Provide template for positioning of anchor bolts.
- C. Provide anchor bolt covers painted to match pole.

## **PART 3 - EXECUTION**

### **3.1 BASES**

- A. Construct as indicated on the civil drawings.
- B. Install anchor bolts with 2 inch projection above top of bases unless indicated otherwise on the contract drawings.

### **3.2 INSTALLATION**

- A. Mount standards on bases plumb and true, utilizing shims as necessary.
- B. Touch-up chips and scratches on poles upon completion.

**END OF SECTION 16503**

## **SECTION 16530**

### **SITE LIGHTING**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including General and Supplementary Conditions, apply to the Work specified in this Section.

##### **1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. All other Sections of Division 16.
- B. All other Divisions of the Contract Documents. Refer to each Division's Specifications and Drawings for requirements, including but not limited to the following:
  - 1. Section 16111 - Conduit.
  - 2. Section 16503 - Poles and Standards.

##### **1.3 SCOPE**

- A. Provide all equipment, materials, labor, supervision, and services necessary for or incidental to the installation of site lighting as shown or indicated on the Drawings and/or as specified.
- B. Work Included:
  - 1. Exterior lighting fixtures.

##### **1.4 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance to the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- C. When requested, provide the Architect with manufacturer's certificate that materials meet or exceed minimum requirements as specified.

#### **PART 2 - PRODUCTS**

##### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Provide exterior lighting fixtures of the types specified on the Drawings.

## **2.2 EXTERIOR LUMINAIRES AND ACCESSORIES**

- A. Enclosures: Complete with gaskets, stops, and barriers to form weatherproof assembly and prevent light leaks.
- B. Provide low temperature ballasts, with reliable starting to -20 degrees F.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install underground wiring in conduit with watertight connections. Refer to Section 16111.

**END OF SECTION 16530**

# TECHNICAL SPECIFICATIONS

## TS -2 GENERAL REQUIREMENTS FOR WATER SERVICE

All new meters installed in the Town of Addison shall be equipped with electronic encoder registers, programmed to read in thousand gallon increments, and equipped with touch-pad readers.

<b>Connection Fees</b>		
.75" = \$50.00	2" = \$400.00	6" = \$800.00
1" = \$100.00	3" = \$500.00	8" = \$1,000.00
1.5" = \$150.00	4" = \$600.00	10" = \$1,200.00

### **A. Domestic (potable) Use:**

1. AU commercial unit applications for domestic use having flow demand's greater than 160 g.p.m. shall employ either a compound type meter, or a single-jet meter, 2", and conforming to Town of Addison Specifications. Hersey MCTW, Neptune Tru/floTM, or Badger Recordall— Compound Series are the accepted compound models at this time. Single-jet meters shall be Metron-Farnier Spectrum".
2. All services with flow capabilities 160 g.p.m. shall employ either a nutaling disc, single-\$, or turbine meter, sized (2", conforming to Town of Addison Specifications. Disc meters shall be Hersey400 Series IIS- or 500 Series IISTM, Neptune T-10-~, or Badger Recordall— Disc Series. Single-jet shall be Metron-Farmer Spectrum~, and turbine meters shall be Hersey MVRTh, Neptune HP", or Badger Recordall" Turbo Series meters.

### **B. Lawn Irrigation:**

1. All irrigation services to 1.5" shall employ a turbine, or single-jet type meter conforming to the above guidelines.
2. Less than 1.5" irrigation meter may be disc meters, but turbine meters are preferred.
3. Connection fees are waived for Irrigation services. Fire Service:
4. Less than or equal to 2" meters shall be a turbine, or single-jet meter as described above.
5. Greater than 2" shall be either a Double Check Detector Assembly, or a Reduced Pressure Zone Detector Assembly. These assemblies shall be approved by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research (USC-FCCCHR), and installed in USC approved orientations and clearances.
6. Connection fees apply; see above.

### **C. Backflow Prevention Assemblies:**

1. All water services (except fire services > 2", see page one) shall have the appropriate BPA installed immediately after the meter. If there are space limitations or other considerations that would preclude installation in that location, the BPA may be installed inside a building or other location. There may be no unprotected taps or tees into the service between the meter and the BPA. The Town of Addison Public Works Department must approve proposed installations prior to actual

installation. All installations shall comply with USC-FCCCHR approved orientations and clearances as found in the most recent edition of the Manual of Cross-Connection Control.

2. All BPA's must be on the most current List of Approved Backflow Prevention Assemblies as published by the USC-FCCCHR.
3. The appropriate BPA will be determined by the Town of Addison Utility Division, using the most current edition of the Manual of Cross-Connection Control as published by USC-FCCCHR as a guideline. Final determination rests with the Town of Addison.
4. The plumber, contractor, and/or owner is responsible for having the BPA tested upon installation and initiation of service by a Tester certified according to TCEQ Rules for the specific type of installation (i.e. Fireline, General) and registered with the Town of Addison Utility Division. Thereafter, it will be the responsibility of the party paying the water bill, to have the BPA tested as determined by the Town of Addison Utility Division based on type of device and Degree of Hazard. Reduced Pressure Zone Assemblies shall be tested at least annually.
5. Stainless steel, brass, or nylon/plastic plugs shall be placed in all test cocks after testing. The use of Teflon tape is required to facilitate removal of plugs for future testing of the device. Plumber's putty or pipe dope is unacceptable for this installation.
6. Double Check Valve Assemblies may be placed in a meter box, but the box must be of sufficient size to provide the proper clearances for accessing, testing, and repair of the device. All above ground device installations shall be protected from freezing with apparatus designed for such use. In no case shall Reduced Pressure Zone Assemblies be permitted in a meter box or vault, or any other below grade installation.

**END OF SECTION**

# **TECHNICAL SPECIFICATIONS**

## **TS-3 WATER SERVICES**

### **WATER SERVICE (Sizes 3/4" through 2")**

Contractors and/or plumbers are responsible for compliance with the following specifications:

- A. The Owner/Developer, or their contractor, shall supply water meters that conform to Town specifications as to make and type (See General Requirements for Water Service). All meters shall be equipped with electronic encoder registers for connection to touch-pad readers. Touch-pads shall be mounted at the direction of the Utilities Superintendent.
  - B. Meters shall be set within the Utility easement and out of vehicular traffic flow and/or parking spaces. Curb stops are to be set 6" to 12" below finished grade.
  - C. To prevent the inflow of mud or silt into the box, 4" to 6" of washed pea gravel shall be placed under the meter inside the box, allowing for 2" to 6" of open space below the meter. Meter box shall be minimum 18" deep. (See Figure SM-I)
  - D. Meter boxes and openings shall be large enough to allow access to, and operation of, all meter nuts' flanges/bolts, and the curb stop without obstruction.
  - E. Boxes unavoidably vulnerable to vehicular traffic shall have load-bearing frames and lids designed to withstand the anticipated load. Submittal and City engineer approval is required.
  - F. An approved Backflow Prevention Assembly shall be installed on all water services after the meter, with a brass or copper nipple between the meter and the Assembly of sufficient length to allow placement in separate boxes. Both meter and assembly shall be accessible for testing and repairs. It shall be the responsibility of the contractor to have the Assembly tested upon installation by a TCEQ certified tester, registered with the Town of Addison Utilities Division, who shall provide the original of the test report to the Town of Addison Utility Division prior to final, continuous connection to the City's water supply.
- All companion flanges shall be elliptical brass, and all bolts & nuts shall be grade 316 stainless steel, 5/8-11 x 2 1/2" hex head.
- H. Meters shall be set level in all directions.
  - I. 2" meters shall have a laying length of 17"; 1.5" meters shall have a laying length of 13". Meters may be "*compact*," but the difference shall be made up with a strainer upstream or a spool with test port downstream from the meter. 5/8" x 3/4" meters shall have 7" laying length, 3/4" meters shall have 9" laying length, and 1" meters shall have 10 3/4" laying length. (Approval of Utility Inspector)
  - J. A meter deposit is required for all meters before initiation of service. The party responsible for the water bill will make application and deposit for service to the Town of Addison Utility Billing Department. (Call 450-7081)



### **3/4" through 2" WATER SERVICE APPROVED MATERIALS and PROCEDURES**

1. Double-strap bronze tapping saddle with CC. (AWWA taper) threads: Mueller #BR2B, Ford #202B, or McDonald #3 825. Tap shall be set at 45° of vertical on the mainline. Alternate tapping saddle #2 following.
2. Mueller Servi—Sea1™ style 502,504,506,508; 7" mm. length; Ford Style FS303-CC, or equal (Submittal to Public Works Dept. for approval).
3. Corporation stop with AWWA taper thread (CC) by conductive compression connection: Mueller H-ISO 13 or B25008 (1.5", 2"), Mueller H-15008 or H-25008 (3/4", 1"), Ford FBI000 or FI000 (1.5", 2", -6-0, -7-6, respectively), (3/4", 1", -3-0, -4-6, respectively), McDonald 4701T or 470 1BT
4. Pipe and meter size shall be determined by owner with approval of Building Inspection or Public Works/Engineering Departments: Piping shall be continuous type "K" copper from corporation to curb stop and completely embedded in sand 6" around the pipe.
5. 90 degree angle curb stop with lock-wing: Mueller H-14277 or B24276 (1.5 ~2"), Ford KV43-666W-G or Fy43-777W-G (1.5' ~ 2"), Mueller H-14277 or B24258 (3/4", 1"), Ford KV43-332W-G or KV43-444W-G (3/4", 1"), McDonald 4646BT or 4606BT. All companion flanges (1.5 ~2") shall be brass.
6. Meter boxes shall be of sufficient size to accommodate the curb stop, meter, and all connections. They shall have a cover with reader lid. Concrete boxes shall be stacked to achieve sufficient depth (see "138cC" page one).
7. In-line curb-stops, meter yokes/setters, and/or meter risers may be considered on a case-by-case basis dependent on situation and subject to approval of Utility Inspector and/or Utility Superintendent. NQ gate valves will be allowed on the inlet side of the meter.
8. The type of Backflow Prevention Assembly required will depend upon the degree of hazard or potential hazard which exists. Contact the Utility Superintendent for further information at 972-661-1693.
9. The tapping saddle and corporation stop must be poly-wrapped (8 mil) and hand backfilled with sand to a depth of 12". Additional backfill may be done by machine, with material free of rocks and clods exceeding three (3) inches in diameter. ***CAUTION!!*** Inspection must be called for and completed ~r|~ to backfill, or tap must be re-exposed by the contractor so that the Town's representative may complete the inspection.

Lawn irrigation sprinklers are exempt from connection fees. Connection to an existing service will require a \$35.00 connection fee. See Figure SM-i for detail.

## **WATER SERVICE (Sizes greater than 2")**

Contractors, plumbers, and/or developers are responsible for compliance with the following specifications:

- A. Provide and install mechanical joint tapping sleeve or Stainless Steel tapping sleeve (such as Mueller H-6 15 or Mueller H-304 respectively). Submittal and approval required if other.
- B. Provide and install tapping valve to meet Addison specification GV-95. 1, for resilient wedge gate valve.
- C. Provide and install piping. Piping shall conform to ANSI/AWWA C-909-98 for Molecularly Oriented PVC Pressure pipe for water distribution. Pipe shall be 150-psi minimum class rating for domestic use, and 200-psi minimum class rating for fire line applications. Submittal and approval required, if other.
- D. Fittings shall be ductile iron mechanical joint style, with restraining glands (such as MegaLug). Fittings shall be wrapped with 8-mu poly prior to backfill.
- E. Pipe embedment shall conform to NCTCOG Class "B-2", or "B+" (from Standard Specifications for Public Works Construction, Third Edition, Drawing 3020, 3030). Crushed stone shall be separated from the granular material by a layer of geotextile fabric. Variations allowed with engineer's seal and approval of City Engineer.
- F. Service meter or Fire Line DCDA shall be placed in a pre-cast concrete vault with floor and access hatch. Hatch shall be "Bilco"-type, aluminum, spring-assisted, lockable, and sufficiently sized to allow for removal of complete meter or assembly. Vault shall be placed within the public ROW, wherever possible, clear of vehicular traffic flow and/or parking areas.
- G. All meters shall be equipped with electronic encoder registers calibrated to read in 1000 U.S. gallon increments, and remote touch-pad reading devices. (See General Requirements J-Q! Water Service)
- H. The meter and/or backflow assembly and piping shall be supported with manufactured supports designed for such application. (For clarification, reference Specification for *Stanton Pipe Supports* as manufactured by Material Resources Co., Hillsboro, Oregon; 503-693-0727 –Models S89 or S92).
- I. There shall be an MJ by flange coupling adapter rn-line on the inlet side of the meter or device.

**END OF SECTION**

*Prepared for:*  
**UDR**  
Dallas, Texas

**SUBSURFACE EXPLORATION FOR  
PROPOSED PARK AND STREET RECONSTRUCTION  
BROOKHAVEN CLUB DRIVE  
ADDISON, TEXAS**

*Prepared by:*  
**GEOTEL ENGINEERING, INC.**  
2750 Northaven Road, Suite 207  
Dallas, Texas 75229  
972-488-1188

Report No. E08-130

March 6, 2008



*Wei Zhang 2/16/08*

# GEOTEL

GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIAL SERVICES

## GEOTEL ENGINEERING, INC.

2750 Northaven Road, Suite 207  
Dallas, Texas 75229

972-488-1188  
Fax 972-488-2488

March 6, 2008

Mr. Bill Deniger

**UDR**

Three Lincoln Centre  
5430 LBJ Freeway, Suite 1250  
Dallas, Texas 75240

Re: Subsurface Exploration for  
Proposed Park and Street Reconstruction  
Brookhaven Club Drive  
Addison, Texas  
GEI Report No. E08-130

Dear Mr. Deniger:

Attached is our geotechnical report for the above referenced project. This report provides recommendations concerning foundation systems and street pavements.

For your future construction materials testing and related quality control requirements, it is recommended that the work be performed by Geotel Engineering, Inc. in order to maintain the continuity of inspection and testing services for the project.

It has been a pleasure to perform this work for you. If, during the course of this project we can be of further assistance, please call.

Sincerely,

**GEOTEL ENGINEERING, INC.**

Wei (Maxwell) Zhang, P.E.  
President



Copies Submitted: 3

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*Proposed Park and Street Reconstruction*  
*Addison, Texas*

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**GEOTECHNICAL REPORT  
PROPOSED PARK AND STREET RECONSTRUCTION  
BROOKHAVEN CLUB DRIVE  
ADDISON, TEXAS**

## **1.0 PROJECT INFORMATION**

Proposed construction consists of a park and Brookhaven Club Drive reconstruction in Addison, Texas. The park will have bridges and canal site walks and pavilion structures. The street will be concrete pavement.

## **2.0 SCOPE OF INVESTIGATION**

The purposes of this study were to: 1) explore the subsurface conditions at the site, 2) evaluate the pertinent engineering properties of the subsurface materials, 3) provide recommendations concerning foundation systems for the proposed structures, and 4) provide comments and recommendations concerning pavement subgrade.

## **3.0 FIELD OPERATIONS**

A total of twenty (20) test borings were drilled between February 1 and 6, 2008 at the site, at the approximate locations shown on the Boring Location Diagram, on Figure 1. The boring locations were established in the field by using approximate right angles by sight and measuring distances from the adjacent streets and existing buildings. The borings were drilled to depths of 10 to 30 feet at the site. The results of the boring program are presented on the Logs of Boring, Figures 2 through 21. The elevations shown on the boring logs were estimated based on the site plans provided by the client's consultant. A Key To Log Terms and Symbols is presented on Figure 22.

A truck-mounted continuous flight auger drilling rig was used to advance the borings and to obtain samples for laboratory evaluation. Undisturbed specimens of cohesive soils were obtained at intermittent intervals with standard, thin-walled, seamless tube samplers. These specimens

were extruded in the field, logged, sealed and packaged to protect them from disturbance and maintain their in-situ moisture content during transportation to our laboratory.

Engineering properties of limestone and shale were evaluated by the Texas Department of Transportation Cone penetration test in the field. The results of the tests are tabulated on the boring logs.

#### **4.0 LABORATORY TESTING**

Samples were examined at our laboratory by the project geotechnical engineer. Selected samples were subjected to laboratory tests under the supervision of this engineer.

The in-situ unit weight, moisture content, and liquid and plastic limits of the selected soil samples were measured. These tests were used to evaluate the potential volumetric change of the different strata and as an indication of the uniformity of the material. Unconfined compression tests were performed on selected samples to evaluate the compression strength of the tested soils. Hand penetrometer tests were also performed to provide an indication of the variation of soil strength with depth. These test results are tabulated on the boring logs.

Absorption swell tests were performed on selected undisturbed samples of the cohesive soils. These tests were performed for the purpose of evaluating the swell potential of these soils at their in-situ moisture content. The results of these tests are presented on Figure 23.

#### **5.0 SITE AND SUBSURFACE CONDITIONS**

##### **5.1 General Site Conditions**

The project site is located along and on the southeast side of Brookhaven Club Drive and the southeast side of the between Marsh Lane and Spring Valley Road in Addison, Texas. See the Boring Location Diagram (Figure 1) for site location and configuration. Existing apartment buildings with a creek were present at the site. The existing street was asphalt paving. The site

generally slopes toward the existing creek at the southeast.

## **5.2 Subsurface Conditions**

Subsurface conditions encountered in the borings, including detailed descriptions of the various strata and their depths and thicknesses, are presented on the Logs of Boring. A brief summary of the stratigraphy indicated by the borings is given below for the site in general. Note that depth on all borings refers to the depth from the existing grade present at the time of the investigation. Boundaries between the various strata are approximate.

### **Park Borings**

A total of 14 borings (B-1 through B-14) were drilled and sampled to depths of 25 to 30 feet for the proposed park. Generally, stiff to very stiff clay was present from the surface to depths of 10 to 15 feet. The clay was underlain by very stiff shaley clay extending to top of gray shale. The top of the gray shale was present at depths ranging from 18 feet to about 25 feet. All borings, except Boring B-1, were terminated in the shale at depths of 25 feet.

### **Street Borings**

A total of 6 borings (P-1 through P-6) were drilled and sampled to depths of 10 feet for the proposed street reconstruction. Generally, fills consisting of very stiff sandy clay and clay of 2 to 6 feet was below the existing asphalt paving. The fills were underlain by very stiff clay and/or tan weathered limestone extending to the termination depth of 10 feet.

## **5.3 Groundwater**

The borings were advanced with a continuous flight auger drilling equipment. This method allows relatively accurate groundwater observations to be made while drilling. Groundwater observations are presented in Table 1.



**TABLE 1. GROUNDWATER READINGS**

BORING	GROUNDWATER DEPTH DURING DRILLING	GROUNDWATER AT COMPLETION
B-1, B-2, B-4 thru B-7, B-11, B-12, B-14	6' to 17'	6' to 21'
B-3, B-8, B-9, B-10, B-13, P-1 through P-6	None	Dry

It is not possible to accurately predict the magnitude of subsurface water fluctuations that might occur based upon short-term observations. The subsurface water conditions are subject to change with variations in climatic conditions and are also functions of subsurface soil conditions.

## **6.0 ANALYSIS AND RECOMMENDATIONS**

Proposed park will consist of three bridges and retaining walls along creek. The street reconstruction will involve removing existing asphalt paving and replaced with a concrete pavement. Recommendations for bridge foundations and retaining walls and street pavement subgrade preparations will be provided in the following sections.

### **6.1 Bridge Foundation**

#### **6.1.1 Allowable Bearing Values – Straight Sided Drilled Shafts**

We recommend that the straight-sided continuously reinforced shafts penetrate gray unweathered shale a minimum of 2 feet or one shaft diameter, whichever is greater, to develop the allowable end bearing pressure along with the allowable side resistance pressures for support of axial loads. The depths of the gray shale were present in Table 2. Recommended design values are presented in Table 3. These values contain a factor of safety of 3. Settlements of the drilled shafts are estimated to be less than 1/2 inch.

**TABLE 2. DEPTH OF UNWEATHERED SHALE**

Bridge Structure	Borings	Depth of Shale below Existing Grade	Top Elevation of Gray Shale Bearing Stratum
A	B-3 & B-5	21' to 25'	527 to 535
B	B-8 & B-11	16.5' to 20'	539.5 to 540
C	B-9 & B-10	18' to 20'	542 to 540

**TABLE 3. ALLOWABLE BEARING VALUES**

SHAFT LOADING TYPE	Bearing Stratum –Gray Unweathered Shale
Axial End Bearing (psf)	20,000
Compression Skin Friction (psf)	2,000
Uplift Skin Friction (psf)	1,200

### 6.1.2 Group Effects

For groups of drilled shafts, where the spacing between shafts will be less than 3-shaft diameters (3D) center to center, a reduction factor should be applied to the allowable skin friction for the determination of required shaft penetrations. For shafts touching, a reduction factor of 50 percent should be used. For a spacing of 3D, where D is the diameter of the largest adjacent pier, no reduction is necessary. A straight-line interpolated reduction should be used between drilled shafts touching and a spacing of 3D.

### 6.1.3 Lateral Capacity

The drilled shafts will be subject to lateral loads. We recommend that the drilled shafts be designed for a uniformly distributed lateral soil resistance of 1,500 psf from a depth of 5 feet

below the ground surface to the top of gray shale. Below the top of gray shale, a uniformly distributed, allowable lateral resistance of 2,000 psf is recommended for design. These allowable lateral resistance values include a factor of safety of 2. The ground surface should be level for a distance of at least 10 feet or 6 shaft diameters beyond the face of the drilled shafts. A point of fixity of 4 shaft diameters or one foot below the top of gray shale, if shallower, may be used for design.

#### **6.1.4 Construction Considerations-Drilled Shafts**

Excavation for the shafts must be maintained in the dry. Rapid placement of steel and concrete may allow placement of the shaft installation to proceed if groundwater is encountered during installation. Any water and loose material should be removed prior to placing concrete in the open shafts.

No shaft should be left open for more than 8 hours. A concrete slump of 5 inches plus or minus 1 inch is recommended. The concrete should be placed in a manner to avoid striking the reinforcing steel and shaft walls during placement.

All drilled shaft installations should be carefully inspected by GEI geotechnical personnel to help verify the bearing stratum, the design penetration, and perform related duties. Allowable bearing capacity recommendations and settlement estimates provided in this report are based on proper construction procedures, including maintaining a dry shaft excavation and proper cleaning of bearing surfaces prior to placing reinforcing steel and concrete.

#### **6.3 Retaining Walls**

A total of 12 test borings were drilled along the existing creek. Active clay and shaley clay were present above the shale at the site. An equivalent fluid earth pressure of 110 psf/ft is recommended for the retaining wall design. An allowable gross bearing capacity of 1,500 psf is recommended for footing founded at least one foot below final grade. The allowable bearing capacity includes a safety factor of 2. An ultimate coefficient of sliding resistance of 0.32 is

recommended for design. A safety factor of 1.5 should be used on the ultimate coefficient of sliding resistance.

We recommend that global slope stability analyses be performed for any slopes more than 10 feet and retaining walls placed on slopes. This office should be contacted for detail studies after critical cross sections of the creek with retaining walls are established.

#### **6.4 Street Reconstruction**

Street reconstruction of Brookhaven Club Drive including pavement type and sections should be performed in accordance with requirements of City of Addison. Pavement subgrade preparations are presented below.

A total of six borings P-1 through P-6 were drilled along Brookhaven Club Drive. Based on the subsurface conditions encountered in the borings, it appears that existing fills consist of both imported sandy soils and on-site active soils beneath the asphalt pavement. On-site clay soils are highly plastic clay soils. Clay subgrade soils are subject to loss in support value with increase in their moisture content. Recommendations for lime treated and compacted pavement subgrades are presented in the following report sections.

Based on the results of lime-PI series tests, the subgrade performance of the on-site clay soils can be improved by stabilization with hydrated lime. For budgeting purposes, 7 percent hydrated lime by dry weight (32 pounds per square yard for a thickness of 6 inches) can be used. Once the subgrade is rough graded laboratory tests should be performed to determine the optimum lime content.

1. Remove existing asphalt pavement and/or any undesirable materials should be removed from the construction area. Removal of such material should extend 12 inches beyond pavement edges.
2. In both cut and fill areas, the exposed subgrade should be proofrolled to detect any areas of weakness. The exposed subgrade should be proofrolled in accordance with the Texas

Department of Transportation Standard Specifications for Construction of Highways, Streets and Bridges, 1993 Edition, Item 216, Proofrolling.

3. Areas of weakness identified by the proofrolling operations should be undercut to firm soil and compacted in lifts with maximum loose thickness of 8 inches as outlined in Item 4. The proofrolling operation should be observed by the geotechnical engineer or one of his or her representatives.
4. In fill areas, fill should be placed to the top of proposed subgrade elevation with a maximum loose lift thickness of 8 inches using the excavated on-site soils or similar imported materials. Fill should be compacted at three percent below the three percent above the optimum moisture content to a minimum of 95 percent of the maximum dry density determined by ASTM D-698.
5. Where the exposed subgrade materials will be stabilized with lime, lime treatment of should be accomplished in accordance with the applicable provisions of Item 260 of the Texas Highway Department Standard Specifications for Construction of Highways, Streets and Bridges, 1993 Edition.
6. Approval of final lime mixing operations should be based on gradation tests with at least 60 percent on a dry weight basis of the stabilized soil passing the No. 4 sieve at moisture content near optimum.
7. The lime stabilized soil or compacted subgrade should be compacted at three percent below to three percent above the optimum moisture content to a minimum of 95 percent of the maximum dry density determined by ASTM D-698.

The moisture content and dry density of the lime stabilized or compacted subgrade should be maintained until the paving is completed.

## **7.0 INSPECTION AND TESTING**

Many problems can be avoided or solved in the field if proper inspection and testing services are provided. It is recommended that all footing excavation, proofrolling, site and subgrade preparation, subgrade stabilization and pavement construction be monitored by a qualified engineering technician. Density tests should be performed to verify compaction and moisture content of any earthwork. Inspection should be performed prior to and during concrete placement operations.

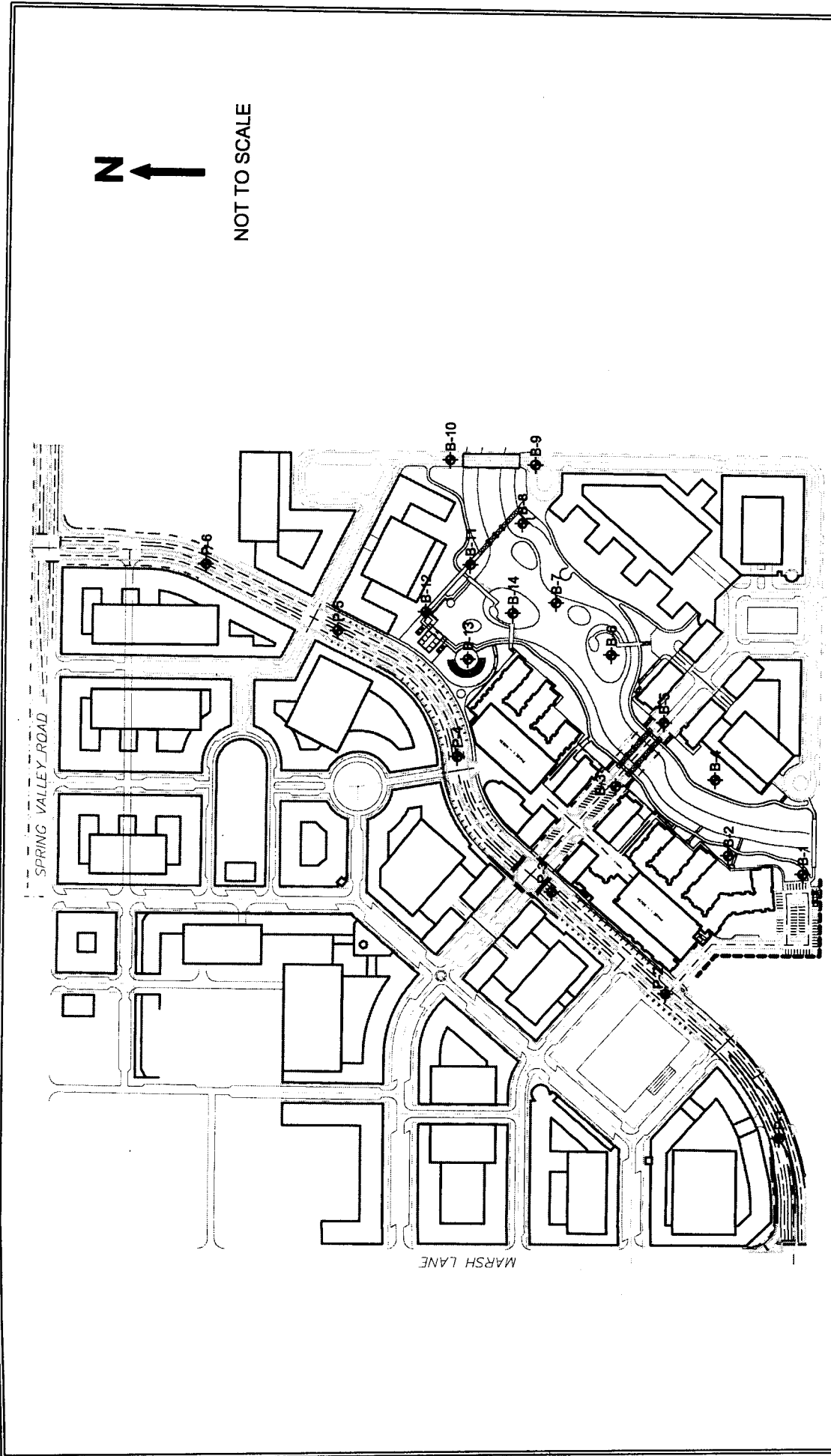
## **8.0 LIMITATIONS**

The professional services which have been performed, the findings obtained, and the recommendations prepared were accomplished in accordance with currently accepted geotechnical engineering principles and practices. The possibility always exists that the subsurface conditions at the site may vary somewhat from those encountered in the bore holes. The number and spacing of test borings were chosen in such a manner as to decrease the possibility of undiscovered abnormalities, while considering the nature of loading, size, and cost of the project. If there are any unusual conditions differing significantly from those described herein, Geotel Engineering, Inc. should be notified to review the effects on the performance of the recommended foundation system.

The recommendations given in this report were prepared exclusively for the use of UDR and/or their consultants. The information supplied herein is applicable only for the design of the previously described development to be constructed at locations indicated at this site and should not be used for any other structures, locations, or for any other purpose. This firm is not responsible for the conclusions, opinions, or recommendations made by others based on the information submitted herein. This report presented recommendations to guide preparation of project specifications and should not be used in place of project specifications.

We will retain the samples acquired for this project for a period of 30 days subsequent to the submittal date printed on the report. After this period, the samples will be discarded unless otherwise notified by the owner in writing.

## **FIGURES**



NOT TO SCALE

NOTE: BORING LOCATIONS ARE APPROXIMATE.

**BORING LOCATION DIAGRAM**

**PROPOSED PARK & STREET IMPROVEMENTS  
BROOKHAVEN CLUB DRIVE  
ADDISON, TEXAS**

**GEOTEL**

PROJECT NO.  
**E08-130**

FIGURE NO.  
**1**



# LOG OF BORING BORING B-1

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 4, 2008** Elev.: **550 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **21 feet**

Depth to water when checked: **During Drilling**

was: **17 feet**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf	
550 - 0		Very stiff, brown <u>CLAY</u>							3.0 3.0 3.5	2.67	
545 - 5		Very stiff, brown with tan <u>CLAY</u>	23	58	24	34		97	4.5+		
		Very stiff, tan and gray <u>CLAY</u>							4.5+		
540 - 10		Very stiff, yellow <u>CLAY</u> with gravel and calcareous nodules	22	46	21	25		100.8	4.0	3.52	
535 - 15									4.5+		
530 - 20				17	43	21	22		110	3.25	2.28
525 - 25		Very stiff, gray Shaly <u>CLAY</u>							3.75		
520 - 30											
515 - 35											

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 2

# LOG OF BORING BORING B-2

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 1, 2008** Elev.: **552 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

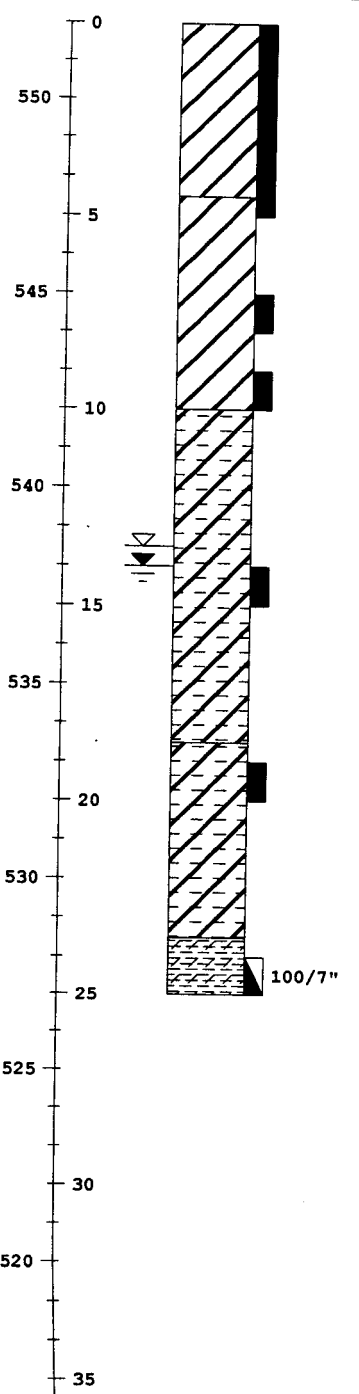
Depth to water at completion of boring: **13.5 feet**

Depth to water when checked: **During Drilling**

was: **14 feet**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
0		Very stiff, brown <u>CLAY</u>							3.0	
550									3.0	
									3.5	
									4.5+	
5			Very stiff, brown with tan <u>CLAY</u> with calcareous nodules	14	46	21	25		118	4.5+
545									4.5+	
10		Very stiff, tan and gray shaley <u>CLAY</u> with sand seams	22	36	19	17		102	4.5	0.89
540										
15			20	59	24	35		102	3.5	2.1
535										
20		Very stiff, gray, shaley <u>CLAY</u>							4.5+	
530										
25		Gray, <u>Weathered SHALE</u>								
525										
30										
520										
35										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 3

# LOG OF BORING BORING B-3

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 4, 2008** Elev.: **556 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**


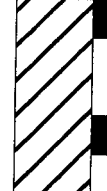
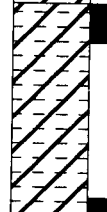
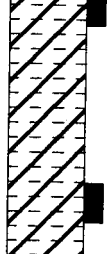
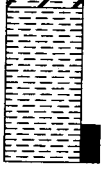

Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
0										
555		Ashalt Paving with 4" Asphalt over 4" road base							3.0	
		Very stiff, tan CLAY with Asphalt and broken limestones (FILL)	10	26	17	9			4.5+	
									4.5	
5		Stiff to hard, tan and gray CLAY							1.0	
550										
			29	75	27	48			1.5	
10		Stiff to hard, tan and gray shaly CLAY							4.0	
545										
			20					109	3.5	2.09
15										
540										
			29					103	4.5+	4.42
20		Gray SHALE								
535										
									4.5+	
25										
530										
30										
525										
35										
520										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 4

# LOG OF BORING BORING B-4

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 1, 2008** Elev.: **550 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **10 feet**

Depth to water when checked: **During Drilling**

was: **9 feet**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf	
550 0		Very stiff, brown <u>CLAY</u>	21	48	22	26		96	2.0 2.75 3.0 4.5+	1.39	
545 5		Very stiff, tan and gray <u>CLAY</u>									
540 10		Very stiff, tan and gray <u>CLAY</u> with gravel and calcareous nodules							103	2.5	1.51
535 15		Very stiff, tan and gray <u>Shaley CLAY</u> with rust	20	58	24	34		105	3.5	1.88	
530 20		Very stiff, gray <u>Shaley CLAY</u>	16	41	20	21		112	4.5+	3.88	
525 25		Gray <u>SHALE</u>									
520 30											
515 35											

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 5

# LOG OF BORING BORING B-5

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 1, 2008** Elev.: **552 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **10 feet**

Depth to water when checked: **During Drilling**

was: **12 feet**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf	
0		Very stiff, brown <u>CLAY</u>									
550									2.0		
				22	56	23	33		101	2.5	1.78
			Very stiff, light brown <u>CLAY</u>							2.0	
5									4.5+		
545											
			Very stiff, tan and gray <u>CLAY</u> with calcareous nodules	19					101	2.5	0.91
10										4.5+	
540											
15			Very stiff, tan and gray <u>Shaley CLAY</u>	18	58	24	34		109	4.0	2.7
535											
20									3.75		
530											
25		Gray <u>SHALE</u>							3.5		
525											
30											
520											
35											

Notes: **Completion Depth: 30 feet.**

FIGURE NO.: 6

# LOG OF BORING BORING B-6

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 1, 2008** Elev.: **554 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

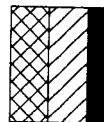
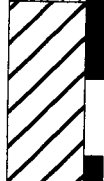
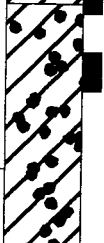
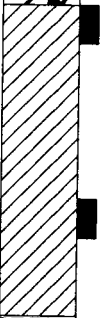


Depth to water at completion of boring: **12 feet**

Depth to water when checked: **During Drilling**

was: **12 feet**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
0		Very stiff, dark brown and tan <u>Clay and Sandy Clay</u> (FILL)							4.5+	
									4.5+	
550		Very stiff, brown <u>CLAY</u>	11	43	21	22			3.0	
5									3.0	
									3.75	
545		Very stiff, light brown <u>CLAY</u> with gravel	14	38	20	18		116	4.5+	7.04
10										
540		Very stiff, tan and gray <u>CLAY</u> with gravel and calcareous nodules							3.5	
15										
535		Gray <u>SHALE</u>	15	51	22	29		115	4.5+	7.38
20									3.25	
530										
25										
525										
520										
35										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 7

# LOG OF BORING BORING B-7

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 4, 2008** Elev.: **556 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **9 ft**

Depth to water when checked: **During Drilling**

was: **10 ft**

Depth to casing when checked: **During Drilling**

was: **12.5 ft**

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC	LL	PL	PI	-200	DD	P. PEN	UNCON
			%	%	%		%	pcf	tsf	tsf
0		Asphalt Paving, 3.5" Asphalt								
555		Very stiff to hard, tan and dark brown <u>CLAY</u> with broken rocks and concrete, etc.(FILL)							3.5	
			23	45	21	24			4.5+	
5									4.5+	
550									3.5	
									4.5+	
10									3.5	
545									4.5+	
		Very stiff, gray and light brown <u>Shaley CLAY</u> with rust and gray shale layer	19					108	4.5+	2.92
15										
540										
		Gray <u>SHALE</u>								
20										
535										
25										
530										
30										
525										
35										
520										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 8

# LOG OF BORING BORING B-8

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 4, 2008** Elev.: **556 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**  
was:

Depth to caving when checked:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
0										
555		Very Stiff to hard, dark brown and tan <u>CLAY</u> with broken rocks, (FILL)							3.75 3.25	
			26	58	24	34			3.5	
5		Very stiff, dark brown to brown <u>CLAY</u>							4.5+	
									4.0	
550										
			14					103	3.25	1.97
10		Very stiff, light brown to gray <u>CLAY</u>							4.5	
545										
		Very stiff, light brown and gray <u>Shaley CLAY</u> with some yellow silty seams								
15			26					96	3.0	2.11
540		Gray <u>SHALE</u> with limestone layers								
20	100/3.5"									
535										
25	100/4.8"									
530										
30										
525										
35										
520										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 9



# LOG OF BORING BORING B-9

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 4, 2008** Elev.: **560 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**


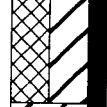
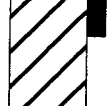
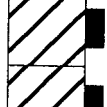
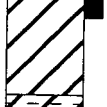
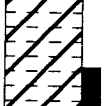
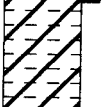
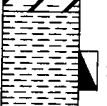
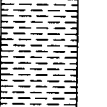
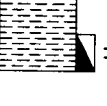




Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
560 - 0		Asphalt Paving, 2.5" Asphalt								
		Stiff, dark brown to brown CLAY (FILL)	31	56	23	33			2.5	
555 - 5		Very stiff, brown to light brown CLAY							1.0	
									1.5	
									4.0	
									3.0	
550 - 10		Very stiff, light brown CLAY	23					102	2.5	1.51
										
545 - 15		Very stiff, gray and light brown Shaly CLAY with rust and yellow silt seams								
									3.0	
540 - 20		Gray SHALE								
										
535 - 25										
										
530 - 30										
525 - 35										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 10

# LOG OF BORING BORING B-10

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 4, 2008** Elev.: **560 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

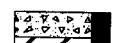
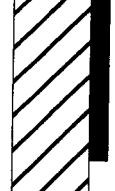
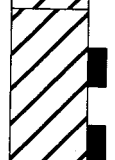
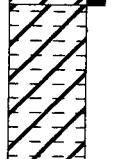
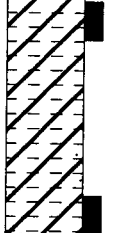
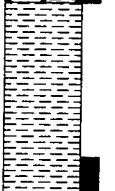

Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

was: **Dry**

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
560 - 0		<u>Asphalt Paving, 4" Asphalt and 4" Roadbase</u>								
		Very stiff, brown and gray <u>CLAY</u>	33	58	24	34			2.5 3.0 3.0 3.0	
555 - 5		Very stiff, gray and tan <u>CLAY</u>	20					102	3.5 4.0	2.35
550 - 10		Very stiff, tan and gray <u>Shaly CLAY</u>								
545 - 15		Gray <u>SHALE</u>	29					95	4.5+	1.21
540 - 20		Gray <u>SHALE</u>	22					101	4.5+	1.74
535 - 25			15					113	4.5+	12.07
530 - 30										
525 - 35										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 11

# LOG OF BORING BORING B-11

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 1, 2008** Elev.: **560 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**


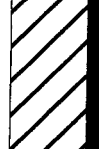
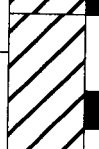
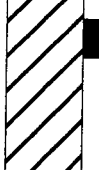
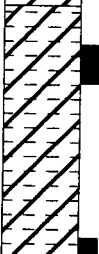
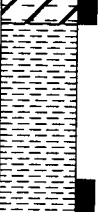

Depth to water at completion of boring: **6 ft**

Depth to water when checked: **During Drilling**

was: **6 ft**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
560 0		Asphalt Paving, 4" Asphalt and 4" Roadbase								
		Very stiff, tan CLAY with Calcareous nodules	22	36	19	17			3.5	
									3.5	
555 5		Medium stiff, tan and gray CLAY							3.0	
									0.75	
550 10			28	45	21	24		99	0.5	0.43
545 15		Very stiff, tan and gray Shaley CLAY							3.0	
540 20		Gray SHALE	23					104	4.5+	3.50
535 25									4.5+	
530 30										
525 35										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 12

# LOG OF BORING BORING B-12

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 1, 2008** Elev.: **568 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **15 feet**

Depth to water when checked: **During Drilling**

was: **13 feet**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
0		Asphalt Paving, 4" asphalt and 4" road base Hard, tan and brown <u>CLAY</u> with gravel and limestone (FILL)							4.5+	
565			18	36	19	17			4.0	
									4.5+	
5		Stiff, brown <u>CLAY</u> Stiff to very stiff, tan and gray <u>Shaley CLAY</u> with sand seams							1.5	
560			28	50	22	28			4.0	
10										
555										
15			28					95	3.5	2.14
550		Gray <u>SHALE</u>								
20			18					118	4.5+	7.40
545									4.5+	
25										
540										
30										
535										
35										

Notes: **Completion Depth: 23 feet.**

FIGURE NO.: 13

# LOG OF BORING BORING B-13

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 4, 2008** Elev.: **568 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf	
0		Very stiff, brown <u>CLAY</u> with broken limestone							4.5+		
565		Tan, weathered <u>LINESTONE</u>									
5		100/5"									
560			Very stiff, tan and gray shaly <u>CLAY</u>							3.5	
10											
555				33				87	3.0	2.20	
15			Gray <u>SHALE</u>								
550											
20				15				117	4.5+	9.73	
545											
25											
540											
30											
535											
35											

Notes: **Completion Depth: 22 feet.**

FIGURE NO.: 14

# LOG OF BORING BORING B-14

Project: **Proposed Park**

Project No.: **E08-130**

Date: **Feb. 1, 2008** Elev.: **562 +/-**

Location: **3900 Brookhaven Club Drive, Addison, Texas**


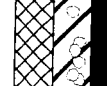



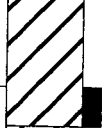



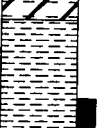

Depth to water at completion of boring: **21 ft**

Depth to water when checked: **During Drilling**

was: **14 ft**

Depth to casing when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
0		Asphalt Paving, 8" Asphalt and 1" Road base								
560		Very stiff, brown and tan CLAY with broken limestones (FILL)							3.0	
									3.75	
5		Very stiff, tan and brown CLAY with broken limestones	30	46	21	25			4.5+	
555									3.0	
10		Stiff, brown and tan CLAY	32					91	1.5	1.27
550									2.0	
15		Very stiff, tan and gray Shaley CLAY								
545										
20									4.5+	
540		Gray SHALE with gray limestone seams								
25									4.5+	
535										
30										
530										
35										

Notes: **Completion Depth: 25 feet.**

FIGURE NO.: 15

# LOG OF BORING BORING P-1

Project: **Proposed Street Reconstruction**

Project No.: **E08-130**

Date: **Feb. 6, 2008** Elev.: **548 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC	LL	PL	PI	-200	DD	P. PEN	UNCON	
			%	%	%		%	pcf	tsf	tsf	
0		Very stiff, dark brown and tan <u>Sandy CLAY</u> with sand	17	19	16	3			4.5+		
545									4.5+		
5			Very stiff, dark brown <u>CLAY</u>	18	28	18	10			2.5	
540			Very stiff, tan and brown <u>CLAY</u>							3.75	
10									3.75		
535											
15											
530											
20											
525											
25											
520											
30											
515											
35											

Notes: **Completion Depth: 10 feet.**

FIGURE NO.: 16

# LOG OF BORING BORING P-2

Project: **Proposed Street Reconstruction**

Project No.: **E08-130**

Date: **Feb. 6, 2008** Elev.: **550 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

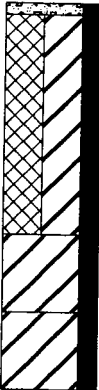
Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC	LL	PL	PI	-200	DD	P. PEN	UNCON	
			%	%	%		%	pcf	tsf	tsf	
550 - 0		Asphalt Paving, 3.5" thick									
		Stiff, dark brown <u>CLAY</u> (FILL)	32	51	22	29				1.5	
545 - 5				27	62	24	38			2.0	
		Very stiff, tan <u>CLAY</u>								2.0	
		Very stiff, tan and gray <u>shaley</u> <u>CLAY</u>							3.0		
540 - 10									3.5		
535 - 15											
530 - 20											
525 - 25											
520 - 30											
515 - 35											

Notes: **Completion Depth: 10 feet.**

FIGURE NO.: 17



# LOG OF BORING BORING P-3

Project: **Proposed Street Reconstruction**

Project No.: **E08-130**

Date: **Feb. 6, 2008** Elev.: **560 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**


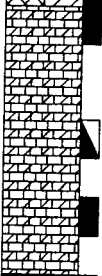


Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC	LL	PL	PI	-200	DD	P. PEN	UNCON
			%	%	%		pcf	tsf	tsf	
560 - 0		Asphalt Paving, 6.5" thick Hard, brown CLAY (FILL)	29	45	21	24			4.5+	
		Tan weathered LIMESTONE with clay layers								
555 - 5	 100/3"									
550 - 10	 100/2.8"	Gray LIMESTONE								
545 - 15										
540 - 20										
535 - 25										
530 - 30										
525 - 35										

Notes: **Completion Depth: 10 feet.**

FIGURE NO.: 18

# LOG OF BORING BORING P-4

Project: **Proposed Street Reconstruction**

Project No.: **E08-130**

Date: **Feb. 6, 2008** Elev.: **568 +/-**

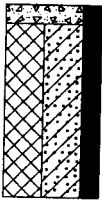
Location: **Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**  
was:

Depth to caving when checked:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
0		Asphalt Paving, 5.25" thick								
565		Stiff, brown and tan CLAY with rocks and sand (FILL)	11	20	16	4			1.0	
5		(Possible utility line)							2.5	3.0
560										
10										
555										
15										
550										
20										
545										
25										
540										
30										
535										
35										

Notes: **Completion Depth: 5 feet.**

FIGURE NO.: 19

# LOG OF BORING BORING P-5

Project: **Proposed Street Reconstruction**

Project No.: **E08-130**

Date: **Feb. 6, 2008** Elev.: **565 +/-**

Location: **Brookhaven Club Drive, Addison, Texas**

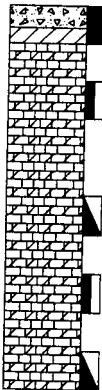
Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI	-200 %	DD pcf	P. PEN tsf	UNCON tsf
565 0		Asphalt Paving, 7" thick Hard, tan and brown CLAY Tan Wethered LIMESTONE with clay layers							4.5+	
560 5	100/3.5"									
555 10	100/2"									
550 15										
545 20										
540 25										
535 30										
530 35										

Notes: **Completion Depth: 10 feet.**

FIGURE NO.: 20

# LOG OF BORING BORING P-6

Project: **Proposed Street Reconstruction**

Project No.: **E08-130**

Date: **Feb. 6, 2008** Elev.: **570 +/-**

Location: **3900 Brookhaven Club Drive, Addison, Texas**

Depth to water at completion of boring: **Dry**

Depth to water when checked: **During Drilling**

was: **Dry**

Depth to caving when checked:

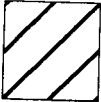

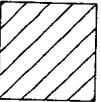
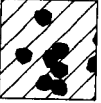
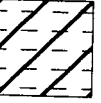
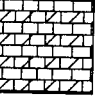
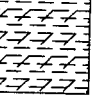
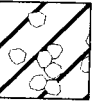

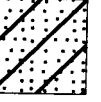

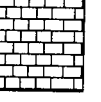
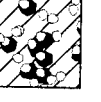



was:

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC	LL	PL	PI	-200	DD	P. PEN	UNCON
			%	%	%		%	pcf	tsf	tsf
570 - 0		Very stiff, brown <u>CLAY</u> with sand	15	19	16	3			4.5+	
565 - 5		Very stiff, tan <u>Silty CLAY</u>							4.5	
560 - 10		Tan <u>Weathered LIMESTONE</u>	14	30	18	12			4.5+	
555 - 15										
550 - 20										
545 - 25										
540 - 30										
535 - 35										

Notes: **Completion Depth: 10 feet.**

FIGURE NO.: 21

# KEY TO LOG TERMS & SYMBOLS

Symbol	Description	Symbol	Description
<b>Strata symbols</b>			
	Clay		Clay with gravel
	Clayey		Clay with gravel
	CLAY, Shaley		LIMESTONE, Weathered
	SHALE, Weathered		Clay with broken limestones
	PAVEMENT w/ base		Clay with sand
	Fill		Limestone
	Clay with Asphalt and broken Limestones		SAND, clayey
	SHALE		Clay, Silty

**Notes:**

1. Exploratory borings were drilled on dates indicated using truck mounted drilling equipment.
2. Water level observations are noted on boring logs.
3. Results of tests conducted on samples recovered are reported on the boring logs. Abbreviations used are:
 

DD = natural dry density (pcf)	LL = liquid limit (%)
MC = natural moisture content (%)	PL = plastic limit (%)
Uncon. = unconfined compression (tsf)	PI = plasticity index
P. Pen. = hand penetrometer (tsf)	-200 = percent passing #200
4. Rock Cores
 

Recovery = sum of core sample recovered divided by length of run, expressed as percentage.

RQD = (Rock Quality Designation) sum of core sample recovery 4" or greater in length divided by the run, expressed as percentage.

# KEY TO LOG TERMS & SYMBOLS

Symbol    Description

## Misc. Symbols



Water table  
when checked



Water table  
at boring  
completion



Depth to caving

## Soil Samplers



Thin wall  
Shelby Tube



THD  
penetration  
test



Auger

## SWELL TEST RESULTS

BORING NO.	DEPTH (FEET)	ATTERBERG LIMITS			IN-SITU MOISTURE CONTENT (%)	FINAL MOISTURE CONTENT (%)	LOAD (PSF)	VERTICAL SWELL (%)
		LL	PL	PI				
P-2	1 - 2	51	22	29	31.5	32.6	250	0.2
P-3	1 - 2	45	21	24	28.5	30.2	250	0.9

**PROCEDURE:**

1. SAMPLE PLACED IN CONFINING RING, DESIGN LOAD (INCLUDING OVERBURDEN) APPLIED, FREE WATER MADE AVAILABLE, AND SAMPLE ALLOWED TO SWELL COMPLETELY.
2. LOAD REMOVED AND FINAL MOISTURE CONTENT DETERMINED.