ADDENDUM NO. 3

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES

PROJECT NAME: **Market Street Realignment**

DATE: 1/30/2013

This addendum should be included in and be considered part of the plans and specifications for the Market Street Realignment Project. The contractor shall be required to sign an acknowledgement of the receipt of this addendum and submit it with their bid.

PROJECT NO.: **40-00300**

GENERAL:

- **Questions and Answers**
- **ROW Clearing Information**. The Tree Preservation Plan has been revised to show trees to be removed by others instead of being removed by the selected contractor.
- **Receipt of Addendum No. 3 Acknowledgement**
- **Addendum 4 Information.** There will be an Addendum No. 4 and it will include some quantity updates and final Q&A. Final questions are due 2/6/2013 by noon and responses will be provided in Addendum 4 which will be released no later than 2/8/2013.

PROPOSAL / SPECIFICATION UPDATES: The documents listed below are to replace those previously issued.

- **010 Invitation for Bids.** This moves the bid date to February 12th, 2013 at 2:00 p.m. C.S.T. as stated on the updated and attached IFB form. It also adds the requirement for a SAWS Long Lead Time Item List and Supplementary Provisioning Technical Documentation (per Chilled Water General Notes Sheet 953 as revised in Addendum 2).
- **020 Bid Form Template.** The estimate changed and lines were added for
  - Additive Alternate #2 (Retaining Wall 7 Area Improvements)
  - SAWS Recycled water
  - SAWS Chilled Water Alternates 1, 2 & 3
  - CPS Gas
- **025 Unit Pricing Form.** This update has additional items of work and updates to quantities.
- **List of Governing Specifications.** Added special provisions and special specifications listed below.

- **Updated Special Specifications** See attached list of updates to the CoSA Landscape Special Specifications for a description of changes to Special Specifications 9003 – 9008.
    - **CoSA SS 9003 Site Furnishings**
    - **CoSA SS 9004A Landscape Concrete Color, Finishes, and Joint Sealants.** SS 9004 was split into 9004A and 9004B.
    - **CoSA SS 9004B, Anti-Graffiti Coatings.**
    - **CoSA SS 9005 Gravel**
    - **CoSA SS 9006 Irrigation System**
    - **CoSA SS 9007 Planting**
    - **CoSA SS 9008 Subsurface Drainage for Landscape Areas**
    - **CoSA SS 9016 Storm Water Planters.** Updated payment widths.
- **Updated Plan Sheets** as listed within the attached Table of Updated Plan Sheets

PROPOSAL / SPECIFICATION ADDITIONS: The documents listed below are added:

- **Special Provision**
    - TxDOT SP 6834-001 Portable Changeable Message Sign
- **Special Specifications**
    - COSA SS 9020 Street Light Foundation
    - TxDOT SS 6834 Portable Changeable Message Sign.

Market Street Questions from Prospective Bidders

January 30, 2013

1. Q: Pay Item 416 2029 Drill Shaft for Roadway Illumination Pole (30") appears to be in error. According to plan sheet 883 the length of each individual drill shaft should be 8'. With 11 new assemblies to be installed, it would appear 88 LF would be needed for this portion of the work. Please have a look at this and confirm.

   A: Pay Item 416 2029 is only for TxDOT safety lights (with HPS luminaires). All COSA street light poles have a separate bid item for their foundations. There are a total of 11 TxDOT safety light poles, but only 3 are mounted on foundations in the ground, which require 8' drill shaft foundations. They are G1 (sheet 850), G2 (sheet 848), and G11 (sheet 834). The other 8 safety light poles are mounted on retaining wall rails. See details on sheet 888. Also, all 30" diameter drilled shaft foundations for the COSA illumination poles (308.1 Drilled Shaft – 30") are being replaced with CPS standard Steel Anchor Foundations (Item 9020). Details, a Special Specification, and quantities will be included in Addendum No. 3.

2. Q: Plan Sheet 814 calls for the relocation of an existing assembly. Shouldn't another 8' of foundation length be provided for this relocation? Will another pay item be provided for the relocation of the assembly itself?

   A: Yes. Bid Item No. 0610 2064 RELOCATE RD IL (TRANS – BASE) will be added for the relocation of the assembly and an additional 8' of foundation length will be added to Pay Item 416 2029 in Addendum No. 3.

3. Q: Could you please direct me to the detail sheet for the desired junction box (example page 861 "JB3").

   A: Refer to sheets 873 and 880.

4. Q: I do not see the special provision for 6834 2002 Changeable Message Board in the proposal book. Could you please supply a copy or direct me to the appropriate section if I missed it.

   A: A Special Specification and a Special Provision to the Special Specification for this item will be included in Addendum No. 3.

5. Q: Plan sheet 15 identifies for all bidders to use $250,000 for this pay item. Is each bidder responsible to add this amount and the pay item to the bid tab?

A: Sheet 15 incorrectly identified this as Item 524. This note pertains to the Vertical Circulator Structure, which is Item No. 9015 on the bid tab (Form 025). The $250,000 has already been included for Item 9015 on Form 025 and Sheet 15 will be corrected in Addendum No. 3.

6. Q: On sheet number 20 of the plans, the section at the bottom that has the line items that begin with 104 (removals), some quantities do not match the amounts given on the Unit Pricing form (Form 025). Could you please clarify?

   A: Some of these differences were corrected on Addendum No. 2 and others will be corrected on Addendum No. 3.

7. Q: Could you please provide a schedule for the Temporary Suspension of Work (Item 9002) that is found in the Specs manual?

   A: Temporary Suspension of Work shall be determined at the discretion of the City at times when work activities may interfere with major events in the Downtown area. A schedule of currently known major events that could result in temporary suspensions of work is shown in Note 15 on Sheet 15 of Addendum No. 2.

8. Q: The quantities for the stormwater planters on Sheet 21 of the plans are different than the ones on the Unit Pricing Form. The sizes of the planters do not match either. Also, the Plan and Profile (sheets 170-171) and Cross Sections (sheets 230-231) for Market Street show stormwater planters at stations 11+08 and 14+50, but no planters in between, while the Landscape plans (sheets 701-702) show continuous planters. Could you please clarify?

   A: The stormwater planters shown on these sheets should have been shown to be continuous. The Plan and Profile sheets, Cross Section sheets, and quantities will be corrected and included in Addendum No. 3. In addition, the stormwater planters will be removed entirely from the south side of Market Street. This change will be included in Addendum No. 3.

9. Q: What is the time frame we have to do our work? CPS Energy, AT&T, Time Warner and COSA IT?

   A: The time frame for completing these facilities will be dictated by Milestone Dates for completing the work for which these facilities are incidental and need to be completed first in accordance with the construction phasing plans shown on the Traffic Control Plans (sheets 35-37). See the Milestone Dates and descriptions of work to be completed

that is included in Section 060 for both the Base Bid Traffic Control Plan and the Alternate Bid Traffic Control Plan included in Addendum No.2.

10. Q: Need drawings for Time Warner and City IT ductbank.

    A: Plans and details for these facilities are shown on the Utility Layout Sheets 897 - 907 included in Addendum No. 2.

11. Q: Regarding the construction of underground utilities, do we do our own demo work that falls within our centerline?

    A: Yes.

12. Q: Will the entrance to northbound and southbound I-37 be shut down as well as Market Street and Bowie going east?

    A: For the Base Bid Traffic Control Plan, it is intended that traffic will be maintained within the project area for the entire construction period, but will be closed at some locations at certain times in accordance with the construction phasing plans. The southbound entrance to IH-37 will be closed once work begins on the temporary exit ramp from IH-37. At that time all traffic that would otherwise enter the southbound entrance ramp will be routed onto Tower of the Americas Way (Bowie) until November 1, 2013. After November 1, 2013 Tower of the Americas Way will be closed to traffic and all traffic will continue on Market Street. The northbound entrance ramp will not be closed.

    For the Alternate Bid Traffic Control Plan, it is intended that all traffic will be detoured out of the construction area from September 15, 2013 to August 1, 2014. At other times, traffic will be maintained within the project area as described above and in accordance with the construction phasing plans.

13: Q: Will existing duct banks, cabinets, manholes for the Transguide system be abandoned before we start work in that area?

    A: No. The contractor will be required to protect the Transguide facilities in place. It should be noted that the alignment of Chilled Water Line B was moved from the sloped embankment area along IH-37 where the Transguide facilities are located to the west side of the West Frontage Road in Addendum No. 2.

14: Q: To conventional bore, HDPE can't be used. Can a 36" diameter steel casing be used instead? (Refers to CPS Electric sheets 1042 -1044 and 1047 – 1048).

A: The bores for the CPS electric lines on the West Frontage Road have been eliminated, and the electric lines at these locations will be installed by open cut trenching. This revision is included in Addendum No. 3. The AT&T bores are to be directional bores, not conventional bores. HDPE casings are to be used for these bores.

15. Q: Are bore casings for CPS and AT&T to be grouted after conduit installation?

    A: See answer to question 14 above for CPS bores. Bore casings for AT&T will only require grouting of the casing ends.

16. Q: On the IT and Time Warner duct banks on the utility layout sheets, it appears that they are going on the same course as AT&T, but there are no pay items for boring.

    A: The IT and Time Warner ducts are not at the same location as the AT&T duct bank. No boring is anticipated to install these ducts.

17. Q: Who is furnishing the IT conduit and manholes?

    A: The contractor will furnish all materials for the IT lines.

18: Q: Sheet 2 of 2 of Addendum No. 2 says there is an updated 025 Bid Form, but it was not included in the addendum. Is there an updated bid form that should have been issued or will it be issued with Addendum No. 3.

    A: Form 025 was inadvertently omitted from Addendum No. 2. It will be included in Addendum No. 3.

19. Q: There are a couple of discrepancies between forms 020 and 025. Form 025 has a total for SAWS Reclaimed Water but there is not a spot for it on form 020. Form 025 has subtotals for 2 chilled water alternates, but there is only one spot on form 020 for chilled water alternate. Can form 020 be updated?

    A: An updated form 020 will be included in Addendum No. 3.

20. Q: The SAWS Long Lead Time spec that is included in Addendum No. 2 and on sheet 953 of the plans requires that submittal data be submitted with the bid. Form 010 does not list these submittals in the list of forms that need to be submitted with the bid. Do these submittals need to be submitted with the bid, and if so, can you provide additional clarification on exactly what should be submitted so that we can make sure that all of our suppliers are providing the correct information?

    A: Additional clarification of what should be submitted with the bid pertaining to the SAWS Long Lead Time will be included in Addendum No. 3.

21. Q: Spec 9014 says that there should be 5 bid items to pay for handling of non-hazardous soils in the area of concern, but these items are not included on form 025. Can these be added?

    A: These items will be included on form 025 in Addendum No. 3.

22. Q: Specs 9015 and 9019 say there will be allowance pay items included in the bid, but they are not included in form 025. Will these items be added?

    A: These allowances will be included on form 025 in Addendum No. 3.

23. The pay item for roadway excavation includes only 1334 CY. The roadway quantity sheets 20 and 21 show that there is only excavation on sheets 204 through 212, but many of the other plan and profile sheets clearly show excavation required. Can you please check this quantity?

    A: The earthwork quantities will be updated and included in Addendum No. 3.

24. Q: Regarding the handling of the Class 2 non hazardous material, will all employees in or near the contaminated area be required to have the 40 hour HAZWOPER training or only the person managing the environmental be required to possess the 40 hour training?

    A: All employees working in the affected area are required to have the 40-hour HAZWOPER certification.

25. Q: When can the additive detour be installed? Can it be installed on day 1 of the project or is the intent to install it right before the 9/14/13 milestone date?

    A: It is the intent to install the additive detour just before the 9/14/13 milestone date.

26. Q: The base bid item 502-2001 has 16 months of barricades and the alternate bid item 502-2001 has only 9 months of barricades. If the alternate bid is accepted, will both items be paid?

    A: The lengths of time for item 502-2001 in the base bid will be changed to 18 months and changed to 11 months for the bid alternate on Bid Form 025 in Addendum No. 3. Both items will be paid. Refer to Special Specification Item 9017, Temporary Closure of Market Street, included in Addendum No. 2 for an explanation of the cost savings to be included in the Diversion of Traffic Bid Alternate to be applied as a credit to the City if the temporary closure of Market Street is approved.

27. Q: Are there any restrictions on work hours or days? If needed, could we work 24 hours a day and 7 days a week?

    A: No work shall occur within 500-feet of the Grand Hyatt Hotel after 8:00 pm every day. Otherwise, there are no restrictions on work hours or days unless the City implements a Temporary Suspension of Work as described in Special Specification Item 9002.

28. Q: The AT&T underground utility calls for 784 LF of directional bores and the CPS underground electric shows 813 LF of directional bores. Is there any reason why we can't cut the frontage road to subgrade and then open cut these utilities?

    A: Please see the answer to Question No. 14 regarding the CPS electric ducts. For the AT&T ducts, the directional bores are intended to minimize impacts to existing Market Street, the northbound entrance ramp to IH-37, and Montana Street where traffic must be maintained until at least September 14, 2013. The contractor can submit an alternative plan to the City for review.

29. Q: Sheets 971-974 call for the existing electric lines to be supported during the chilled water construction. What are the size, configuration, voltage and depth of these lines?

    A: Based on information obtained from CPS Energy, the existing electric duct bank that runs along the west side of the West Frontage Road (Tower of the Americas Way) is a 3x5 - 15 duct system. Voltage is 13,800 kv. Average depth of cover is approximately 5-feet.

30: Q: The pay item for 24" DI water has a quantity of 0. Will this item be deleted or will a quantity be added?

    A: The correct quantity of 24" DI water pipe will be included in Addendum No. 3. Also, the quantity of 12" DI water pipe will be revised in Addendum No. 3.

31. Q: The chilled water summary on sheet 952 does not match the summary on sheet 19. Can this be clarified in the addendum?

    A: Sheet 19 will be deleted from the plans in Addendum No. 3.

32. Q: Can you issue CAD files so that we can use them for our take offs?

    A: CAD files will be provided only to the selected contractor following award of the contract.

33. Q: The current form 025 bid form shows 16 months of barricades. Plan sheet 18 shows 20 months of barricades. Form 010 shows 550 calendar days which is approximately 18 months. What is correct?

    A: Please see the answer to Question No. 26.

34. Q: The excavation quantity appears to be very low for all the excavation along the freeway for the MSE wall.

    A: Please see the answer to Question No. 23.

35. Q: There is no quantity for 24" waterline.

    A: Please see the answer to Question No. 30.

36. Q: Cannot find details for the overhead sign supports.

    A: The Overhead Sign Bridge layouts, details, and standards are included in the original plan set on Sheets 954 to 962. Sheets 954, 955, and 957 were also included in Addendum No. 2.

37. Q: Regarding the hot tap for the chilled water line, what is the material on the main carrier pipe? Are they grout lined like the new lines?

    A: Bidders should assume that the existing 30" and 24" chilled water mains are grout lined like the new lines.

38. Q: Can you provide contact information for the AT&T approved contractors?

    A: 1. Bartek, Casey Bartek, 210.648.4780, office@bartektx.com

    2. Texstar, Wanda Baldwin, 210.656.8775, wandabaldwin@texstarenterprises.com

    Pete Espinoza, 210.669.7557, peteespinoza@texstarenterprises.com

    3. Zachry Construction, Alvin Zigmond, 210.260.4297, pam.erwin@zachrycorp.com

39. Q: Is phasing going to change in Addendum No. 3, because it seems to have been taken out of Addendum No. 2? Or will it remain similar to the original plans?

    A: Phasing will remain the same as in the original plans. Phasing was not included in Addendum No. 2 because there was no change in the phasing from the original plans.

40. Q: Where are Bid Items 814 (8" and 30" DI Pipe) located on the plans?

A: Bid Items 814 (8” and 30” DI Pipe) are storm sewer force main pipes shown on plan sheets 328 – 330. The technical specification for these pipes is the SAWS specification for ductile Iron pipe, Item No. 814.

CITY OF SAN ANTONIO
DEPARTMENT OF CAPITAL IMPROVEMENTS MANAGEMENT SERVICES
CONTRACT SERVICES DIVISION

RECEIPT OF ADDENDUM NUMBER **3** IS HEREBY ACKNOWLEDGED FOR PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF **Market Street Realignment** FOR WHICH BIDS WILL BE OPENED ON TUESDAY, FEBRUARY 12, 2013 AT 2:00 P.M. C.S.T.

THIS ACKNOWLEDGEMENT MUST BE SIGNED AND RETURNED WITH THE BID PACKAGE.

Company Name: _____

Address: _____

City/State/Zip Code: _____

Date: _____

Signature: _____

Print Name/Title: _____

CITY OF SAN ANTONIO

Issued By: CIMS Department **Date Issued: December 28, 2012**
ID NO.: 40-00300 **Page 1 of 1**

FORMAL INVITATION FOR BIDS (IFB) and CONTRACT
MARKET STREET REALIGNMENT #40-00300

Sealed bids, subject to the Terms and Conditions of this Invitation for Bids and other contract provisions, will be received at the Office of the City Clerk, City Hall, 100 Military Plaza, 2nd floor San Antonio, Tx 78205 until **2:00 p.m. CST** on **Tuesday, February 12, 2013** and publicly read aloud at **114 W. Commerce, Municipal Plaza Building "B" Room**. This is the *solicitation deadline*. Bids must be submitted in a sealed envelope and clearly marked with the due date of bid, bidder name, Project Name and ID NO. The City is not responsible for submissions not clearly and appropriately marked. Late submissions will be rejected and returned to bidder. A Non-Mandatory Pre-submittal conference will be held at 114 W. Commerce, San Antonio, TX 78205 in the B Room on Tuesday, January 8, 2013 at 2:00 pm.

TABLE A - This invitation includes the following Contract Documents:

010	Invitation for Bids and Contract Signature Page	◘	Subcontractor/Supplier Utilization Plan
020	Bid Form	060	Supplemental Conditions
025	Unit Pricing Form	075	Performance Bond
030	Qualification Questionnaire	076	Payment Bond
040	Standard Instructions to Respondent	081	General Conditions for Construction Contracts
050.01	SBEDA Guidelines	095	SAWS Special Conditions
		◘	Heavy/Hwy Wage Decision

Plans, Specifications and Special Conditions may be purchased at a cost of **$175.00** per set (tax included) from the office of **URS Corporation 9901 IH-10, Ste 350**, San Antonio, TX 78230 Phone- (210) 377-3764. No refund will be made for plan sets that are returned. Addenda will be posted on the web at www.sanantonio.gov/rfplistings along with this solicitation. Changes to Plans, Specifications and Special Conditions will be included in an addendum and may be obtained from the office of **URS Corporation**. Bidder understands and agrees that bidder is responsible for obtaining addenda and adhering to all requirements in addenda. City is not responsible for incorrect information obtained through other sources.

The following documents (fully completed and with original signatures) constitute the required information to be submitted as a part of the bid proposal clearly marked on the outside of the sealed envelope with the due date of bid, bidder name, Project Name and ID NO as follows:

1.) 010 Invitation for Bids and Contract Signature Page
2.) 020 Bid Form
3.) 025 Unit Pricing Form
4.) 030 Qualification Questionnaire
5.) ◘ Bid Bond
6.) Subcontractor/Supplier Utilization Plan
7.) Signed Addenda Acknowledgement Forms
8.) SAWS Long Lead Time Item List (LLTIL) and Supplementary Provisioning Technical Documentation (SPTD)

This is a Qualified Low Bid Solicitation. It is understood and agreed that the work is to be completed in full on or before **550** calendar days. This project includes hazardous environmental work. This project requires **2** project sign(s).

Respondents must demonstrate commitment to satisfy a twenty-five percent (25%) SBE subcontracting goal and twenty percent (20%) M/WBE subcontracting goal. In the absence of a waiver granted by the Small Business Office, failure of a Respondent to commit to satisfying the S/M/WBE subcontracting goals shall render its response NON-RESPONSIVE.

This is a Public Works Contract and chapter 2258 of the Texas Government Code requires that not less than the prevailing wage rate for work of a similar character in this locality shall be paid all laborers, workmen, and mechanics employed in the construction thereof. The Wage Decision Number **TX130016 01/04/2013 TX16** shall be used on this contract, which is available on the web at http://www.wdol.gov/dba.aspx#0.

The undersigned, by his/her signature, represents that he/she is authorized to bind the bidder to fully comply with Contract Documents for the amount(s) shown on the accompanying bid sheet(s). The work proposed to be done shall be accepted when fully completed and finished to the entire satisfaction of the City. The undersigned certifies all prices contained in this bid have been carefully checked and are submitted as correct and final. The Bidder by submitting this bid and signing below, acknowledges that he/she has received & read the entire Bid and Contract document and agrees to be bound by the terms therein, has received all Addenda, and agrees to the terms, conditions, and requirements of the bidder's bid proposal and all documents listed in TABLE A above and the enabling Ordinance and associated documentation that form the entire Contract upon approval by the City Council.

Official Name of Company (legal):_____

_____/_____ Signer's Name: _____
Original Signature of Person Authorized to Sign Bid/Contract Date (Please Print or Type)

020

BID FORM

The estimated construction budget for this contract is $[$26,250,000.00]

I. BASE BID

Amount of Street/Roadway Construction Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of SAWS Water Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of SAWS Sewer Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of SAWS Recycled Water Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of SAWS Chilled Water Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of AT&T Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of CPS Electric Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of Time Warner Cable and City IT Conduits Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of CPS Gas Base Bid (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Total Amount of Base Bid (Insert Amount in Words and Numbers):

_____ **$**_____

II. ALTERNATES

Amount of each Alternates (if applicable) insert in Numbers: If Applicable, or write N/A, if not applicable

Additive Alternate #1 (Diversion of Traffic) (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Additive Alternate #2 (Retaining Wall 7 Area Improvements) (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of SAWS Chilled Water Alternate 1 (Insulation Lines "A" and "C") (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of SAWS Chilled Water Alternate 2 (Insulation Line "B") (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

Amount of SAWS Chilled Water Alternate 3 (Insulation Line "D") (Insert Amount in Words and Numbers): If Applicable, or write N/A, if not applicable

_____ $_____

III. UNIT PRICES

Bidders shall submit unit pricing on the 025 Unit Pricing form, and it shall be attached immediately following this sheet.

IV. ALLOWANCES (if applicable)

_____	_____
Official Name of Company (legal)	Telephone No.
_____	_____
Address	Fax No.
_____	_____
City, State and Zip Code	E-mail Address

Name of the proposed **Project Manager:** _____

Name of the proposed **Site Superintendent:** _____

CITY OF SAN ANTONIO

025 UNIT PRICING FORM - ADDENDUM 3

PROJECT NAME: MARKET STREET REALIGNMENT

PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	100.1			MOBILIZATION	LS	1			
	100.2			INSURANCE & BOND	LS	1			
	101.1			PREPARATION OF RIGHT OF WAY	LS	1			
	106.1			BOX CULVERT EXCAVATION & BACKFILL	CY	3817			
	202.1			PRIME COAT	GAL	807			
	203.1			TACK COAT	GAL	2785			
	205.3			HMA PAVEMENT, TYPE C (2" COMP. DEPTH)	SY	10913			
	208.1			SALV, HAUL & STKPL RCL APH PV (2")	SY	34457			
	209.1			CONCRETE PAVEMENT (BUS PAD) (10")	SY	178			
	307.1			CONCRETE STRUCTURE (MISCELLANEOUS)	CY	7.7			
	308.1			DRILLED SHAFTS (18")	LF	512			
	308.1			DRILLED SHAFTS (24")	LF	153			
	308.1			DRILLED SHAFTS (30")	LF	78			
	308.1			DRILLED SHAFTS (36")	LF	49			
	308.1			DRILLED SHAFTS (48")	LF	50			
	309.1			PRECAST REINFORCED CONCRETE CULVERT (4' x 3')	LF	152			
	309.1			PRECAST REINFORCED CONCRETE CULVERT (4' x 4')	LF	486			
	309.1			PRECAST REINFORCED CONCRETE CULVERT (5' x 3')	LF	110			
	309.1			PRECAST REINFORCED CONCRETE CULVERT (6' x 4')	LF	393			
	401.1			REINFORCED CONCRETE PIPE (CLASS III)(18" DIA)	LF	7			
	401.1			REINFORCED CONCRETE PIPE (CLASS III)(24" DIA)	LF	1190			
	401.1			REINFORCED CONCRETE PIPE (CLASS III)(30" DIA)	LF	304			
	401.1			REINFORCED CONCRETE PIPE (CLASS III)(36" DIA)	LF	461			
	401.1			REINFORCED CONCRETE PIPE (CLASS III)(42" DIA)	LF	303			
	401.1			REINFORCED CONCRETE PIPE (CLASS III)(48" DIA)	LF	60			
	403.1			JUNCTION BOX 4'X4'X4'	EA	9			
	403.2			JUNCTION BOX 5'X5'X5'	EA	2			
	403.3			JUNCTION BOX 6'X6'X6'	EA	5			
	403.4			JUNCTION BOX 7'X7'X7'	EA	3			
	403.7			INLET TYPE I (COMPLETE)(10FT)	EA	7			
	403.XX			MANHOLES (STAGE II)	EA	10			
	403.XX			INLET TYPE X-1	EA	2			
	403.XX			CI TYPE IL-C	EA	10			
	403.XX			51' X 8" TRENCH DRAIN	EA	1			

Description Codes: SS=Special Specification; COSA=City of San Antonio Specification Item; SAWS=San Antonio Water System Specification Item

PROJECT NAME: MARKET STREET REALIGNMENT
PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	403.XX			DOMED GRATE INLET (24")	EA	3			
	403.XX			INLET TYPE Y-1	EA	1			
	410.2			GRAVEL SUBGRADE FILLER (100 CY< X < 1,000 C.Y.)	CY	565			
	413.1			FLOWABLE BACKFILL (LOW STRENGTH)	CY	3325			
	500.4			CONCRETE CURB & GUTTER (> 1,000 L.F.)	LF	9490			
	500.5			CONCRETE CURB & GUTTER (TY.2) (> 1,000 L.F.)	LF	0			
	502.1			CONCRETE SIDEWALKS(1,000 S.Y.< X <10,000S.Y.)	SY	8676			
	503.1			PORTLAND CEMENT CONCRETE DRIVEWAY	SY	200			
	505.1			CONCRETE RIPRAP (5" THICK) (< 100 S.Y.)	SY	8.6			
	506.1			CONCRETE RETAINING WALLS-COMB. TYPE (< 20 C.Y.)	CY	10			
	507.2A			TEMPORARY CHAIN LINK WIRE FENCE (6' HIGH)	LF	2300			
	520.1			HYDROMULCH	SY	28862			
	524			CONCRETE STEPS	CY	3			
	531			OBJECT MARKER ASSEMBLY	EA	15			
	531.13R			R3-7R RIGHT LANE MUST TURN RIGHT (30" X 30")	EA	1			
	531.14SPL			R3-8SPL LANE-USE CONTROL SPECIAL (VARIES)	EA	1			
	531.17			R4-7 KEEP RIGHT (24" X 30")	EA	1			
	531.18			R5-1 DO NOT ENTER (30" X 30")	EA	4			
	531.19			R6-1R ONE WAY (36" X 12")	EA	1			
	531.43			W1-7T LARGE ARROW (48" X 24")	EA	1			
	531.49			W9-2L LANE ENDS MERGE LEFT (30" X 30")	EA	1			
	531.7			R3-1R NO RIGHT TURN (24" X24")	EA	1			
	531.D11-1			D11-1 BIKE ROUTE (24" X 18")	EA	12			
	531.D1-2			D11-2 DESTINATION (42" X 30")	EA	1			
	531.M1-1			M1-1 INTERSTATE ROUTE MARKER (24" X 24")	EA	1			
	531.M1-4			M1-4 US ROUTE MARKER (24" X 24")	EA	1			
	531.M3-1			M3-1 CARDINAL DIRECTION NORTH (24" X 12")	EA	2			
	531.M4-14			M4-14 BEGIN (12" X " 6")	EA	4			
	531.M4-6			M4-6 END (12" X 6")	EA	1			
	531.M6-1			M6-1 BIKE ARROW SIGN (12" X 9")	EA	1			
	531.M6-2L			M6-2 DIRECTIONAL ARROW LEFT (21" X 15")	EA	2			
	531.M6-2R			M6-2R BIKE ARROW SIGN (12" X 9")	EA	1			
	531.M6-4			M6-4 BIKE ARROW SIGN (12" X 9")	EA	1			

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	531.R3-5bP			R3-5bP LEFT LANE (PLAQUE) (30" X 12")	EA	1			
	531.R3-5L			R3-5L LEFT TURN ONLY (30" X 36")	EA	5			
	531.R3-5R			R3-5R RIGHT TURN ONLY (30" X 36")	EA	3			
	531.R3-6L			R3-5R LEFT AND THRU (30" X 36")	EA	1			
	531.R5-1A			R5-1A WRONG WAY (42" X 30")	EA	4			
	531.R5-1B			R5-1B BICYCLE WRONG WAY (12" X 18")	EA	1			
	531.R5-2			R5-2 NO TRUCKS (24" X 24")	EA	1			
	531.R9-6			R9-6 BICYCLE REGULATORY YIELD TO PEDS (12" X "18")	EA	2			
	531.R9-7			R9-7 SHARED USE PATH RESTRICTION (12" X 18")	EA	1			
	531.R10-11A			R10-11A NO TURN ON RED (30" X 36")	EA	5			
	531.R10-6			R10-6 STOP HERE ON RED (24" X 36")	EA	2			
	531.SPL			SPECIAL SIGN (18" X 18")	EA	2			
	531.W12-2A			W12-2A LOW CLEARANCE (78" X 24")	EA	1			
	531.W3-3			W3-3 ADVANCED TRAFFIC CONTROL (30" X 30")	EA	1			
	531.W4-3L			W4-3L ADDED LANE (36" X 36")	EA	1			
	535			24 INCH WIDE YELLOW LINE	LF	62			
	535.1			4 INCH WIDE YELLOW LINE	LF	2577			
	535.12			WORD "ONLY"	EA	10			
	535.16			STRAIGHT WHITE ARROW BICYCLE FACILITY	EA	28			
	535.17			BICYCLE RIDER SYMBOL	EA	28			
	535.2			4 INCH WIDE WHITE LINE	LF	5464			
	535.4			8 INCH WIDE WHITE LINE	LF	1959			
	535.5			12 INCH WIDE WHITE LINE	LF	468			
	535.7			24 INCH WIDE WHITE LINE	LF	1206			
	535.8			RIGHT WHITE ARROW	EA	10			
	535.9			LEFT WHITE ARROW	EA	11			
	535.XX	SS		REFL PAV MRK TY I BIKE LANE(G)(SLD)(100MIL)	SF	3244			
	537.6			TRAFFIC BUTTON TYPE I-C	EA	37			
	537.8			TRAFFIC BUTTON TYPE II-A-A	EA	58			
	537.9			TRAFFIC BUTTON TYPE II-C-R	EA	220			
	540.6			CONSTRUCTION EXITS (INSTALL/REMOVE)	SY	340			
	540.9			TEMPORARY SEDIMENT CONTROL FENCE	LF	970			
	540.10			GRAVEL FILTER BAGS FOR EROSION CONTROL	LF	988			
	550.1			TRENCH EXCAVATION SAFETY PROTECTION	LF	4799			

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	615.1			TRAFFIC SIGNAL CONTROLLER ASSEMBLY (TYPE 332 CABINET)	EA	4			
	618.1			CONDUIT (2 INCH/PVC SCHEDULE 40)	LF	602			
	618.2			CONDUIT (3 INCH/PVC SCHEDULE 40) (BORE)	LF	854			
	618.2			CONDUIT (3 INCH/PVC SCHEDULE 40)	LF	2164			
	620.1			ELECTRICAL CONDUCTORS (NO. 6)(BARE)	LF	37			
	620.2			ELECTRICAL CONDUCTORS (NO. 8)(BARE)	LF	3538			
	620.3			ELECTRICAL CONDUCTORS (NO. 6)(INSULATED)	LF	74			
	624.4			GROUND BOXES TYPE D (162922)	EA	25			
	628.1			ELECTRICAL SERVICES (PER INSTALLATION)	EA	4			
	633.1			BATTERY BACKUP SYSTEM	EA	4			
	655.1			TYPE 332 CONTROLLER FOUNDATION	EA	4			
	680.1			INSTALLATION OF HIGHWAY TRAFFIC SIGNALS [ISOLATED]	EA	3			
	680.3			INSTALLATION OF HIGHWAY TRAFFIC SIGNALS [SYSTEM]	EA	1			
	682.1			INSTALL VEHICLE SIGNAL SECTION WITH BACK PLATE (3 SECOND)	EA	41			
	682.2			INSTALL VEHICLE SIGNAL SECTION WITH BACK PLATE (4 SECOND)	EA	3			
	682.3			INSTALL VEHICLE SIGNAL SECTION WITH BACK PLATE (5 SECOND)	EA	3			
	683.1			LED COUNTDOWN PEDESTRIAN MODULE	EA	26			
	684.1			TRAFFIC SIGNAL CABLES (TYPE C)(14 AWG)(CONDUCTOR NO. 4)	LF	2976			
	684.1			TRAFFIC SIGNAL CABLES (TYPE A)(14 AWG)(CONDUCTOR NO. 9)	LF	11368			
	686.1			INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(2 ARM 44-24')	EA	1			
	686.1			INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(2 ARM 50-36')	EA	2			
	686.1			INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(1 ARM 24')	EA	2			
	686.1			INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(1 ARM 32')(LUM)	EA	3			
	686.1			INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(1 ARM 36')(LUM)	EA	1			

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	686.1			INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(1 ARM 44')(LUM)	EA	1			
	687.1			PEDESTAL POLE ASSEMBLY	EA	20			
	688.2			PEDESTRIAN DETECTORS [2 INCH PUSH BUTTON]	EA	45			
	693.1			INTERNALLY LIGHTED STREET NAME SIGNS [TYPE/SIZE]	LF	14			
	695.3			EMERGENCY PREEMPTION DETECTOR	EA	11			
	695.4			EMERGENCY PREEMPTION DETECTOR CABLE	EA	2317			
	696.1			RADAR ADVANCE DETECTION DEVICE (RADD)	EA	11			
	696.2			RADAR ADVANCE DETECTION DEVICE (RPDD)	EA	14			
	696.3			RADD COMMUNICATION AND POWER CABLE	LF	1778			
	696.3			RPDD COMMUNICATION AND POWER CABLE	LF	3190			
	SPECIAL SPECIFICATION ITEMS								
	9001	SS		GROUT COLUMNS	LF	2353			
	9002.1	SS		TEMPORARY SUSPENSION OF WORK IN WHOLE	DAY	20			
	9002.2	SS		TEMPORARY SUSPENSION OF WORK IN PART	DAY	20			
	9003.1	SS		CAST CONCRETE SEAT (CUSTOM W/INTEGRAL COLOR)	EA	9			
	9003.2a	SS		CAST CONCRETE BENCH, 6' LONG (CUSTOM W/INTEGRAL COLOR)	EA	0			
	9003.2b	SS		CAST CONCRETE BENCH, 4' LONG (CUSTOM W/INTEGRAL COLOR)	EA	10			
	9003.3	SS		TRASH/RECYCLING RECEPTACLES	EA	8			
	9003.4	SS		BOLLARDS (FAIRWEATHER, 3' HIGH)	EA	3			
	9003.5	SS		BIKE RACKS (MAGLIN MBR200)	EA	8			
	9003.6	SS		TREE GUARDS (VS IRONSITES, S-6)	EA	32			
	9004A.1	SS		CONCRETE SEATWALL (COLOR, FINISH, JOINT SEALER, AND ANTI-GRAFFITI)	LF	101			
	9004A.2	SS		SPECIAL PAVING #1 UPCHARGE	SF	10822			
	9004A.3	SS		SPECIAL PAVING #2 UPCHARGE	SF	1433			
	9004A.4	SS		SPECIAL PAVING #3 UPCHARGE	SF	324			
	9004A.5	SS		SPECIAL PAVING #4 UPCHARGE	SF	288			
	9004A.6	SS		SPECIAL PAVING #5 (ARTIST DESIGNED PAVING)	SF	168			
	9004B	SS		ANTI-GRAFFITI COATING	SF	1954			

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	9005.1	SS		CRUSHED STONE AT TREE WELLS AND PAVING DIVIDERS	SF	2736			
	9005.2	SS		GRAVEL SWALE	SF	444			
	9005.3	SS		COBBLE DISSIPATORS AT STORMWATER INLETS	SF	265			
	9006.1	SS		WATER TAP AND METER (1" SIZE)	EA	1			
	9006.2	SS		BACKFLOW PREVENTION DEVICE WITH ENCLOSURE (1" SIZE):	EA	1			
	9006.3	SS		IRRIGATION BOOSTER PUMP SYSTEM:	EA	1			
	9006.4	SS		LANDSCAPE INJECTOR SYSTEMS:	EA	1			
	9006.5	SS		AUTOMATIC IRRIGATION CONTROLLER (2-WIRE CENTRAL CONTROL):	EA	1			
	9006.6	SS		CONTROL WIRE (2-WIRE):	LF	6710			
	9006.7	SS		IRRIGATION SLEEVES (MAINLINE):	LF	1376			
	9006.8	SS		IRRIGATION SLEEVES (LATERALS):	LF	1142			
	9006.9	SS		IRRIGATION SLEEVES (WIRES):	LF	1376			
	9006.10	SS		IRRIGATION PRESSURE MAINLINE (2-1/2" SIZE):	LF	3620			
	9006.11	SS		IRRIGATION PRESSURE MAINLINE (2" SIZE):	LF	3090			
	9006.12	SS		IRRIGATION ISOLATION GATE VALVES (2-1/2" SIZE):	EA	14			
	9006.13	SS		IRRIGATION ISOLATION GATE VALVES (2" SIZE):	EA	17			
	9006.14	SS		IRRIGATION QUICK COUPLING VALVE (1" SIZE):	EA	44			
	9006.15	SS		TREE ROOT WATERING SYSTEM (2 PER TREE):	EA	542			
	9006.16	SS		SUBSURFACE DRIP IRRIGATION:	SF	48328			
	9006.17	SS		REMOTE CONTROL VALVE:	EA	26			
	9006.18	SS		DRIP REMOTE CONTROL VALVE:	EA	31			
	9007.1	SS		TREES, 2.5" CALIPER	EA	68			
	9007.2	SS		TREES, 3" CALIPER	EA	130			
	9007.3	SS		TREES, 4" CALIPER	EA	73			
	9007.4-7	SS		SHRUBS AND GROUNDCOVER	SF	42680			
	9007.8a	SS		SOIL PREP + AMENDMENTS (SHRUB/GROUNDCOVER), 12-18" DEEP	SF	26557			
	9007.8b	SS		SOIL FOR TRENCHES	SF	1356			
	9007.8c	SS		SOIL FOR TREE WELLS	SF	2736			
	9007.9	SS		PLANTING AREA SHEET MULCH	SF	26557			
	9007.1	SS		SOIL PREP + AMENDMENTS (STORMWATER)	SF	21771			

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	9007.11	SS		STORMWATER PLANTER SHEET MULCH	SF	21771			
	9007.12a	SS		TREE STAKES (9' REDDYSTAKE)	EA	130			
	9007.12b	SS		TREE STAKES (MEGASTAKE)	EA	73			
	9007.13	SS		SOIL FERTILITY TESTING	EA	12			
	9007.14	SS		SOIL FOOD WEB ANALYSIS TESTING	EA	12			
	9007.15	SS		LANDSCAPE MAINTENANCE, 12 MONTHS	EA	1			
	9008.1a	SS		PERF. PIPE AT STORMWATER PLANTER + TREE WELLS WITH TRENCHING & DRAIN ROCK	LF	3329			
	9008.1b	SS		SOLID PIPE AT TREE WELLS W/TRENCHING & DRAIN ROCK	LF	450			
	9008.1c	SS		CLEANOUTS FOR UNDERDRAIN LINES	EA	61			
	9009	SS		GEOGRID FOR BASE AND EMBANKMENT REINFORCEMENT	SY	22107			
	9010	SS		INS VALMONT 26 FT 2 IN TAVERN GREEN STREET LIGHT ASSEMBLY (INCLUDES POLE, BASE, AND ARM)	EA	78			
	9011	SS		INS GREENSTAR LED LUMINAIRE, GALAXY XD-- GLX30 MODEL, 68W	EA	59			
	9011	SS		INS GREENSTAR LED LUMINAIRE, GALAXY XD-- GLX48 MODEL, 109W	EA	19			
	9012	SS		INS LANDSCAPEFORMS 12 FT METALLIC BRONZE ALCOTT PEDESTRIAN LIGHT	EA	128			
	9013	SS		INS LANDSCAPEFORMS 3 FT 1 IN METALLIC BRONZE HAWTHORN BOLLARD LIGHT	EA	31			
	9014.3.1	SS		TRANSPORTATION TO DISPOSAL FACILITY (CLASS 2 NON-HAZ SOIL) (COSA)	EA	621			
	9014.3.2	SS		LANDFILL DISPOSAL (CLASS 2 NON-HAZ SOIL) (COSA)	EA	621			
	9014.3.3	SS		TRANSPORTATION TO DISPOSAL FACILITY (CLASS 2 NON-HAZ SOIL) (COSA)	EA	175			
	9014.3.4	SS		LANDFILL DISPOSAL (CLASS 2 NON-HAZ SOIL) (COSA)	EA	175			
	9014.6.1	SS		PREPARATION AND IMPLEMENTATION OF A SITE SPECIFIC HEALTH AND SAFETY PLAN	LS	1			
	9015	SS		VERTICAL CIRCULATOR	LS	1	$ 250,000.00	$ 250,000.00	
	9016.1	SS		CONCRETE STRUCTURE (STORM WATER PLANTER - 5'-6' WIDE)	LF	1870			
	9016.2	SS		CONCRETE STRUCTURE (STORM WATER PLANTER - 6'-7' WIDE)	LF	490			

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	9016.3	SS		CONCRETE STRUCTURE (STORM WATER PLANTER - 7'-8' WIDE)	LF	0			
	9016.4	SS		CONCRETE STRUCTURE (STORM WATER PLANTER - 8'-15' WIDE)	LF	670			
	9018.1	SS		ORNAMENTAL FENCE	LF	367			
	9018.2	SS		ORNAMENTAL GATE	EA	1			
	9019.1	SS		PEDESTRIAN ENHANCEMENTS ON COMMERCE ST	LS	1	$ 600,000.00	$ 600,000.00	
	9020	SS		STREET LIGHT FOUNDATION	EA	79			
	814	SAWS		8" DI PIPE	LF	449			
	814	SAWS		30" DI PIPE	LF	449			
	TxDOT ITEMS								
	104 2009			REMOVING CONC (RIPRAP)	SY	2226			
	104 2011			REMOVING CONC (MEDIANS)	SY	165			
	104 2015			REMOVING CONC (SIDEWALKS)	SY	6374			
	104 2021			REMOVING CONC (CURB)	LF	7652			
	110 2001			EXCAVATION (ROADWAY)	CY	64583			
	132 2002			EMBANKMENT (FINAL)(DENS CONT)(TY A)	CY	9990			
	132 2003			EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	300			
	160 2003			FURNISHING AND PLACING TOPSOIL (4")	SY	28862			
	247 2041			FL BS (CMP IN PLC)(TY A GR 1)(FNAL POS)	CY	1572			
	340 2011			D-GR HMA(METH) TY-B PG64-22	TON	616			
	340 2014			D-GR HMA(METH) TY-B PG70-22	TON	12053			
	340 2050			D-GR HMA(METH) TY-C PG70-22	TON	5750			
	342 2002			PFC (ASPHALT) PG76-22	TON	506			
	360 2002			CONC PVMT (CONT REINF - CRCP) (9")	SY	563			
	400 2008			CUT & RESTORING PAV (ASPH)	SY	1370			
	403 2001			TEMPORARY SPL SHORING	SF	12,311			
	416 2001			DRILL SHAFT (18 IN)	LF	40			
	416 2003			DRILL SHAFT (30 IN)	LF	168			
	416 2004			DRILL SHAFT (36 IN)	LF	7,959			
	416 2006			DRILL SHAFT (48 IN)	LF	728			
	416 2016			DRILL SHAFT (SIGN MTS)(12 IN)	LF	21			
	416 2029			DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	32			
	420 2003			CL C CONC (ABUT)	CY	52.7			

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	420 2004			CL C CONC (BENT)	CY	182			
	420 2006			CL C CONC (RAIL FOUNDATION)	CY	15			
	420 2013			CL C CONC (MISC)	CY	27.88			
	420 2017			CL C CONC (BENT)(MASS PLACEMENT)	CY	298.3			
	420 2018			CL C CONC (FOOTING)(MASS PLACEMENT)	CY	124.6			
	420 2029			CL S CONC (SLAB)	CY	43.5			
	420 2031			CL S CONC (SHEAR KEY)	CY	14			
	420 2033			CL S CONC (APPR SLAB)	CY	41.7			
	422 2001			REINF CONC SLAB	SF	23,914			
	423 2001			RETAINING WALL (MSE)	SF	10,791			
	423 2012			RETAINING WALL (CAST-IN-PLACE)	SF	503			
	423 2013			RETAINING WALL (TIEBACK)	SF	13,930			
	423 2026			RETAINING WALL (CANT DRILL SHAFT)(FACIA)	SF	620			
	425 2006			PRESTR CONC BOX BEAM (4B20)	LF	318			
	425 2040			PRESTR CONC BOX BEAM (5B20)(SPL)	LF	79.5			
	425 2053			PRESTR CONC BOX BEAM (5B20)(MOD)	LF	159			
	425 2068			PRESTR CONC GIRDER (TX54)	LF	3,282.90			
	428 2001			CONC SURF TREAT (CLASS I)	SY	3,142			
	432 2001			RIPRAP (CONC)(4 IN)	CY	195			
	432 2002			RIPRAP (CONC)(5 IN)	CY	8.6			
	432 2039			RIPRAP (MOW STRIP)(4 IN)	CY	22			
	432 2048			RIPRAP (CONC)(FLUME)	CY	44			
	432 2084			RIPRAP (CONC) (CL B) (4")	CY	7.6			
	442 2005			STR STL (MISCELLANEOUS)	LB	1045			
	442 2048			STRUCTURAL STEEL (MISC NON-BRIDGE)	LB	826			
	450 2077			RAIL (PEDESTRIAN RAIL) (TY PR6)	LF	213			
	450 2079			RAIL (TY 3-HD) (SPL)	LF	162			
	450 2121			RAIL (PEDESTRIAN RAIL) (TY PR3)	LF	244.1			
	450 2210			RAIL (TY T551) (MOD)	LF	3000			
	452 2010			REMOV RAIL (PEDESTRIAN)	LF	255			
	454 2001			SEALED EXPANSION JOINT (4 IN)(SEJ-A)	LF	159			
	460 2004			CMP (GAL STL 18 IN)	LF	32			
	460 2004			CMP (GAL STL 24 IN)	LF	11			
	464 2005			RC PIPE (CL III)(24 IN)	LF	876			

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	464 2010			RC PIPE (CL III)(42 IN)	LF	55			
	465 2032			INLET (COMPL) (CURB) (TY 1) (10' X 3')	LF	1			
	465 2092			MANH (COMPL)(TY 1)	EA	6			
	465 2188			INLET (COMPL)(DROP)(TY Y-1)	EA	6			
	465 2478			INLET (COMPL)(TY RWIR)	EA	1			
	465 XXXX			INLET (COMPL)(TY M)	EA	1			
	471 2003			GRATE & FRAME	EA	4			
	481 2013			PVC (6" DIA)	LF	123			
	481 2013			PVC (8" DIA)	LF	241			
	481 2013			PVC (12" DIA)	LF	110			
	495 2001			RAISE EXIST STR	EA	1			
	496 2011			REMOV STR (BRIDGE 500-999 FT LENGTH)	EA	1			
	496 2067			REMOV STR (LRG PED BRIDGE) (0-50 FT LENGTH)	EA	1			
	502 2001A			BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	18			
	508 2002			CONSTRUCTING DETOURS	SY	1908			
	512 2004			PORT CTB (FUR & INST) (SNGL SLP) (TY 1)	LF	1248			
	512 2005			PORT CTB (FUR & INST)(SNGL SLP)(TY 2)	LF	1960			
	512 2008			PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	2680			
	512 2009			PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	180			
	512 2023			PORT CTB (MOVE)(SNGL SLP) (TY 2)	LF	480			
	512 2026			PORT CTB (MOVE)(LOW PROF)(TY 1)	LF	760			
	512 2027			PORT CTB (MOVE)(LOW PROF)(TY 2)	LF	200			
	512 2035			PORT CTB (STKPL)(LOW PROF)(TY 1)	LF	240			
	512 2040			PORT CTB (REMOVE) (SNGL SLP) (TY 1)	LF	1248			
	512 2041			PORT CTB (REMOVE)(SNGL SLP) (TY 2)	LF	1960			
	512 2044			PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF	2680			
	512 2045			PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF	180			
	512 2052			PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	1322			
	514 2015			PERM CONC TRF BARR (F-SHAPE)(TY 1)	LF	443			
	514 2016			PERM CONC TRF BARR (F-SHAPE)(TY 2)	LF	30			
	540 2001			MTL W-BEAM GD FEN (TIM POST)	LF	873			
	540 2005			TERMINAL ANCHOR SECTION	EA	2			
	540 2044			DOWNSTREAM ANCHOR TERMINAL (DAT) SECTION	EA	2			
	542 2001			REMOVING METAL BEAM GUARD FENCE	LF	1660			

PROJECT NAME: MARKET STREET REALIGNMENT
PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	542 2002			REMOVING TERMINAL ANCHOR SECTION	EA	1			
	545 2001			CRASH CUSH ATTEN (INSTL)	EA	2			
	545 2002			CRASH CUSH ATTEN (MOVE & RESET)	EA	1			
	545 2003			CRASH CUSH ATTEN (REMOVE)	EA	2			
	545 2049			CRASH CUSH ATTEN (INSTL) (WORK ZONE)	EA	2			
	545 2051			CRASH CUSH ATTEN (REMOVE) (WORK ZONE)	EA	2			
	610 2064			RELOCATE RD IL ASM (TRANS-BASE)	EA	2			
	610 2072			REMOVE RDWY ILL ASSEM	EA	30			
	610 XXXX			INS RD IL AM (TY SA) 40S - 6 (.25 KW) S	EA	8			
	610 XXXX			INS RD IL AM (TY SA) 40T - 6 (.25 KW) S	EA	3			
	617 2003			TEMP RD IL (TIMBER POLES W/ARMS)	EA	4			
	618 2018			CONDT (PVC) (SCHD 40) (2")	LF	14459			
	618 2035			CONDT (PVC) (SCHD 80) (2") (BORE)	LF	616			
	620 2003			ELEC CONDR (NO. 2) BARE	LF	450			
	620 2004			ELEC CONDR (NO. 2) INSULATED	LF	900			
	620 2009			ELEC CONDR (NO. 6) BARE	LF	1830			
	620 2010			ELEC CONDR (NO. 6) INSULATED	LF	3660			
	620 2011			ELEC CONDR (NO. 8) BARE	LF	13887			
	620 2012			ELEC CONDR (NO. 8) INSULATED	LF	27774			
	624 2007			GROUND BOX TY A (122311)	EA	40			
	624 2008			GROUND BOX TY A (122311) W / APRON	EA	37			
	628 2101			ELC SRV TY D 120 / 240 070 (NS) SS (E) SP (U)	EA	4			
	636 2001			ALUMINUM SIGNS (TY A)	SF	70			
	636 2002			ALUMINUM SIGNS (TY G)	SF	6			
	636 2003			ALUMINUM SIGNS (TY O)	SF	673			
	644 2022			INS SM RD SN SUP&AM TY S80(1) SA(P)	EA	26			
	644 2025			INS SM RD SN SUP&AM TY S80(1) SA(T)	EA	4			
	644 2027			INS SM RD SN SUP&AM TY S80(1) SA(U)	EA	2			
	644 2056			RELOCATE SM RD SN SUP & AM TY 10BWG	EA	3			
	644 2058			RELOCATE SM RD SN SUP & AM TY S80	EA	5			
	644 2060			REMOVE SM RD SN SUP & AM	EA	41			
	647 2001			INSTALL LRSS (STRUCT STEEL)	LB	516			
	647 2002			RELOCATE LRSA	EA	3			
	650 2053			INS OH SN SUP (50 FT BRDG)	EA	2			

PROJECT NAME: MARKET STREET REALIGNMENT
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ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	658 2315			INSTL OM ASSM (OM-2Y)(WC) GND	EA	2			
	662 2001			WK ZN PAV MRK NON-REMOV (W) 4" (BRK)	LF	1540			
	662 2002			WK ZN PAV MRK NON-REMOV (W) 4" (DOT)	LF	64			
	662 2004			WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	LF	6825			
	662 2012			WK ZN PAV MRK NON-REMOV (W) 8" (SLD)	LF	3604			
	662 2016			WK ZN PAV MRK NON-REMOV (W) 24" (SLD)	LF	1573			
	662 2017			WK ZN PAV MRK NON-REMOV (W) (ARROW)	EA	31			
	662 2018			WK ZN PAV MRK NON-REMOV (W) (DBL ARROW)	EA	2			
	662 2026			WK ZN PAV MRK NON-REMOV(W)(UTURN ARROW)	EA	2			
	662 2027			WK ZN PAV MRK NON-REMOV (W) (WORD)	EA	20			
	662 2028			WK ZN PAV MRK NON-REMOV (W)18"(YLD TRI)	EA	25			
	662 2030			WK ZN PAV MRK NON-REMOV (Y) 4" (BRK)	LF	60			
	662 2032			WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	6768			
	662 2039			WK ZN PAV MRK NON-REMOV (Y) 24" (SLD)	LF	62			
	662 2064			WK ZN PAV MRK REMOV (W) 4" (BRK)	LF	910			
	662 2067			WK ZN PAV MRK REMOV (W) 4" (SLD)	LF	11926			
	662 2073			WK ZN PAV MRK REMOV (W) 8" (DOT)	LF	24			
	662 2075			WK ZN PAV MRK REMOV (W) 8" (SLD)	LF	5202			
	662 2079			WK ZN PAV MRK REMOV (W) 24" (SLD)	LF	226			
	662 2084			WK ZN PAV MRK REMOV (W) (ARROW)	EA	15			
	662 2085			WK ZN PAV MRK REMOV (W) (DBL ARROW)	EA	8			
	662 2093			WK ZN PAV MRK REMOV (W) (UTURN ARROW)	EA	4			
	662 2094			WK ZN PAV MRK REMOV (W) (WORD)	EA	19			
	662 2095			WK ZN PAV MRK REMOV (W) 18" (YLD TRI)	EA	7			
	662 2099			WK ZN PAV MRK REMOV (Y) 4" (SLD)	LF	6011			
	662 2103			WK ZN PAV MRK REMOV (Y) 8" (SLD)	LF	182			
	662 2113			WK ZN PAV MRK SHT TERM (TAB) TY W	EA	1218			
	662 2115			WK ZN PAV MRK SHT TERM (TAB) TY Y-2	EA	458			
	666 2003			REFL PAV MRK TY I (W) 4" (BRK)(100MIL)	LF	190			
	666 2012			REFL PAV MRK TY I (W) 4" (SLD)(100MIL)	LF	4287			
	666 2036			REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	1333			
	666 2048			REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	489			
	666 2054			REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	10			
	666 2069			REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	2			

PROJECT NAME: MARKET STREET REALIGNMENT
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ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	666 2093			REFL PAV MRK TY I(W)(UTURN ARW)(100MIL)	EA	2			
	666 2096			REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	10			
	666 2099			REF PAV MRK TY I(W)18"(YLD TRI)(100MIL)	EA	25			
	666 2111			REFL PAV MRK TY I (Y) 4" (SLD)(100MIL)	LF	3512			
	666 2141			REFL PAV MRK TY I (Y)(MED NOSE)(100MIL)	EA	1			
	666 2189			PAVEMENT SEALER 4"	LF	7799			
	666 2191			PAVEMENT SEALER 8"	LF	1333			
	666 2195			PAVEMENT SEALER 24"	LF	489			
	666 2219			PAVEMENT SEALER (ARROW)	EA	10			
	666 2220			PAVEMENT SEALER (WORD)	EA	10			
	666 2221			PAVEMENT SEALER (MED NOSE)	EA	1			
	666 2224			PAVEMENT SEALER (DBL ARROW)	EA	2			
	666 2230			PAVEMENT SEALER UTURN ARROW	EA	2			
	666 2257			PAVEMENT SEALER (YLD TRI)	EA	25			
	672 2017			REFL PAV MRKR TY II-C-R	EA	127			
	677 2001			ELIM EXT PAV MRK & MRKS (4")	LF	3006			
	677 2003			ELIM EXT PAV MRK & MRKS (8")	LF	1158			
	677 2005			ELIM EXT PAV MRK & MRKS (12")	LF	450			
	677 2020			ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	7			
	690 2024			REMOVAL OF SIGNAL HEAD ASSM	EA	1			
	690 2026			INSTALL OF SIGNAL HEAD ASSM	EA	1			
	690 2051			REMOVAL OF SIGNAL POLE ASSM	EA	1			
	6834 2002			PORTABLE CHANGEABLE MESSAGE SIGN	EA	4			
							Total Bid Amount:		

PROJECT NAME: MARKET STREET REALIGNMENT
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ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
BID ALTERNATE 1: DIVERSION OF TRAFFIC									
	203.1			TACK COAT	GAL	1076.3			
	205.3			HMA PAVEMENT, TYPE C (2" COMP. DEPTH)	SY	10763			
	208.1			SALV, HAUL & STKPL RCL APH PV (2")	SY	10763			
	535			24 INCH WIDE YELLOW LINE	LF	252			
	535.1			4 INCH WIDE YELLOW LINE	LF	260			
	535.11			COM THRU/LEFT WHITE ARROW	EA	6			
	535.12			WORD "ONLY"	EA	5			
	535.2			4 INCH WIDE WHITE LINE	LF	790			
	535.4			8 INCH WIDE WHITE LINE	LF	1433			
	535.5			12 INCH WIDE WHITE LINE	LF	1669			
	535.7			24 INCH WIDE WHITE LINE	LF	756			
	535.8			RIGHT WHITE ARROW	EA	5			
	535.9			LEFT WHITE ARROW	EA	14			
	537.6			TRAFFIC BUTTON TYPE I-C	EA	19			
	537.8			TRAFFIC BUTTON TYPE II-A-A	EA	14			
	537.9			TRAFFIC BUTTON TYPE II-C-R	EA	116			
	305 2002			SALV, HAUL & STKPL RCL APH PV (0 TO 2")	SY	3336			
	340 2050			D-GR HMA(METH) TY-C PG70-22	TON	367			
	502 2001			BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11			
	662 2064			WK ZN PAV MRK REMOV (W) 4" (BRK)	LF	315			
	662 2065			WK ZN PAV MRK REMOV (W) 4" (DOT)	LF	344			
	662 2067			WK ZN PAV MRK REMOV (W) 4" (SLD)	LF	916			
	662 2075			WK ZN PAV MRK REMOV (W) 8" (SLD)	LF	1967			
	662 2084			WK ZN PAV MRK REMOV (W) (ARROW)	EA	251			
	662 2085			WK ZN PAV MRK REMOV (W) (DBL ARROW)	EA	7			
	662 2094			WK ZN PAV MRK REMOV (W) (WORD)	EA	15			
	662 2113			WK ZN PAV MRK SHT TERM (TAB) TY W	EA	185			
	662 2115			WK ZN PAV MRK SHT TERM (TAB) TY Y-2	EA	32			
	666 2003			REFL PAV MRK TY I (W) 4" (BRK)(100MIL)	LF	160			
	666 2036			REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	30			
	666 2048			REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	357			
	666 2111			REFL PAV MRK TY I (Y) 4" (SLD)(100MIL)	LF	812			
	666 2132			REFL PAV MRK TY I (Y) 24"(SLD)(100MIL)	LF	155			

CITY OF SAN ANTONIO

025 UNIT PRICING FORM - ADDENDUM 3

PROJECT NAME: MARKET STREET REALIGNMENT

PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	666 2141			REFL PAV MRK TY I (Y)(MED NOSE)(100MIL)	EA	2			
	666 2189			PAVEMENT SEALER 4"	LF	972			
	666 2191			PAVEMENT SEALER 8"	LF	30			
	666 2195			PAVEMENT SEALER 24"	LF	512			
	666 2221			PAVEMENT SEALER (MED NOSE)	EA	2			
	672 2012			REFL PAV MRKR TY I-C	EA	18			
	672 2015			REFL PAV MRKR TY II-A-A	EA	120			
	672 2017			REFL PAV MRKR TY II-C-R	EA	3			
	677 2008			ELIM EXT PAV MRK & MRKS (ARROW)	EA	2			
	690 2024			REMOVAL OF SIGNAL HEAD ASSM	EA	19			
	690 2026			INSTALL OF SIGNAL HEAD ASSM	EA	19			
							Total Bid Amount for Alternate TCP:		
	9017.1			TRAFFIC CONTROL CREDIT DUE TO THE TEMPORARY CLOSURE OF MARKET STREET	LS	1			
							Total Bid Amount for Bid Alternate 1:		

Description Codes: SS=Special Specification; COSA=City of San Antonio Specification Item; SAWS=San Antonio Water System Specification Item

PROJECT NAME: MARKET STREET REALIGNMENT
PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
BID ALTERNATE 2: RETAINING WALL 7 AREA IMPROVEMENTS									
	432 2001			RIPRAP (CONC)(4 IN)	CY	46			
	0416 2004			DRILL SHAFT (36 IN)	LF	138			
	0416 2006			DRILL SHAFT (48 IN)	LF	1166			
	0423 2026			RETAINING WALL (CANT DRILL SHAFT)(FACIA)	SF	2960			
	9006.6	SS		CONTROL WIRE (2-WIRE):	LF	240			
	9006.8	SS		IRRIGATION SLEEVES (LATERALS):	LF	15			
	9006.10	SS		IRRIGATION PRESSURE MAINLINE (2-1/2" SIZE):	LF	240			
	9006.14	SS		IRRIGATION QUICK COUPLING VALVE (1" SIZE):	EA	2			
	9006.16	SS		SUBSURFACE DRIP IRRIGATION:	SF	6659			
	9006.18	SS		DRIP REMOTE CONTROL VALVE:	EA	5			
	9007.4-7	SS		SHRUBS AND GROUNDCOVER	SF	6659			
	9007.8a	SS		SOIL PREP + AMENDMENTS (SHRUB/GROUNDCOVER), 12-18" DEEP	SF	6659			
	9007.9	SS		PLANTING AREA SHEET MULCH	SF	6659			
						Total Bid Amount for Bid Alternate 2:			

City of San Antonio Statement:

_____certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____Acknowleged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

PROJECT NAME: MARKET STREET REALIGNMENT
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ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
SAN ANTONIO WATER SYSTEM - WATER									
	100			MOBILIZATION	LS	1			
	101			PREPARATION OF RIGHT OF WAY	LS	1			
	413			FLOWABLE FILL	CY	87.78			
	550			TRENCH EXCAVATION	LF	1808			
	814			12" DI PIPE	LF	204			
	814			24" DI PIPE	LF	1606			
	814			20" DI PIPE	LF	45			
	814			6" DI PIPE	LF	45			
	814			8" DI PIPE	LF	40			
	824			LONG SERVICE	EA	1			
	824			SHORT SERVICE	EA	1			
	828			8" GATE VALVE	EA	2			
	828			12" GATE VALVES	EA	3			
	828			6" GATE VALVE	EA	1			
	828			20" BUTTERFLY VALVE	EA	1			
	830			24" BUTTERFLY VALVE	EA	5			
	831			24" X 24" TEE CUT-IN	EA	2			
	834			FIRE HYDRANT	EA	3			
	836			FITTINGS	TON	12.1			
	840			12" WATER TIE-INS	EA	2			
	840			24" WATER TIE-INS	EA	4			
	841			HYDROSTATIC TESTING	EA	3			
	844			2" TEMPORARY BLOW OFF	EA	1			
	844			4" TEMPORARY BLOW OFF	EA	2			
	846			2" AIR RELEASE VALVE	EA	1			
	856			24" STEEL CASING	LF	20			
	856			42" STEEL CASING	LF	45			
	858			CONCRETE ENCASEMENT	CY	5.8			
	3000			DISPOSAL OF AC PIPE	LF	50			
						Total Water Bid Amount:			

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PROJECT NAME: MARKET STREET REALIGNMENT
PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
SAN ANTONIO WATER SYSTEM - SEWER									
	100			MOBILIZATION	LS	1			
	101			PREPARATION OF RIGHT OF WAY	LS	1			
	550			TRENCH EXCAVATION SAFETY PROTECTION	LF	129			
	858			CONCRETE ENCASEMENT	CY	15.4			
	862			SEWER LINE ABANDONMENT	LF	167			
						Total Sewer Bid Amount:			
SAN ANTONIO WATER SYSTEM - RECYCLED WATER (RW)									
	100			MOBILIZATION	LS	1			
	101			PREPARING RIGHT OF WAY	LS	1			
	511.2	COSA		ASPHALT PAVEMENT REPLACEMENT, 11" CTB	SY	5			
	550			TRENCH EXCAVATION SAFETY PROTECTION	LF	258			
	818			12" PVC RECYCLED WATER MAIN	LF	258			
	836			PIPE FITTINGS	TON	0.5			
	840			TIE-IN 12"	EA	2			
	841			HYDROSTATIC TEST	EA	1			
	844			2" TEMPORARY BLOW-OFF	EA	1			
	862			ABANDONMENT OF RECYCLED WATER MAIN	LF	342			
							Total RW Bid Amount:		

PROJECT NAME: MARKET STREET REALIGNMENT
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ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
SAN ANTONIO WATER SYSTEM - CHILLED WATER (CW)									
	LINE "A" & "C": MARKET ST. CHILLED WATER								
	1			20" CHW STEEL PIPE (OPEN CUT)	LF	72			
	2			20" CHW PIPE INSULATION	LF	72			
	3			20" GATE VALVE	EA	2			
	4			20" BUTTERFLY VALVE	EA	2			
	5			30" CHW STEEL PIPE (OPEN CUT)	LF	2484			
	6			30" CHW PIPE PRE-INSULATION	LF	2484			
	7			30" BUTTERFLY VALVE	EA	4			
	8			TRENCH EXCAVATION SAFETY PROTECTION	LF	1242			
	9			TRENCHING, BACKFILLING & COMPACTION	LF	1242			
	10			CONCRETE ANCHOR	EA	4			
	11			30" PIPE STOP (INCLUDE HOT TAPPING)	EA	4			
	12			TIE-IN 30"	EA	4			
	13			2" AIR RELEASE ASSEMBLIES	EA	8			
	14			4" TEMPORARY BLOW-OFF	EA	4			
	15			HYDROSTATIC TEST	EA	2			
	16			CATHODIC PROTECTION	LF	2484			
	17			REINFORCED CONCRETE VAULT	EA	1			
	18			ABANDONMENT OF CHILLED WATER MAIN	LF	1017			
	858			CONCRETE ENCASEMENT	CY	12			
						Line "A" & "C" Subtotal:			
	LINE "B": WFR/CHERRY STREET PLANT CHILLED WATER								
	40			20" CHW STEEL PIPE (OPEN CUT)	LF	3264			
	41			20" CHW PIPE PRE-INSULATION	LF	3264			
	42			JACK & BORE 60" DIA	LF	203			
	43			STEEL CASING 60" DIA	LF	213			
	44			20" CHW STEEL CARRIER PIPE	LF	426			
	45			20" CHW CARRIER PIPE INSULATION	LF	426			
	46			20" GATE VALVE	EA	4			
	47			TRENCHING, BACKFILLING & COMPACTION	LF	1632			
	48			TRENCH EXCAVATION SAFETY PROTECTION	LF	1632			
	49			QUICK SETTING FLOWABLE FILL	CY	2000			

PROJECT NAME: MARKET STREET REALIGNMENT
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ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	50			24" X 20" HOT TAPPING	EA	2			
	51			30" X 20" HOT TAPPING	EA	2			
	52			2" AIR RELEASE ASSEMBLIES	EA	10			
	53			4" TEMPORARY BLOW-OFF	EA	2			
	54			HYDROSTATIC TEST	EA	2			
	55			CATHODIC PROTECTION	LF	3690			
	56			3" MILL & OVERLAY ASPHALT	SY	440			
	57			ASPHALT PAVEMENT REPLACEMENT	SY	235			
							Line "B" Subtotal:		
	LINE "D": MARKET STREET CHILLED WATER								
	3			20" GATE VALVE	EA	3			
	5.1			24" CHW STEEL PIPE (OPEN CUT)	LF	24			
	6.1			24" CHW PIPE PRE-INSULATION	LF	24			
	5.2			30" CHW STEEL PIPE (OPEN CUT)	LF	232			
	6.2			30" CHW PIPE PRE-INSULATION	LF	232			
	7			30" BUTTERFLY VALVE	EA	1			
	8			TRENCH EXCAVATION SAFETY PROTECTION	LF	232			
	9			TRENCHING, BACKFILLING, AND COMPACTION	LF	232			
	12.1			TIE-IN 24"	EA	1			
	12.2			TIE-IN 30"	EA	1			
	13			2" AIR RELEASE ASSEMBLIES	EA	1			
	14			4" TEMPORARY BLOW-OFF	EA	1			
	15			HYDROSTATIC TEST	EA	1			
	16			CATHODIC PROTECTION	LF	232			
	18			ABANDONMENT OF CHILLED WATER MAIN	LF	232			
	50			24" X 20" HOT TAPPING	EA	2			
	50.1			TEMPORARY 20" CHW JUMPER PIPE	LF	90			
							Line "D" Subtotal:		
						Line "A", "C", "B" and "D" Subtotal:			
	100			MOBILIZATION	LS	1			
	101			PREPARING RIGHT OF WAY	LS	1			
							Total CW Bid Amount:		

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PROJECT NAME: MARKET STREET REALIGNMENT
PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	ALTERNATE 1: INSULATION FOR LINE "A" & "C": MARKET ST. CHILLED WATER								
	100			MOBILIZATION	LS	1			
	101			PREPARING RIGHT OF WAY	LS	1			
	30			DEDUCT TRENCHING, BACKFILLING & COMPACTION	LF	1242			
	31			DEDUCT 20 CHW PIPE PRE-INSULATION	LF	72			
	32			DEDUCT 30" CHW PIPE PRE-INSULATION	LF	2484			
	33			DEDUCT CATHODIC PROTECTION	LF	2484			
	34			ADD GILSULATE 500XR INSULATION (MATERIAL ONLY)	CF	29601			
	35			ADD GILSULATE 500XR INSULATION (SHIPPING & HANDLING)	TRUCK	27.6			
	36			ADD GILSULATE 500XR INSULATION (INSTALLATION, COMPLETE)	CF	29601			
						Alt. 1 for Line "A" Bid Amount:			
	ALTERNATE 2: INSULATION FOR LINE "B": WFR/CHERRY STREET PLANT CHILLED WATER								
	100			MOBILIZATION	LS	1			
	101			PREPARING RIGHT OF WAY	LS	1			
	70			DEDUCT TRENCHING, BACKFILLING & COMPACTION	LF	1530			
	71			DEDUCT 20" CHW PIPE PRE-INSULATION	LF	3059.4			
	72			DEDUCT CATHODIC PROTECTION	LF	3059.4			
	73			ADD GILSULATE 500XR INSULATION (MATERIAL ONLY)	CF	20954			
	74			ADD GILSULATE 500XR INSULATION (SHIPPING & HANDLING)	TRUCK	19.4			
	75			ADD GILSULATE 500XR INSULATION (INSTALLATION, COMPLETE)	CF	20954			
						Alt. 2 for Line "B" Bid Amount:			
	ALTERNATE 3: INSULATION FOR LINE "D": MARKET STREET CHILLED WATER								
	100			MOBILIZATION	LS	1			
	101			PREPARING RIGHT OF WAY	LS	1			
	30			DEDUCT TRENCHING, BACKFILLING & COMPACTION	LF	232			
	31			DEDUCT 24" CHW PIPE PRE-INSULATION	LF	24			
	32			DEDUCT 30" CHW PIPE PRE-INSULATION	LF	232			
	33			DEDUCT CATHODIC PROTECTION	LF	232			

PROJECT NAME: MARKET STREET REALIGNMENT
PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
	34			ADD GILSULATE 500XR INSULATION (MATERIAL ONLY)	CF	2978			
	35			ADD GILSULATE 500XR INSULATION (SHIPPING & HANDLING)	TRUCK	2.7			
	36			ADD GILSULATE 500XR INSULATION (INSTALLATION, COMPLETE)	CF	2978			
						Alt. 3 for Line "D" Bid Amount:			

SAWS Statement:

_____certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____Acknowleged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

CITY OF SAN ANTONIO

025 UNIT PRICING FORM - ADDENDUM 3

PROJECT NAME: MARKET STREET REALIGNMENT

PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
AT&T - UNDERGROUND UTILITY									
	100.1	COSA		MOBILIZATION	LS	1			
	100.2	COSA		PREPARATION OF RIGHT OF WAY	LS	1			
	1			6-4" PVC CONCRETE ENCASED (TELE)	LF	1678			
	2			DIRECTIONAL BORE	LF	784			
	3			TRENCH PROTECTION	LF	874			
	4			MANHOLE 4'x8'x6'	EA	6			
	4			REMOVAL OF EXIST MANHOLE	EA	9			
	5			COPPER INSTALLATION	LF	2275			
	6			FIBER INSTALLATION	LF	2275			
							Total Bid Amount:		

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Signed: _____ Date: _____

PROJECT NAME: MARKET STREET REALIGNMENT
PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
CPS - UNDERGROUND ELECTRIC									
	100.1	COSA		MOBILIZATION	LS	1			
	100.2	COSA		PREPARATION OF RIGHT OF WAY	LS	1			
	1			CONDUIT CONCRETE ENCASED 12-4" PVC W/3-2" (SCH 40)	L.F.	2579			
	2			DIRECTIONAL BORE	L.F.	813			
	3			TRENCH EXCAVATION	L.F.	2085			
	4			MANHOLE 7'x7'x7' (ELEC)	L.F.	16			
							Total Bid Amount:		

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CITY OF SAN ANTONIO

025 UNIT PRICING FORM - ADDENDUM 3

PROJECT NAME: MARKET STREET REALIGNMENT

PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
TIME WARNER AND CITY IT CONDUITS									
	100.1	COSA		MOBILIZATION	LS	1			
	100.2	COSA		PREPARATION OF RIGHT OF WAY	LS	1			
	618.3	COSA		CONDUIT - PVC (SCH 40) INSTALL ONLY	LF	3680			
	618.3	COSA		CONDUIT - PVC (SCH 40) FURNISH AND INSTALL	LF	3680			
	852	SAWS		MANHOLE 4'x4' INSTALL ONLY	EA	2			
	852	SAWS		MANHOLE 4'x4' FURNISH AND INSTALL	EA	3			
	550.1	COSA		TRENCH EXCAVATION PROTECTION	LF	1840			
							Total Bid Amount:		

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Signed: _____ Date: _____

CITY OF SAN ANTONIO

025 UNIT PRICING FORM - ADDENDUM 3

PROJECT NAME: MARKET STREET REALIGNMENT

PROJECT NO. 40-00300

ALT. NO.	ITEM NO.	DESC. CODE	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
CPS - GAS									
	100.1	COSA		MOBILIZATION	LS	1			
	100.2	COSA		PREPARATION OF RIGHT OF WAY	LS	1			
	1			INSTALL GAS MAIN OR CASING (DISTANCE AS MEASURED ALONG THE TOP OF TRENCH)					
	1.1			6" PLASTIC PIPE AND TRACER WIRE	LF	145			
	1.2			8" PLASTIC PIPE AND TRACER WIRE	LF	172			
	1.3			12" STEEL PIPE	LF	470			
	2			CONCRETE/FLATWORK	SY	17			
	3			FLOWABLE FILL	CY	195			
	4			CUT AND RESTORE PAVEMENT (TO BE USED AS DIRECTED)	SY	56			
							Total Bid Amount:		

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Signed: _____ Date: _____

CITY OF SAN ANTONIO, TEXAS
MARKET STREET REALIGNMENT
GOVERNING SPECIFICATIONS

All standard City of San Antonio, Texas Department of Transportation, and San Antonio Water System specifications, special provisions and special specifications applicable to this project are identified as follows:

CITY OF SAN ANTONIO
STANDARD SPECIFICATIONS FOR CONSTRUCTION (JUNE 2008)

ITEM NO.	DESCRIPTION
100	MOBILIZATION
101	PREPARING RIGHT-OF-WAY
106	BOX CULVERT EXCAVATION AND BACKFILLING
202	PRIME COAT
203	TACK COAT
205	HOT MIX ASPHALTIC CONCRETE PAVEMENT
208	SALVAGING, HAULING & STOCKPILING RECLAIMABLE ASPHALTIC PAVEMENT
209	CONCRETE PAVEMENT
306	STRUCTURAL EXCAVATION
307	CONCRETE STRUCTURES
308	DRILLED SHAFTS AND UNDER-REAMED FOUNDATIONS
309	PRECAST REINFORCED CONCRETE BOX CULVERTS
401	REINFORCED CONCRETE PIPE
403	STORM SEWER JUNCTION BOXES AND INLETS
406	JACKING, BORING AND TUNNELING
407	CONCRETE ENCASEMENT, CRADLES, SADDLES, AND COLLARS
409	CAST IRON CASTINGS
410	SUBGRADE FILLER
413	FLOWABLE FILL
500	CONCRETE CURB, GUTTER, AND CONCRETE CURB AND GUTTER
502	CONCRETE SIDEWALKS AND DRIVEWAYS
503	ASPHALTIC CONCRETE, PORTLAND CEMENT CONCRETE, AND GRAVEL DRIVEWAYS
505	CONCRETE RIPRAP
506	CONCRETE RETAINING WALL – COMBINATION TYPE
507	CHAIN LINK WIRE FENCE
511	CUTTING AND REPLACING PAVEMENTS (TRENCH REPAIR)
520	HYDROMULCH
524	CONCRETE STEPS
526	FIELD OFFICE
531	SIGNS

ITEM NO.	DESCRIPTION
535	HOT APPLIED THERMOPLASTIC PAVEMENT MARKINGS
537	RAISED PAVEMENT MARKERS
540	TEMPORARY EROSION, SEDIMENTATION AND WATER POLLUTION PREVENTION & CONTROL
550	TRENCH EXCAVATION SAFETY PROTECTION
551	SPECIAL SHORING
600	TRAFFIC SIGNAL GENERAL CONDITIONS
615	TRAFFIC SIGNAL CONTROLLER CABINET
618	CONDUIT
620	ELECTRICAL CONDUCTORS
624	GROUND BOXES
628	ELECTRICAL SERVICES
633	BATTERY BACKUP SYSTEM FOR TRAFFIC SIGNAL
655	CONTROLLER FOUNDATION AND PEDESTAL POSTS
680	INSTALLATION OF HIGHWAY TRAFFIC SIGNALS
681	TEMPORARY TRAFFIC SIGNALS
682	VEHICLE AND PEDESTRIAN SIGNAL HEADS
683	LED COUNTDOWN PEDESTRIAN SIGNAL MODULE
684	TRAFFIC SIGNAL CABLES
686	TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)
687	PEDESTAL POLE ASSEMBLIES
688	PEDESTRIAN DETECTORS AND VEHICLE LOOP DETECTORS
693	INTERNALLY LIGHTED STREET NAME SIGN ASSEMBLIES
695	EMERGENCY VEHICLE TRAFFIC SIGNAL PRIORITY CONTROL SYSTEM
696	RADAR VEHICLE DETECTION DEVICES (RVDD)
700	SCHEDULE
1000	WEB PORTAL

CITY OF SAN ANTONIO SPECIAL PROVISIONS

ITEM NO.	DESCRIPTION
	SPECIAL PROVISION UPDATE MAY 2009
	SPECIAL PROVISION UPDATE FEBRUARY 2010
	SPECIAL PROVISION UPDATE JUNE 2010
	SPECIAL PROVISION UPDATE TO THE GENERAL CONDITIONS
526SPL	FIELD OFFICE
680SPL	INSTALLATION OF HIGHWAY TRAFFIC SIGNALS
9800	PROJECT SIGNS

CITY OF SAN ANTONIO SPECIAL SPECIFICATIONS

ITEM NO.	DESCRIPTION
535.XX	BIKE PAVEMENT MARKINGS
9000	PROJECT SIGNS
9001	GROUT COLUMNS
9002	TEMPORARY SUSPENSION OF WORK
9003	SITE FURNISHINGS
9004	LANDSCAPE CONCRETE COLOR AND FINISHES
9005	CRUSHED STONE, GRAVEL, AND COBBLES
9006	IRRIGATION
9007	PLANTING
9008	SUBSURFACE DRAINAGE FOR LANDSCAPE AREAS
9009	GEOGRID FOR BASE AND EMBANKMENT REINFORCEMENT
9010	VALMONT ILLUMINATION STREET LIGHT ASSEMBLY
9011	GREENSTAR LED LUMINAIRE, GALAXY XD – GLX30 & GLX48
9012	LANDSCAPE FORMS PEDESTRIAN LIGHT
9013	LANDSCAPE FORMS HAWTHORN BOLLARD LIGHT
9014	SPECIAL ENVIRONMENTAL SPECIFICATION FOR CLASS 2 NON-HAZARDOUS SOILS
9015	VERTICAL CIRCULATOR
9016	STORMWATER PLANTER
9017	TEMPORARY CLOSURE OF MARKET STREET
9018	ORNAMENTAL FENCE AND GATE
9019	PEDESTRIAN ENHANCEMENTS ON COMMERCE STREET
9020	STREET LIGHT FOUNDATION

TEXAS DEPARTMENT OF TRANSPORTATION
STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES 2004

ITEM NO.	DESCRIPTION
0104	REMOVING CONCRETE
0110	EXCAVATION (132)
0132	EMBANKMENT (100)(204)(210)(216)(400)
0160	TOPSOIL
0164	BROADCAST SEED (162)(166)(168)
0168	VEGETATIVE WATERING
0247	FLEXIBLE BASE (105)(204)(210)(216)(520)
0275	CEMENT TREATMENT (ROAD-MIXED) (132)(204)(210)(216)(247)(300)(310)(520)
0340	DENSE-GRADED HOT-MIX ASPHALT (METHOD) (210)(300)(301)(320)(520)(585)
0342	PERMEABLE FRICTION COURSE (PFC) (210)(300)(301)(320)(520)(585)
0400	EXCAVATION AND BACKFILL FOR STRUCTURES (132)(401)(420)(421)
0401	FLOWABLE BACKFILL
0403	TEMPORARY SPECIAL SHORING (423)
0416	DRILLED SHAFT FOUNDATIONS (420)(421)(440)(448)
0420	CONCRETE STRUCTURES (400)(404)(421)(426)(427)(438)(440)(448)
0422	REINFORCED CONCRETE SLAB (420)(421)(440)
0423	RETAINING WALLS (110)(132)(400)(420)(421)(424)(440)(445)(556)
0425	PRECAST PRESTRESSED CONCRETE STRUCTURAL MEMBERS (420)(421)(424)(426)(427)(434)(440)(442)
0428	CONCRETE SURFACE TREATMENT (427)
0432	RIPRAP (420)(421)(427)(440)
0442	METAL FOR STRUCTURES (441)(445)(446)(447)(448)(449)
0450	RAILING (420)(421)(424)(440)(441)(442)(445)(446)(448)
0452	REMOVE RAILING
0454	BRIDGE EXPANSION JOINTS (429)(442)
0460	CORRUGATED METAL PIPE (400)(445)
0464	REINFORCED CONCRETE PIPE (400)
0465	MANHOLES AND INLETS (400)(420)(421)(440)(471)
0471	FRAMES, GRATES, RINGS, AND COVERS (441)(445)(448)
0481	PVC PIPE FOR DRAINS (400)
0495	RAISING EXISTING STRUCTURES
0496	REMOVING STRUCTURES (430)
0502	BARRICADES, SIGNS, AND TRAFFIC HANDLING
0508	CONSTRUCTING DETOURS
0512	PORTABLE CONCRETE TRAFFIC BARRIER (420)(421)(424)(440)(442)
0514	PERMANENT CONCRETE TRAFFIC BARRIER (400)(416)(420)(421)(424)(440)(442)(448)
0540	METAL BEAM GUARD FENCE (421)(445)(529)(542)(544)
0542	REMOVING METAL BEAM GUARD FENCE
0545	CRUSH CUSHION ATTENUATORS (421)
0610	ROADWAY ILLUMINATION ASSEMBLIES (421)(441)(442)(445)(446)(449)(616)(620)
0617	TEMPORARY ROADWAY ILLUMINATION (416)(610)(613)(614)(618)(620)(621)(622)(624)(627)(628)

ITEM NO.	DESCRIPTION
0618	CONDUIT (400)(445)(476)(622)
0620	ELECTRICAL CONDUCTORS
0624	GROUND BOXES (421)(440)
0628	ELECTRICAL SERVICES (441)(445)(449)(618)(620)(627)(656)
0636	ALUMINUM SIGNS (643)
0644	SMALL ROADSIDE SIGN SUPPORTS AND ASSEMBLIES (421)(440)(441)(442)(445)(634)(636)(643)(656)
0647	LARGE ROADSIDE SIGN SUPPORTS AND ASSEMBLIES (421)(440)(441)(442)(445)(634)
0650	OVERHEAD SIGN SUPPORTS (416)(420)(421)(441)(442)(445)(449)(618)
0658	DELINEATOR AND OBJECT MARKER ASSEMBLIES (445)
0662	WORKZONE PAVEMENT MARKINGS (666)(668)(672)(677)
0666	REFLECTORIZED PAVEMENT MARKINGS (316)(318)(662)(677)(678)
0672	RAISED PAVEMENT MARKERS (677)(678)
0677	ELIMINATE EXISTING PAVEMENT MARKINGS AND MARKERS (300)(302)(316)
0690	MAINTENANCE OF TRAFFIC SIGNALS (416)(421)(476)(610)(618)(620)(622)(624)(625)(627)

TxDOT SPECIAL PROVISIONS

ITEM NO.	DESCRIPTION
132-007	EMBANKMENT
275-003	CEMENT TREATMENT (ROAD MIXED)
416-001	DRILLED SHAFT FOUNDATIONS
420-002	CONCRETE STRUCTURES
421-035	HYDRAULIC CEMENT CONCRETE
424-002	PRECAST CONCRETE STRUCTURES (FABRICATION)
425-001	PRECAST PRESTRESSED CONCRETE STRUCTURAL MEMBERS
448-002	STRUCTURAL FIELD WELDING
450-001	RAILING
502-033	BARRICADES, SIGNS, AND TRAFFIC HANDLING
512-002	PORTABLE CONCRETE TRAFFIC BARRIER
514-002	PERMANENT CONCRETE TRAFFIC BARRIER
540-031	METAL BEAM GUARD FENCE
556-003	PIPE UNDERDRAINS
610-005	ROADWAY ILLUMINATION ASSEMBLIES
617-003	TEMPORARY ROADWAY ILLUMINATION
620-001	ELECTRICAL CONDUCTORS
624-014	GROUND BOXES
628-003	ELECTRICAL SERVICES
636-014	ALUMINUM SIGNS
666-014	REFLECTORIZED PAVEMENT MARKINGS
672-034	RAISED PAVEMENT MARKERS
690-009	MAINTENANCE OF TRAFFIC SIGNALS
6834-001	PORTABLE CHANGEABLE MESSAGE SIGN

TxDOT SPECIAL SPECIFICATIONS

ITEM NO.	DESCRIPTION
4601	PRESTRESSED GROUND ANCHORS
8260	LED COUNTDOWN PEDESTRIAN SIGNAL MODULE
8615	RADAR ADVANCE DETECTION DEVICES
6007	REMOVING TRAFFIC SIGNALS
6834	PORTABLE CHANGEABLE MESSAGE SIGN

SAN ANTONIO WATER SYSTEM
SPECIFICATIONS FOR WATER AND SANITARY SEWER CONSTRUCTION
JUNE 2009

ITEM NO.	DESCRIPTION
100	MOBILIZATION
101	PREPARATION OF RIGHT-OF-WAY
550	TRENCH EXCAVATION SAFETY PROTECTION
804	EXCAVATION, TRENCHING AND BACKFILL
808	REINFORCED CONCRETE VAULTS
814	DUCTILE IRON PIPE
816	STEEL PIPE INSTALLATION
818	PVC (C-900) PIPE INSTALLATION
820	CONCRETE STEEL CYLINDER PIPE INSTALLATION
824	SERVICE SUPPLY LINES
828	GATE VALVES
830	BUTTERFLY VALVES
831	CUT-IN TEES
833	METER AND METER BOX INSTALLATION
834	FIRE HYDRANTS
836	GREY-IRON AND DUCTILE-IRON FITTINGS
839	ANCHORAGE AND THRUST BLOCKING
840	WATER TIE-INS
841	HYDROSTATIC TESTING OPERATIONS
844	BLOWOFF ASSEMBLIES
846	AIR RELEASE ASSEMBLIES
847	DISINFECTION
852	SANITARY SEWER MANHOLES
856	JACKING, BORING OR TUNNELING PIPE
858	CONCRETE ENCASEMENT, CRADLES, SADDLES AND COLLARS
862	ABANDONEMENT OF SEWER MAINS AND MANHOLES

SAWS SPECIAL SPECIFICATIONS

ITEM NO.	DESCRIPTION
3000	REMOVAL, TRANSPORT AND DISPOSAL OF AC PIPE

Chilled Water and Recycled Water

DIVISION 1 - GENERAL REQUIREMENTS

010010	SUMMARY OF WORK
010025	MEASUREMENT AND PAYMENT
010300	SUBMITTALS
010400	QUALITY CONTROL
010720	PROJECT RECORD DOCUMENTS

DIVISION 2 – EXISTING CONDITIONS (NOT USED)

ITEM NO.	DESCRIPTION

DIVISION 3 – CONCRETE

030600	GROUT

DIVISION 4 – MASONRY (NOT USED)

DIVISION 5 – METALS (NOT USED)

DIVISION 6 – WOOD, PLASTICS AND COMPOSITES (NOT USED)

DIVISION 7 – THERMAL AND MOISTURE PROTECTION (NOT USED)

DIVISION 8 – OPENINGS (NOT USED)

DIVISION 9 - FINISHES

090900	PAINTING

DIVISION 10 – SPECIALTIES (NOT USED)

DIVISION 11 – EQUIPMENT (NOT USED)

DIVISION 21 – FIRE SUPPRESSION (NOT USED)

DIVISION 22 – PLUMBING (NOT USED)

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING (NOT USED)

DIVISION 26 – ELECTRICAL

260110	CATHODIC PROTECTION

DIVISION 27 – COMMUNICATION (NOT USED)

DIVISION 28 – ELECTRIC SAFETY & SECURITY (NOT USED)

DIVISION 31 – EARTHWORK

(In Accordance with COSA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION AND SAWS SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION)

DIVISION 32 – EXTERIOR IMPROVEMENTS

(In Accordance with COSA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION AND SAWS SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION)

DIVISION 33 – UTILITIES

330500	COMMON WORK RESULTS
332600	RECYCLED WATER MAIN PIPE
332640	VALVES
336313	UNDERGROUND CHILLED WATER

CITY PUBLIC SERVICE
SPECIAL SPECIFICATIONS FOR CONSTRUCTION

ITEM NO.	DESCRIPTION
9200	CPS ENERGY ELECTRICAL CONDUIT SYSTEM
9201	CPS ENERGY NATURAL GAS DISTRIBUTION SYSTEM

AT&T
SPECIAL SPECIFICATIONS FOR CONSTRUCTION

ITEM NO.	DESCRIPTION
9100	AT&T TELECOMMUNICATION SYSTEM

LANDSCAPE SPECIFICATIONS 9003 – 9008 UPDATE DESCRIPTIONS

Item 9003:

1. For Section 1.1A, add reference to 9004B, Anti-graffiti coating

2. Under Section 2.1A, add "or approved equal" to manufacturer's list

3. Under bid items, change 9003.2 to:

"9003.2a Pre-cast concrete benches, 6' long

9003.2b Pre-cast concrete benches, 4' long"

Item 9004:

1. Change to Item 9004 A

2. Delete Sections 2.9 and 3.6 regarding anti-graffiti coating (replaced by Item 9004B).

3. Edit paragraph 2.3B, 6:
"Special Concrete Paving #5
   a. Finish: Medium Broom
   b. Dust-on Color: Caution Yellow #1005"

Add Item 9004B, Anti-graffiti coatings.

Item 9006:

1. Add paragraph to Section 1.8:

"B. All irrigation system work shall be performed under the supervision of a person possessing an irrigator's license issued by the Texas Commission on Environmental Quality (TCEQ). Contractor shall provide documentation of this license."

2. Insert Section 2.4:

"RECLAIMEDWATER EQUIPMENT IDENTIFICATION

A. All reclaimed water pipes, including pressure mainline pipe and non-pressure lateral pipe, valve boxes and appurtenances shall be identified to clearly distinguish between reclaimed water the potable water systems. Specific wording on identification tape, tags, etc. shall be as per the Texas Commission on Environmental Quality (TCEQ) and the San Antonio Water Systems (SAWS).

B. Refer to the San Antonio Water System Recycled Water User's Handbook for additional requirements.

C. Purple PVC Pipe for Reclaimed Water Pipelines:
   1. General: PVC pipe used for reclaimed water shall conform to the requirements within such specifications and shall be colored purple.

2. PVC Pipe Coloring and Markings: PVC Pipe shall be purple, and shall be marked on both sides of the pipe with the wording (English and Spanish): "RECLAIMED WATER – DO NOT DRINK" and "AGUA DE RECUPERACIÓN – NO BEBER". Lettering shall be a minimum of ½-inch high black letters, and shall be repeacted every 12-inchs. The purple color shall be achieved by adding pigment to the PVC material as the pipe is being manufactured.

D. Identification Tags:
1. Shall be manufactured from polyurethane Behr Desopan, incorporating an integral attachment neck and reinforced attachment hole and will be capable of withstanding 180 lbs. pull out resistance.
2. The Identification Tag shall be approximately 3" x 4" in size and .0625" thick. All lettering is capable of withstanding outdoor usage. The standard alpha-numeric designations shall incorporate alpha-numeric lettering 1.125" in height. Special lettering, designations or stampings will be the maximum size available & either hot stamped or laser printed based on the manufacturers judgment. The tag color will purple.
3. The marking tag will be double side stamped with "RECLAIMED WATER – DO NOT DRINK" on one side and "AGUA DE RECUPERACIÓN – NO BEBER" on the other.

E. Detectable Warning Tape:
1. Non-Detectable marking tape consists of a minimum 4.0 mil (0.004") thickness, linear low-density polyethylene, specifically formulated for extended use underground.
2. The legend/message continually repeats a minimum of every three feet.
3. The tape tensile strength shall be in accordance with ASTM D882 and not be less than 4100 MD (longitudinal direction) and 3650 TD (transversal direction).
4. Elongation properties are in accordance with ASTM D882 and will be greater than 550% + at the break point.
5. Tape flexibility is in accordance with ASTM D671 and remains pliable.
6. Tape composition shall be of virgin LLDPE/LDPE.
7. The color shall be purple.
8. Tape width is 3".
9. Tape shall include the following message: "RECLAIMED WATER – DO NOT DRINK" and "AGUA DE RECUPERACIÓN – NO BEBER".

F. Pipe (Above Ground)/ Controller/ Pump/ Landscape Injector Marking Decal:
1. Manufactured from a 3.5 mil flexible vinyl base with a permanent acrylic adhesive backing on a 90# stayflat liner.
2. Both the background and legend shall be printed with a UV cured vinyl ink.
3. The entire decal shall be clear flood over-printed for superior weathering and UV protection.
4. The decal shall be purple in color.
5. The decal shall include the following message: "RECLAIMED WATER – DO NOT DRINK" and "AGUA DE RECUPERACIÓN – NO BEBER".

G. Backflow and Riser Marking:

1. The marker shall be vinyl based with a top scratch resistant mylar coating.
2. The marker shall be purple in color with jet black printing.
3. The adhesive shall be all-weather in nature.
4. The marker shall be approximately 21/2" x 3".
5. The marker shall include the following message: "RECLAIMED WATER – DO NOT DRINK" and "AGUA DE RECUPERACIÓN – NO BEBER".

H. Approved Manufacturer:
1. T. Christy Enterprises, Inc., 655 E. Ball Rd., Anaheim, CA 92085, 1-714-597-3300 or equal."

3. Insert Section 2.8,C:

"All PVC reclaimed water pipe shall be a solid purple color only."

4. Insert Sections 3.6 and 3.7:

"3.6 INSTALLATION OF PIPE WARNING TAPE

A. Warning Tape: Warning tape shall be installed directly on the top of the pipe longitudinally and shall be centered. The warning tape shall be installed continuously for the entire length of the pipe and shall be fastened to each pipe length by plastic adhesive tape banded around the pipe and warning tape at no more than 5-foot intervals. Taping attached to the sections of pipe before laying in the trench shall have 5-foot minimum overlap for continuous coverage. All risers between the main line and control valves shall be installed with warning tape. The warning tape shall extend up into the valve boxes or other appurtenances a minimum of 12-inches, so that it can be read clearly by opening the box or enclosure.

3.7 INSTALLATION OF WARNING LABELS AND SIGNS AND TAGS

A. Method of Attachment: Warning labels shall be firmly attached using heavy-duty nylon fasteners, and shall be sized and installed at locations as shown on the plans.

B. Equipment Requiring Labels or Tags: Warning labels shall be installed on all appurtenances in valve boxes, such as, but not limited to, meters, remote control valves, and on designated facilities, such as, but not limited to, controller panels, and booster pumps.

C. Identification tags shall be securely attached using UV rated zip ties rated to hold 50 pounds."

Item 9007:

1. Add paragraph to Section 1.5:

"D. Substitutions: For plants other than trees, the contractor shall contract with a nursery or nurseries to grow any plants, for which the contractor cannot provide a guarantee of availability at the start of planting. Within 21 days of start of construction, if any specified plants or products are not obtainable, or cannot be grown/manufactured by contract, the contractor shall submit to Landscape Architect proof of non-availability and proposal for use of equivalent."

2. Insert Paragraph 2.7, A, 2:

"For trees in tree wells with crushed stone/decomposed granite mulch, provide tree guard (see Item 9003) and stabilize tree with rubber strap attached to tree guard."

Item 9008:

1. Replace paragraph Section 4.1 follows:

"MEASUREMENT

I. Subsurface drainage shall be measured as follows:
1. Pipe shall be measured by the linear foot, to the nearest foot.
2. Cleanouts shall be measured by the each
Only the subsurface drain lines and cleanouts located as shown on the plans or approved by the Engineer will be measured for payment. "

3. Replace paragraph Section 4.2 follows:

"PAYMENT

J. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid as described below:
1. Provision and installation of perforated drain pipe at stormwater planters and tree wells, including trenching, drain rock and filter fabric, and connections to the storm drain
2. Provision and installation solid drain pipe at tree wells, including trenching, drain rock, and filter fabric, and connections to the storm drain.
3. Provision and installation of cleanouts for underdrain lines

This price is full compensation for furnishing the tools, equipment, materials, testing, labor, and incidentals required to meet the subsurface drainage requirements of the plans.

Bid Items:

9008.1a Perforated Pipe at Stormwater Planters and Tree Wells, with trenching, drain rock and filter fabric

9008.1b Solid Pipe at Tree Wells with trenching, drain rock, and filter fabric

9008.1c Cleanouts for underdrain lines."

ITEM 9003

Site Furnishings

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections include the following:
   1. Item 9004B, for anti-graffiti coatings
   2. See electrical plans/specifications for lighting fixtures

B. This Section includes installation for the following:
   1. Pre-cast concrete seats and benches
   2. Trash and Recycling Receptacles
   3. Bollards
   4. Bike Racks
   5. Tree Guards

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed finish.

C. Material Certificates: For site furnishings, signed by manufacturers.

D. Maintenance Data.

E. Shop Drawings: Show fabrication and installation details for custom fabricated elements.

F. Provide model and/or detail drawings for all fabricated elements.

1.3 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of slabs, walls, and other construction contiguous with site furnishings and sculptural elements by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating elements without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
   2. Provide allowance for minor adjustment and fitting at site.

1.4 COORDINATION

A. Coordinate installation of anchorages for site furnishings and sculpted elements where required. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. SITE FURNISHINGS LIST:

Site Furnishing	***Mfg's Number***	***Manufacturer's Contact***	***Color/Finish***
Precast Concrete Benches and Seats	Manufacturer's Custom # TBD	**Quickcrete Products Corp.,** or approved local equal 731 Parkridge Ave. Norco, CA 92860 951.737.6240 www.quickcrete.com	Base = Scofield "Dark Red," A-27 Top = Scofield "Venetian Pink," A-56
Trash/Recycling Receptacle	Victor Stanley, Steelsites RSDC-36	**Victor Stanley, Inc**., or approved equal Dunkirk, Maryland 20754 USA 1.800.368.2573 (USA & Canada) www.victorstanley.com	"Tavern Green"
Bollard	FairWeather, B-2, 4" diam.	**FairWeather Site Furnishings,** or approved equal 540 Leader International Drive Port Orchard, WA 98367-6437 800-323-1798 www.fairweathersf.com	RAL color To match Victor Stanley's "Tavern Green"
Bike Rack	Maglin, MBR-201	Maglin Corporation, or approved equal 600 17th Street, Suite 2800 South Denver, CO 80202 (800) 716-5506 www.maglin.com	RAL color To match Victor Stanley's "Tavern Green"
Tree Guard	Victor Stanley, Ironsites S-6, 54" high x 16" diameter	**Victor Stanley, Inc**., or approved equal Dunkirk, Maryland 20754 USA 1.800.368.2573 (USA & Canada) www.victorstanley.com	"Tavern Green"

2.2 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.

E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

F. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Post Setting: Set cast-in support posts in concrete footing plumb or at correct angle and aligned and at correct height and spacing.

C. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and fill annular space between post and concrete with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

D. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. All Site Furnishings in this item shall be measured by each. Only the Site Furnishings shown on the plans or approved by the Engineer will be measured for payment.

4.2 PAYMENT

A. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Site Furnishings". This price is full compensation for furnishing the tools, equipment, materials, testing, labor, and incidentals required to provide site furnishings meeting the requirements of the plans.

Bid Items:

9003.1 Pre-cast concrete seats

9003.2a Pre-cast concrete benches, 6' long

9003.2b Pre-cast concrete benches, 4' long

9003.3 Trash/Recycling Receptacles

9003.4 Bollards

9003.5 Bike Racks

9003.6 Tree Guards

ITEM 9004A

Landscape Concrete Color, Finishes, and Joint Sealants

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes concrete finishes for:

1. Cast-in-place concrete seat wall
2. Colored concrete paving
3. Colored, seeded and exposed aggregate concrete paving

B. Related Sections include the following:
1. City of San Antonio Standard Specifications, Item 502 Concrete Sidewalks and Driveways, for concrete paving and joints
2. TxDOT Specification 420 Concrete Structures
3. Item 9003, for pre-cast concrete benches and seatwall
4. Item 9004A, for anti-graffiti coatings

1.3 SUBMITTALS

A. Product data: Submit manufacturer's or supplier's data for each type of product indicated

1. Exposed aggregate paving:
   a. The Contractor shall submit 1 quart container of aggregates to be used in the concrete mix for the areas to be finished as exposed aggregate of the for approval prior to delivery to the job site. Contractor shall review the existing exposed aggregate paving on site and select aggregates to match as closely as possible. Contractor shall verify that adequate supply of the material is available to complete the project.

2. Concrete finish samples:
   a. For each concrete finish, a minimum 6" x 6" sample shall be poured and finished for approval by the Landscape Architect prior to beginning concrete work.
   b. All approved samples shall be kept at the jobsite for comparison with finished work.
   c. Do not deliver product to job site until submittal has been approved.

3. Joint sealant samples:
   a. Submit to Landscape Architect manufacturer's literature, specification data, and color sample for all materials proposed for the project (see section 2.7A).
   b. Identify their use and location.

B. Other Action Submittals:

1. Design Mixtures: For each concrete paving mixture, include alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer must demonstrate their previous experience in completing paving similar in type, scope and scale to the elements described in the drawings and herein.
2. Installer must demonstrate that they have successfully completed at least five (5) other installations for public use.

B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

C. ACI Publications: Comply with ACI 301 unless otherwise indicated.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of concrete paving not less than 5 feet by 5 feet to demonstrate typical joints; surface color, pattern, and texture; curing; and standard of workmanship. For the seatwall provide 24" x 24"x 18" section with top and edge treatment, reveals and color wax finish. Approved samples shall serve as standard for the color and finish for all subsequent concrete work for the project.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Landscape Architect specifically approves such deviations in writing.
3. Contractor shall meet or exceed the quality of the approved finish in all subsequent work.
4. Contractor shall remove the mock-ups at completion of the work.

E. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to decorative concrete paving, including but not limited to, the following:

   a. Concrete mixture design.

b. Quality control of concrete materials and decorative concrete paving construction practices.
c. Mockup samples.

PART 2 - PRODUCTS

2.1 GENERAL

A. For concrete paving forms, steel reinforcing, and concrete mixes, refer to civil drawings and specs.

2.2 COLORED CONCRETE

A. Manufacturer:
1. L.M. Scofield Company: phone 800-800-9900 or internet http://www.scofield.com, or approved equal.

B. Materials

1. Color additives
a. Color additives shall contain pure, concentrated mineral pigments specially processed for mixing into concrete and complying with ASTM C979.
b. Color additives containing carbon black are not acceptable
c. Dosage rate for color additives shall be as recommended by the pigment manufacturer for the colors selected, based on weight of portland cement, fly ash, silica fume, lime and other cementitious materials but not aggregate or sand.

C. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

D. Dosage rate of color additive shall not exceed 10 percent of weight of cementitious materials in mix.

2.3 CONCRETE COLOR AND FINISH SCHEDULE

A. Cast-in-Place Concrete Color and Finish Schedule

1. Concrete Seat Wall
a. Top of wall: Smooth steel trowel finish
b. Other surfaces exposed to public view: Smooth form finish
c. Integral Color: Vermillion #5816

B. Concrete Paving Color and Finish Schedule
   1. Concrete paving color and finish shall be as indicated below and referenced on the drawings.
   2. Special Concrete Paving #1
      a. Finish: Medium Broom
      b. Integral Color: Vermillion to match Dust-on color
      c. Dust-on color: Vermillion #5816
   3. Special Concrete Paving #2
      a. Finish: Exposed aggregate field
      b. Integral Color: Vermillion to match Dust-on color
   4. Special Concrete Paving #3
      a. Finish: Medium Broom
      b. Dust-on Color: Grass Green (120 lbs/100 sf)
   5. Special Concrete Paving #4
      a. Finish: Medium Broom
      b. Dust-on Color: Espresso #1758
   6. Special Concrete Paving #5
      a. Finish: Medium Broom
      b. Dust-on Color: Caution Yellow #1005

2.4 COLOR WAX FOR CURING SEATWALLS

A. Two-component system formulated for curing exterior colored concrete, conforming to moisture retention requirements of ASTM C309 Liquid Membrane-Forming Compounds for Curing Conrete, and enhancing integrally colored concrete, Lithochrome Colorwax as manufactured by L.M. Scofield Company.

2.5 CHEMICAL SURFACE RETARDER

A. Chemical Surface Retarder for Exposed Aggregate Finish Paving: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch. Scofield, L. M. Company; LITHOTEX Top Surface Retarder or equal.

2.6 AGGREGATE SEEDING MATERIALS (Special Concrete Paving #2)

A. Aggregate shall be Rocky Mountain, available from Keller Materials, 1920 SE Loop 410, San Antonio, TX 78220; 210-648-4221, www.kellermaterial.com

   1. Texture shall be water worn and naturally smooth, 5/8-inch size stones, with a mixture of colors with overall appearance of medium to dark warm grey.
   2. The aggregates shall be seeded at the rate of 3 to 5 pounds per square foot.

2.7 JOINT SEALANT AND BACKING

A. Joint sealing material for "special concrete paving" shall be as manufactured by Pecora or approved equal. Joint sealant shall be color-matched to adjacent concrete.
   1. Concrete-to-concrete (horizontal joint): NR-201 with primer.
   2. Concrete-to-concrete (vertical joint): Dynatrol II

B. Joint backing shall be rods or tape in sizes and types as recommended by manufacturer of sealing or caulking material, and completely compatible with compound.

2.8 CURING AND SEALING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

B. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B, manufactured for colored concrete.

   1. For integrally colored concrete, curing compound shall be pigmented type approved by coloring admixture manufacturer.
   2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

C. Waterborne, low VOC, clear sealer:
   1. For all "special concrete paving" concrete, provide Scofield Selectseal-W, or approved equal.

PART 3 - EXECUTION

3.1 INTEGRALLY COLORED CONCRETE MIXING

A. The concrete mix receiving the color-conditioning admixture shall have a maximum slump of 4 inches and must contain a minimum of 5 sacks per cubic yard of cement for flatwork and 6 sacks per cubic yard for vertical concrete.

B. No calcium chloride should be added.

C. The same brand of cement, source of sand, and water/cement ratio shall be maintained for each load of concrete of the same color.

D. Do not add color admixtures to an empty drum or at the tail end of a load.

E. Since some batching and mixing procedures do not completely disintegrate the admixture bags, a test batch shall be prepared to determine mixing time and suitability. If bags do not completely disintegrate in the test batch, the bags shall be opened and the color-conditioning admixture batched directly into the mix.

F. Flatwork concrete shall be cured using methods and materials approved by the color additive manufacturer.

3.2 INTEGRALLY COLORED CONCRETE FINISHES

A. Medium-to-Fine-Textured Broom Finish:

1. First provide a floated finish.
2. When the concrete has set sufficiently to begin the process, the surface shall be worked with a steel trowel to produce a dense, smooth, even finish, that is relatively free of defects but that may still show some trowel marks.
3. Draw a soft-bristle broom across trowel-finished concrete surface across width of concrete, to provide a uniform, fine-line texture. At time of brooming, the troweled surface shall have hardened sufficiently to retain the scoring or ridges.
4. Finish surface shall be clean with uniform and reasonably straight lines.

B. Light sandblast finish:

1. Surfaces designated as light sandblast finish shall be finished by sand blasting finished concrete surface after the concrete has cured minimum of 2 weeks and have reached minimum of 95% of ultimate strength.
2. The surface shall be lightly sandblasted until fine cement film layer is removed and sand and small aggregate surfaces are exposed.

C. Seeded Exposed-Aggregate Finish: Immediately after initial floating, spread a single layer of aggregate uniformly on paving surface. Tamp aggregate into plastic concrete and float finish to entirely embed aggregate with mortar cover of 1/16 inch.

1. Spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove sheeting when ready to continue finishing operations.
3. Without dislodging aggregate, remove mortar concealing the aggregate by **lightly** sandblasting until cement film layer is removed and sand and small aggregate surfaces are exposed. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.

3.3 SURFACE FINISHES EXCEPT PAVEMENT FINISHES

A. Surfaces Not Against Forms (Tops of Curbs and Walls):

1. Surfaces not otherwise specified shall be finished with wood floats and steel trowel to even surfaces. Finish shall match adjacent finishes.

B. Formed Surfaces

1. As-Cast Rough Form for Surfaces Not Exposed to Public View
   a. Remove fins and other projections exceeding 0.25 inch in height.
   b. Level abrupt irregularities.
2. As-Cast Smooth Form for Surfaces Exposed to Public View
   a. Form facing material shall produce a smooth, hard, uniform texture on the concrete, similar to a steel troweled finish.
   b. Remove fins and other projections; patch voids to match adjacent surface.

3. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   a. Apply to concrete surfaces of curbs and seatwalls exposed to public.
   b. Smooth-Rubbed Finish: For concrete curbs not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
4. Color wax for exposed seatwall surfaces: Apply color wax curing compound on top and exposed portions of seatwall following manufacturer's recommendation.

3.4 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Compound: Apply according to manufacturer's written instructions.

3.5 JOINT BACKING AND SEALANT

A. Expansion Joints: Locate expansion joints where indicated on the drawings

B. Joint Backing:
1. Install joint backing in all expansion joints to receive sealants. Backing shall be sized to require 20% to 50% compression upon insertion, and shall be placed so that sealant depth is approximately ½ joint width.
2. Furnish joint backing in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
3. During concrete placement, protect top edge of joint backing with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

C. Joint Sealant:
1. Apply sealant and caulking material under pressure to fill joint completely, allowing no air pockets or voids. Tool the joint surface to compress the compound into the joint. Apply in a neat, straight line over all expansion joints, minimum ½" depth.

3.6 CONCRETE SEALING AND WASHING

A. Exposed Aggregate Concrete:
   1. Immediately following the washing operation, the curing operation shall begin. The concrete shall be kept in continuously moist condition for 7 days.
   2. After the slab is cured and no sooner than 2 weeks after the concrete has been placed, cement film shall be removed from the surface of the aggregate by acid wash. The slab shall be saturated with water, brushed free of standing water, and washed with a 5 to 10% solution of Muriatic Acid. Several flushing with clear water should follow the acid wash until the surface matches the approved sample.
   3. Care must be taken to ensure that run-off waters are treated in accordance with local by-laws and regulations and with the approval of the Engineer.

B. All Special Concrete Paving
   1. Apply concrete sealer to all special concrete paving according to manufacturer's instructions.

3.7 PAVING TOLERANCES

A. Comply with tolerances referenced in Civil drawings and specifications.

3.8 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken or damaged or does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Cast-in-place concrete seatwall color and finish shall be measured by the linear foot, to the nearest foot. Only the color and finish for the concrete seatwall located as shown on the plans or approved by the Engineer will be measured for payment. (Tools, equipment, materials, testing, labor, and installation of the cast-in-place concrete are included under TxDOT Specification 420 Concrete Structures).

B. Concrete paving color and finish shall be measured by the square foot, to the nearest foot. Each separate color and finish specified in Section 2.2D above shall be measured separately. Only concrete color and finish shown on the plans or approved by the

Engineer will be measured for payment. (Tools, equipment, materials, testing, labor, and installation of the concrete paving are included under City of San Antonio Standard Specifications, Item 502 Concrete Sidewalks and Driveways).

4.2 PAYMENT

A. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Landscape Concrete Color and Finish". This price is full compensation for furnishing the tools, equipment, materials, testing, labor, and incidentals required to provide color and finish meeting the requirements of the plans, including all sealing, curing, joint backing and sealants, washing, repairs, and protection.

Bid Items:

9004A.1 Cast-in-place concrete seatwall color, finish, and joint sealant
9004A.2 Special Concrete Paving #1 color, finish, and joint sealant
9004A.3 Special Concrete Paving #2 color, finish, and joint sealant
9004A.4 Special Concrete Paving #3 color, finish, and joint sealant
9004A.5 Special Concrete Paving #4 color, finish, and joint sealant
9004A.6 Special Concrete Paving #5 color, finish, and joint sealant

ITEM 9004A

Anti-graffiti Coatings

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this section.

1.2 SUMMARY

A. This section includes surface preparation and field application of anti-graffiti coating systems to items and surfaces scheduled.

B. Related Sections include the following:

1. Division 9 Section "Painting" for general field painting.

1.3 SUBMITTALS

A. Product Data: For each coating system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.

B. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.

C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.

D. Qualification Data: For Firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owner, and other information specified.

E. Warranty.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage Manufacturer to provide an GSS Coatings, LLC "Certified" applicator who has completed anti-graffiti coating system applications similar in material and extent to those indicated for Project, and whose work has a record of successful in-service performance.

B. Source Limitations: Obtain base coatings, top coatings, and removal agent from the same manufacturer.

1.5 PERFORMANCE REQUIREMENTS

A. Provide anti-graffiti coating system complying with the following:
   1. Permanent coating system. Coatings shall not require re application regardless of number of graffiti taggings during the life of the 10 year performance warranty period.
   2. Show no signs of deterioration or change of appearance after graffiti removal during the warranty period. No ghosting staining or shadowing.
   3. Capability of removing 100% of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate.
   4. Upon graffiti removal, no evidence of graffiti shall remain.
   5. Capable of withstanding a minimum of 120 cleaning cycles over the same area without measurable coating deterioration.
   6. Shall not increase dirt pick-up of substrate.
   7. Meet the following test results for the following chemicals:

a.	MEK	No effect after 5 days
b.	Carboxylic Acid	No effect after 5 days
c.	75% Phosphoric Acid	No effect after 5 days
d.	37% HCL	3 hours blister
e.	50% Sulfuric Acid	No effect after 5 days
f.	20% NIT	68 hours blister

B. Time Tested:
   1. System specified must have been in successful commercial use for at least 12 years.
   2. Provide documentation of performance of the anti-graffiti coating system by written report from a nationally recognized and certified Protective Coating Specialist. Such documentation shall include; type of substrate, location, length of service, testing performed and results.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:

   1. Name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.

6. Application instructions.
7. Color name and number.
8. Handling instructions and precautions.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

1.7 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.

1.8 EXTRA MATERIALS

A. Furnish extra graffiti removal materials in quantities described below. Package coating material in unopened, factory-sealed containers for storage and identify with labels describing contents.

1. Quantity: One full case (12, 16 ounce bottles).

1.9 WARRANTY

A. System Performance Warranty: Provide written warranty signed by manufacturer that exhibits defects in materials or workmanship. Defects are defined to include failure to withstand complete graffiti removal, ghosting, shadowing, chemical staining, yellowing, and normal environmental effects. Refer to GSS Coatings, LLC 10 Year Warranty. To obtain warranty service the purchaser must contact GSS Coatings, LLC in writing.

1. Warranty process to be completed via Skype with GSS Coatings, LLC
2. Warranty period: 10 years from date of completion.

PART 2 - PRODUCTS

2.1 ANTI GRAFFITI SYSTEM/MANUFACTURER

A. GSS-10 Anti-Graffiti System manufactured by GSS Coatings, LLC, Utah 866-366-1139, 801-255-9505, or approved equal.

2.2 ANTI-GRAFFITI COATING MATERIALS

A. VOC Classification: Provide materials that comply with the South Coast Air Quality Management District's VOC classification.

B. Coatings shall meet requirements of the following:
   1. ASTM B 117 and ASTM D 714 (salt spray minimum acceptable of 8000 hours.
   2. ASTM D 530 (hardness)
   3. ASTM D 412 (tensile strength and elongation)
   4. ASTM D 522 (pass 3/8 inch mandral)
   5. ASTM 968 (abrasion test)
   6. ASTM E 96 (vapor transmission)
   7. Water clear, non-yellowing, free of waxes and urethanes.
   8. Shall allow moisture vapor transmission.

C. GSS-10 Undercoating: Clear Base Coat (GSS307); a water-based high performance under coating used as sealer. Specify Sure Bond (GSS308) for metal, marble, slate and tile surfaces.

D. GSS-10 Top coatings: permanent anti-graffiti top coating.
   1. Clear Finish: GSS100 Clear Matte [Matte is defined as the finish of the top coating reading less than five degrees on a Gardner Gloss Meter] or GSS101 Clear semi-gloss or GSS102 Clear gloss.
   2. Pigmented Finish: GSS200 Pigmented Matte or GSS201 Pigmented semi-gloss or GSS202 Pigmented gloss.

E. Graffiti Remover: GSS Erasol; Non-flammable, biodegradable, with a pH 7 - 8.5 and recyclable, allowing graffiti removal without the use of blasting equipment, hot water, or high pressure wash equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to bid, with Applicator present, a job “walk through” examining substrates and conditions under which anti-graffiti coatings will be applied for compliance with coating application requirements is essential. Surface / substrates will vary and must be taken into account.

   1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
   2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.

B. Coordination of Work: Review other sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.

1. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding.

a. Confirmation of the primer's suitability for expected service conditions.
b. Confirmation of primer's ability to be top coated with materials specified.

2. Notify Architect about anticipated problems before using the coatings specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of the size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operation, reinstall items that were removed; use workers skilled in the trades involved.

B. Cleaning: Before applying coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and coating application so dust and other contaminates from cleaning process will not fall on wet, newly coated surfaces.

C. Surface preparation: Clean and prepare surfaces to be coated according to manufacturers written instructions for each substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
2. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
   a. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
3. Metal Substrates: Clean ferrous-metal surfaces that have been shop coated; remove oil, grease, dirt and other foreign substances.

D. Material Preparation: Carefully mix and prepare coating materials according to the manufacturers written instructions.

1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.

2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application.

3.3 APPLICATION

A. General: Apply coatings according to manufacturer's written instructions.

1. Use applicators and techniques best suited for the material being applied.
   a. Do not apply coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
   b. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.

B. Application Over Cementitious Surfaces:

1. All natural surfaces to include concrete, all masonry units, brick tile and block should be treated with a siloxane penetrating water sealer: Aqua-lock WB Water Repellent by GSS Coatings, LLC is compatible with the Graffiti Solution System.
2. Base: Minimum of 1 to 2 coats equaling 3 to 4 mils minimum dry film thickness [or as many as necessary to achieve a **pinhole free surface**] of GSS Barrier undercoating as specified by manufacturer.
3. Finish: Minimum of 2 coats of top coating; 3 to 4 mils minimum dry film thickness [or as many coats as necessary to satisfy warranty requirements]

Surfaces will vary and the objective is to have the coating work on all substrates, the number of coats could vary as well.

C. Application Over Primed Metal Surfaces:
1. Finish: 2 coats of top coating; 3 to 4 mils minimum dry film thickness.

D. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:

1. Owner will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:
   a. Quantitive materials analysis.
   b. Absorption
   c. Accelerated weathering.
   d. Accelerated yellowness.

e. Alkali and mildew resistance.
f. Abrasion resistance.
g. Washability.

3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. If necessary, Contractor may be required to remove rejected materials from previously coated surfaces if, on recoating with specified materials, the two coatings are not compatible.

B. Demonstration: Apply alkyd-based graffiti to a 2 ft. sq. treated area selected by the Architect. 5 days minimum after application, demonstrate complete removal of the graffiti in the presence of the Architect.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Anti-graffiti coating shall be measured by the square foot, to the nearest foot. Only anti-graffitti coatings for all site furnishings and concrete seatwall located as shown on the plans or approved by the Engineer will be measured for payment.

4.2 PAYMENT

A. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Anti-graffiti Coating". This price is full compensation for furnishing the tools, equipment, materials, testing, labor, and incidentals required to provide anti-graffiti coating meeting the requirements of the plans.

Bid Items:

9004B Anti-graffiti coating

ITEM 9005

Crushed Stone, Gravel, and Cobbles

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Crushed stone or decomposed granite for tree wells.
2. Cobbles for gravel swale.
3. Cobbles for dissipators at curb inlets

1.2 SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Samples for crushed stone and washed stone

1.3 QUALITY ASSURANCE

A. Mockups: Build a mockup for approval by the Owner's Representative for the following:
1. Layout of washed stone gravel swale.

B. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or build on frozen subgrade or setting beds.

PART 2 - PRODUCTS

2.1 CRUSHED STONE at tree wells

A. 3/8” or 1/4" crushed aggregate or decomposed granite screenings

1. Crushed Stone Sieve Analysis Percentage of Weight Passing a Square Mesh Sieve AASHTO T11-82 and T27-82

1/4" MINUS AGGREGATE GRADATION

U.S. Sieve No.	Percent Passing by Weight
# 3/8"	100
# 4	90 – 100
# 8	75 – 80
# 16	55 – 65
# 30	40 – 50
# 50	25 – 35
# 100	15 – 20
# 200 to	10 – 15

B. Decomposed granite or crushed stone color to be tan or light brown, or equal approved by the Architect.

2.2 COBBLES for Gravel Swale and Dissipators at Curb Inlets

1. Irregular shaped river washed stones, 2”-4”, equal or similar to “Calico Creek” and approved by the Architect. Calico Creek available at Keller Materials, 1920 SE Loop 410 San Antonio, Texas 78220, 210-648-4221, www.kellermaterials.com.

PART 3 - EXECUTION

3.1 CRUSHED STONE or DECOMPOSED GRANITE

A. Ensure trees have been planted and soil has been placed in tree wells according to the details and specs. and approved by Owner’s Representative.

B. Placement

1. Place the crushed stone screenings on top of tree well planting soil. Level to desired grade and cross section.

2. Compact crushed stone enough to hold it in place, maximum 85 percent.

3.2 GRAVEL SWALE

A. Upon approval of the stone layout by the Owner's Representative, carefully mark the location of the gravel swale per plans. Excavate the soil to allow positive drainage flow from the eastern end of the swale to the western end.

B. Place washed stone cobbles to cover the full width and length of the swale to a depth of plus/minus 2 inches.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Crushed stone or decomposed granite at tree wells shall be measured by the square foot, to the nearest foot. Only the crushed stone or decomposed granite areas shown on the plans or approved by the Engineer will be measured for payment.

B. Gravel swale shall be measured by the square foot, to the nearest foot. Only the gravel swale located as shown on the plans or approved by the Engineer will be measured for payment.

C. Cobble dissapators shall be measured by the square foot to the nearest foot.

4.2 PAYMENT

A. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Crushed Stone, Gravel, and Cobbles". This price is full compensation for furnishing the tools, equipment, materials, testing, labor, and incidentals required to provide gravel and cobbles meeting the requirements of the plans.

Bid Items:

9005.1 Crushed stone or decomposed granite at tree wells

9005.2 Gravel swale

9005.3 Cobble Dissapators

ITEM 9006

Irrigation

PART 1 - GENERAL

1.1 SUMMARY

A. Provide labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the irrigation system, and guarantee/warranty as shown on the drawings, the installation details, and as specified herein.

B. Section includes:

1. Procurement of applicable licenses, permits, and fees.
2. Coordination of Utility Locates ("Call Before You Dig")
3. Coordination and installation of SAWS Dedicated Irrigation Water Meters
4. Services of a factory field service person to supervise the assembly, installation, and start-up of the pumping system, the training of maintenance staff, and provision of O&M manual.
5. Furnishing and installing a prefabricated, booster type pumping system including pumps, motors, electrical controls, and other items as specified.
6. Furnishing and installing landscape injection system, including pumps, storage, electrical controls and other items as specified.
7. Connection of electrical power supply to the pumping system.
8. Sleeving for irrigation pipe and wire.
9. Furnishing and installed a prefabricated automatic irrigation controller as specified within.
10. Connection of electrical power supply to irrigation control system.
11. Connection of electrical power supply to irrigation booster pumps
12. Preparation of Record Drawings.
13. Maintenance period.

C. Discrepancies:

1. It is the intent of these plans and specification that the all equipment installed for the irrigation system is complete and workable. It is the Contractor's responsibility to make sure that the equipment furnished is compatible and adheres to all regulations. Any discrepancies should be noted immediately and should be reported to the owner's representative for clarification.

D. Work not included:

1. Items of work specifically excluded or covered under other sections are:
   a. Provision of electrical power supply to irrigation control system and irrigation booster pump system.

1.2 DEFINITIONS

A. Backflow: Any unwanted flow of used or non-potable water or substance from any domestic, industrial or institutional piping system into the pure, potable water distribution system. The direction of flow under these conditions is in the reverse direction from that intended by the system and normally assumed by the owner of the system (USC, 1998)

B. Capillary Action – The movement of water through the soil where the water sticks to the sides of very small passages or capillaries between soil particles. (Rain Bird 2011)

C. Cycle: The operating duration, in minutes or hours, of one or more valves for one irrigation start time. (Water Mgt Committee 2001)

D. Emitter: The device inside the drip tubing that controls the amount of water flow out of each outlet hole. (Rain Bird 2011)

E. Flow rate: Volume of flow per unit time, such as discharge from an irrigation sprinkler or emitter; or flow into a zone.

F. Flush Header – Flexible or rigid pipe and fittings connecting a group of dripline rows and found at the opposite end of the Supply Header (also known as "manifold"). (Rain Bird 2011)

G. Flush Valve – A valve that can be opened automatically or manually to discharge the water that is in the system of dripline rows and headers to remove any accumulated dirt or debris. (Rain Bird 2011)

H. Irrigation: The intentional application of water for purposes of sustained plant growth. (Water Mgt Committee 2001)

I. Irrigation system: Set of components which may include the water source, water distribution network, control components and other general irrigation equipment. (Rain Bird, 1997)

J. Precipitation rate: Rate at which a sprinkler system applies irrigation water.

K. Hydrostatic pressure: Pressure in a closed system, without any water movement. (Rain Bird, 1997)

L. Pressure regulator: Device which maintains constant downstream operating pressure (immediately downstream of the device) that is lower than the upstream pressure. (Rain Bird, 1997)

M. Record drawing: Set of construction plans, or computer file, including the original design and noting all design deviations. These drawings should also show the location of all major underground components, dimensioned from permanent features. (Water Mgt Committee 2001)

N. Runoff: Portion of irrigation water that leaves the target area, primarily due to slope or the precipitation rate exceeding the soil infiltration (intake) rate. (Water Mgt Committee 2001).

O. Supply Header – The combination of flexible or rigid pipe plus fittings that supplies water to many rows of dripline (also known as "manifold"). (Rain Bird 2011)

1.3 REFERENCES

A. American Standard for Testing and Materials (ASTM) – Latest Edition:
   1. D 1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (CPVC) Compounds
   2. D 1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedules 40, 80, 120
   3. D 2241 Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
   4. D 2464 Poly (Vinyl Chloride) (PVC) Plastic Fittings, Thread, Schedule 80
   5. D 2466 Poly (Vinyl Chloride) (PVC) Plastic Fittings, Schedule 40
   6. D 2467 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Socket Type, Schedule 80
   7. D 2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
   8. D 2287 Flexible Ploy Vinyl Chloride (PVC) Plastic Pipe
   9. D 2855 Making Solvent – Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
   10. F 656 Poly (Vinyl Chloride) (PVC) Solvent Weld Primer

B. Chapter 1305.101(a)(2) of the Texas Electrical Safety and Licensing Act

C. Chapter 10 of the San Antonio City Code, Building-Related Codes of the City of San Antonio.

D. Latest edition of the National Electrical Code (NEC)

E. Latest edition of the International Plumbing Code.

F. Underwriters Laboratories, Inc. (UL):
   1. UL 651 Schedule 40 and 80 Rigid PVC Conduit.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated,

   1. Deliver four (4) copies of submittals to City's Representative within 10 working days from date of Notice to Proceed. Furnish information in 3-ring binder with table of contents and index sheet. Index sections for different components and label with specification section number and name of component. Furnish submittals for components on material list. Indicate which items are being supplied on catalog cut sheets when multiple items are shown on one sheet. Incomplete submittals will be returned without review. All submittals shall be in accordance with Section 013300 Submittal Procedures.
   2. Materials List: Include sleeving, pipe, fittings, mainline components, bubbler components, drip irrigation components, control system components, shop drawings and other components shown on drawings and installation details or described herein. Include pipe sealant, wire, wire connectors, ID tags, and other miscellaneous items. Quantities of materials need not be included.
   3. Manufacturers' Data: Submit manufacturers' catalog cuts, specifications, and operating instructions for equipment shown on materials list.
   4. Shop Drawings: Submit shop drawings called for in installation details. Show products required for proper installation, their relative locations, and critical dimensions. Note modifications to installation detail.

5. The Contractor shall furnish the articles, equipment, materials or processes specified by name in the drawings and notes. No substitutions will be allowed without prior written approval by City's Representative.
6. Equipment or materials installed or furnished without prior approval of the City's Representative may be rejected and the Contractor may be required to remove such materials from the site at his own expense.
7. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.
8. Engineered Booster Pump Assembly:
    a. Materials List: Include pipe, fittings, pumps and motors, control system components, and electrical equipment. Quantities of materials need not be included.
    b. Manufacturers' Data: Submit manufacturers' catalog cuts, performance curves, specifications, and operating instructions for equipment shown on the materials list. Submit complete instructions for installation, operation, and recommended maintenance of the pump system and components.
    c. Submit shop drawings of proposed pump system. Show products required for proper installation, their relative locations, and critical dimensions. Submit technical data sheets, electrical schematics, sequence of operation, UL listing authorization form, and schematics of irrigation pump system within the proposed building with critical dimensions noted. Note any modification to the construction documents.
    d. The station must be completely wired, piped, hydraulically, electrically, and flow tested to full station capacity at factory prior to shipment to job site.
    e. Documentation of testing report must include name of test, date of test, name of the individual completing the test, name of the company completing the test, and a summary of the test results. If system fails any test, document any and retest until system passes test.
    f. Testing report must be verified by Owner prior to pump station shipment.
    g. Record drawings as required in the specifications.

B. Operation and Maintenance Manual:

1. Prepare and deliver to the City's Representative, prior to the start of maintenance, all required and necessary descriptive material in complete detail and sufficient quantity properly prepared in two (2) individually bound copies. Describe the material installed in sufficient detail to permit qualified operating personal to understand, operate and maintain all equipment. Each manual shall include the following:
    a. Index sheet, stating Contractor's address and telephone number.
    b. Duration of guarantee period with guarantee forms.
    c. List of equipment with names and addresses of manufacturer's local representative.
    d. Complete operating and maintenance instructions on all major equipment.
    e. Spare parts list and related manufacturer information for all equipment.
2. Operation and maintenance manuals shall be delivered to the City 10 calendar days prior to final inspection. The manuals shall describe the material installed.

C. Spare Parts and Equipment

1. Prior to the start of maintenance prepare and deliver to the City's Representative, all required spare parts, tools and equipment. Spare parts, tools and equipment shall include but not be limited to the following:
   a. Two (2) operating keys suitable to operate each type of valve used;
   b. Six (6) quick coupler valve keys to fit type of couplers used (complete with hose bibb);
   c. Six (6) quick coupler lock type cover keys:
   d. One (1) set of automatic controller cabinet keys for each controller used;
   e. One (1) set of booster pump enclosure keys for each booster pump installed;
   f. Twelve (12) of each tree bubbler nozzle specified on plans;
   g. Two (2) 500' rolls of subsurface dripline identified on plans;
   h. Six (6) air/vacuum relief valves;
   i. Six (6) manual flush coupling and cap;
   j. Provide Three (3) sets of maintenance and parts manuals for controller, remote control valves, shut-off valves, quick coupler valves, rotary heads, and all other mechanical devices with moving parts used in this contract. Present in hardback three-ring binders.

D. Controller Charts

1. As-built drawings shall be approved in writing prior to preparing charts.
2. Charts must be completed and approved prior to final review of irrigation system. Show controller designation on each chart.
3. Provide two (2) controller charts for each controller supplied, showing area covered by the automatic controller, on the inside surface of the cover of each controller.
4. All valves shall be numbered to match the operation schedule and the drawings. Only those areas controlled by that controller shall be shown.
5. Identify the area of coverage of each remote control valve, using a distinctly different pastel color, drawn over the entire area of coverage.
6. This chart shall be a plot plan, entire or partial, showing building, walks, roads and walls. A photostatic print of this plan, reduced as necessary, and legible in all details, shall be made to size that will fit into the controller cover. If the controller sequence is not legible when reduced, enlarge it to a size that will be legible when reduced.
7. Charts shall be black line print with a different transparent color used to show area of coverage for each station.
8. Completed and approved charts must be laminated with 20 mil. thick plastic minimum (2- 10mil pieces).
9. Charts shall be completed and approved prior to final inspection of the irrigation system.
10. Controller access. The City's Representative reserves the right to have complete access to the controller clocks for monitoring and controlling system failures. The Contractor shall provide two (2) sets of all keys necessary for access to the controller clocks within the designated area. The keys will then become the property of the City.

1.5 COORDINATION

A. Complete sleeve installation (not otherwise provided) in coordination with paving and other concrete pours.

B. Coordinate to ensure that an electrical power source is in place.

C. Coordinate system installation work specified in other Sections and coordinate with landscape installer to ensure plant material is uniformly watered in accordance with intent shown on drawings.

1.6 RULES AND REGULATIONS

A. Provide work and materials in accordance with latest edition of National Electric Code, Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws, regulations and codes of governing authorities.

B. When contract documents call for materials or construction of better quality or larger size than required by above-mentioned rules and regulations, provide quality and size required by contract documents.

C. If quantities are furnished either in specifications or on drawings, quantities are furnished for information only. It is Contractor's responsibility to determine actual quantities of material, equipment, and supplies required by the project and to complete independent estimate of quantities and wastage.

D. Notify City's Representative in writing prior to construction about discrepancies between contract documents and existing site conditions or manufacturer's specific recommendations for use of their product.

E. Contractor is responsible for damage to site amenities during construction. Replace damaged items with identical materials of equal value to match existing conditions. Make replacements at no additional cost to contract price.

F. All electrical control panels with controls must be built in accordance to N.E.C., U.L. and E.T.L. standards. The electrical components and enclosure must be labeled as a complete U.L. listed assembly with manufacturer's U.L. label applied to the door. All equipment and wiring must be mounted within the enclosure and labeled for proper identification.

G. Provide single source responsibility for the manufacture, warranty, service, operation, and installation of a prefabricated, skid mounted, fully automatic constant speed pumping system as described in contract documents. Pumping system must conform to the following specifications in all respects. This specification covers the minimum requirements; however, it should not be construed as all inclusive.

1.7 CHECKLIST

A. Provide a signed and dated checklist and deliver to the Agency's Representative prior to final review of the work.

B. Use the following format:
   1. Confirmation of service pressure: psi, by whom and date.
   2. Plumbing permits: if none required, so noted.
   3. Materials approvals: approved by and date.
   4. Pressure line tests: by whom and date.
   5. Record drawings: received by and date.

6. Controller charts: received by and date.
7. Materials furnished: received by and date.
8. Operation and maintenance manuals: received by and date.
9. System and equipment operation instructions: received by and date.
10. Manufacturer's warranties if required: received by and date.
11. Written guarantee: received by and date.

1.8 QUALITY ASSURANCE

A. General: The entire irrigation system, including all work done under this contract, shall be guaranteed against all defects and fault of material and workmanship for a period of one (1) year following the filing of the Notice of Completion. All materials used shall carry a manufacturer's guarantee of one (1) year.

B. Should any problem with the irrigation system be discovered within the guarantee period, it shall be corrected by the Contractor at no additional expense to the City within ten (10) calendar days of receipt of written notice from the City. When the nature of the repairs as determined by the City constitutes an emergency (e.g. broken pressure line) the City may proceed to make repairs at the Contractor's expense. Any and all damages to existing improvement resulting either from faulty materials or workmanship, or from the necessary repairs to correct same, shall be repaired to the satisfaction of the City by the Contractor, all at no additional cost to the City.

C. Permits: Obtain and pay for all permits and inspections required by outside agencies.

D. Ordinances and regulations: Local, municipal and state laws and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the Contractor. Anything contained in the specifications shall not be construed to conflict with any of these rules and regulations or requirements of the same. However, when the specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by these rules and regulations, the provisions of the specifications and drawings shall take precedence.

E. Protection: Erect and maintain barricades, warning signs and lights and provide guards as necessary or required to protect all persons on the site.

F. Underwriters Laboratories: Electrical wiring, controls, motors and devices shall be U.L. listed and so labeled.

G. Installer qualifications (for solvent): Each person shall be trained by the manufacturer's representative in techniques for making correct joints prior to performing work on the site.

H. Work of this Section which is allied with the work of other trades shall be coordinated as necessary.

I. Superintendent: A superintendent satisfactory to the Agency's Representative shall be present on the site at all times during the progress of the work.
   1. The Superintendent shall not be changed, except with the consent of the Agency's Representative.
   2. The Superintendent shall be authorized to represent the Contractor.

J. Discrepancies: When discrepancies exist between drawings and specifications, and no specific interpretation is issued prior to bidding, the decision regarding this interpretation will rest with the Agency's Representative. The Contractor will be compelled to act on this decision as directed. In the event the installation deviates from the directions given, it shall be corrected at the Contractor's expense.

K. Manufacturer's directions: Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturers used in this Contract furnish directions covering points not shown in the drawings and specifications.

L. Work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications.

M. The Contractor shall not install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in equipment usage or area dimensions exist that might have been considered in the engineering. Such obstructions or differences shall be brought to the attention of the Agency's authorized representative. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary at no cost to the Agency.

N. Any settling of trenches which may occur during the one-year period following acceptance shall be repaired to City's satisfaction by the Contractor without any additional expense to the City. Repairs shall include the complete restoration of all damage to planting, paving or other improvements of any kind as a result of the work.

O. Engineered Booster Pump Assembly**:**
   1. The manufacturer shall warrant the pumping station to be free of defects and product malfunctions for a period of 24 months from date of start up or 30 months after shipment, whichever occurs first.
   2. Failures caused by lightning strikes, power surges, vandalism, flooding, operator abuse, or acts of God are excluded from warranty coverage.

1.9 WATER METERS:

A. Water Meters shall be furnished and installed by contractor as per San Antonio Water Systems (SAWS) construction specifications and drawings. See plans for sizes and locations. Work shall include payment of impact fees to the San Antonio Water System.

1.10 DRAWINGS

A. The drawings are diagrammatic only. It is the intent of the plans and specifications that the irrigation system shall efficiently and uniformly irrigate all areas according to horticultural and soil requirements, and that it shall be complete in every respect and shall be ready for operation to the satisfaction of the Agency.

B. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc. which may be required. Carefully investigate the structural and finished conditions affecting all of this work and plan this work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be

installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting and engineering features.

1.11 PROJECT RECORD (AS-BUILT) DRAWINGS:

A. Document changes to design. Maintain on-site and separate from documents used for construction, one complete set of contract documents as Project Documents. Do not permanently cover work until accurate "as-built" information is recorded.

B. Record pipe and wiring network alterations on a daily basis. Record work that is installed differently than shown on construction drawings. Record accurate reference dimensions, measured from at least two permanent reference points, of each irrigation system valve, each backflow prevention device, each controller assembly, each sleeve end, each stub-out for future pipe or wiring connections, and other irrigation components enclosed within valve box.

C. Turn over "Record Drawings" to Construction Manager. Completion of Record Drawings is required prior to final construction review at completion of irrigation system installation.

D. Record dimensioned locations and depths for each of the following:
1. Point of connection.
2. Irrigation pressure line (mainline) routing. (Provide dimensions for each 100 lineal feet [maximum] along each routing and for each change in direction.)
3. Flow Meters.
4. Master Valves
5. Gate Valves.
6. Sleeving/ Conduits.
7. Junction Boxes.
8. Remote Control Valves
9. Quick Coupling Valves
10. Control Wire Routing
11. Spare Wire Boxes

E. Other related items as may be directed by the Agency representative.

F. Locate all dimensions from two permanent points (buildings, monuments, sidewalks, curbs or pavements).

G. Record all changes which are made from the Contract Drawings, including changes in the pressure and non-pressure lines.

H. Record all required information on a set of black line prints of the drawings. Do not use these prints for any other purpose.

I. Maintain information daily. Keep drawings at the site at all times and available for review by the Agency representative.

J. When record drawings have been approved by the Agency representative, transfer all information to a set of reproducible prints using permanent India ink. Changes using ballpoint pens are not acceptable.

K. Make dimensions accurately at the same scale used on original drawings or larger. If photo reduction is required to facilitate controller chart housing, notes or dimensions must be a minimum 1/4 inch in size.

L. Reproducible prints (5 maximum) will be furnished by the Agency representative at cost for printing and handling.

M. Use appropriate eradicating fluid for removing original lines and dimensions where changes are made. Completed reproducible shall be equal to the original drawings.

1.12 DELIVERY, STORAGE, STOCKPILING, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Handling of PVC Pipe and Fittings: The Contractor is cautioned to exercise care in handling, loading, unloading and storing of PVC fittings. All PVC pipe shall lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of pipe that has been dented or damaged will be discarded and, if installed, shall be replaced with new piping. Pipe and fittings shall not be stored in direct sunlight.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

1.13 PROJECT CONDITIONS

A. Site Inspections:

1. Contractor must verify construction site conditions and note irregularities affecting work of this section. Report irregularities in writing to City's Representative prior to beginning work.
2. Commencement of work implies acceptance of existing site conditions.

B. Utility Locates ("Call Before You Dig")

1. Arrange and coordinate Utility Locates with local authorities prior to construction.
2. Repair underground utilities that are damaged during construction. Make repairs at no additional cost to contract price.

C. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by the City or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify City's Representative no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without the City's written permission.

1.14 CONSTRUCTION REVIEW

A. The purpose of on-site reviews by Construction Manager is to daily observe work in progress, Contractor's interpretation of construction documents, and to address questions with regard to installation.
   1. Schedule reviews for irrigation system layout or testing with Construction Manager as required by these specifications.
   2. Impromptu reviews may occur at any time during project.
   3. A review will occur at completion of irrigation system installation and Project Record Drawing submittal.

1.15 GUARANTEE/WARRANTY AND REPLACEMENT

A. The purpose of guarantee/warranty is to ensure that City receives irrigation materials of prime quality, installed and maintained in thorough and careful manner.

   1. Guarantee/warranty irrigation materials, equipment, and workmanship against defects for period of one year from formal written acceptance by City's Representative. Fill and repair depressions. Restore landscape, utilities, structures and site features damaged by settlement of irrigation trenches or excavations. Repair damage to premises caused by defective items. Make repairs within seven days of notification from City's Representative.
   2. Replace damaged items with identical materials and methods per contract documents or applicable codes. Make replacements at no additional cost to contract price.
   3. Guarantee/warranty applies to originally installed materials and equipment, and replacements made during guarantee/warranty period.

PART 2 - PRODUCTS

2.1 SPECIFIYING BY NAME

A. Whenever any material is specified by name and number thereof, such specifications shall be deemed to be used for the purpose of facilitating a description of the materials and established quality, and shall be deemed and construed to be followed by the words "or approved equal". No item will be considered as "equal" if it is constructed of different materials or alloy or is of a different principle of operation. Piping, tubing, conduit, valve, or any device through which the flow of water must pass shall not cause a greater resistance, turbulence, or pressure loss due to friction than that material as engineered and designed into this system.

B. Pressure loss curves shall be certified by an impartial commercial testing laboratory with all costs for tests and reports being paid for by the Contractor wishing to make the substitution.

C. Contractor shall submit letter (with material list) stating his reasons for any substitution and showing amount of credit offered if substitution should be acceptable.

2.2 QUALITY

A. Use new materials without flaws or defects.

2.3 SUBSTITUTIONS

A. Use specified equipment, or pre-approved equal. Alternative equipment must be approved by City's Representative prior to bidding. Changes and associated design costs to accommodate alternative equipment are Contractor's responsibility.

B. Three (3) copies of descriptive literature, including pressure loss curves, nozzle performance characteristics, etc., shall be furnished for any materials submitted as "equal" substitutes.

C. Pipe sizes referenced in the construction documents are minimum sizes, and may be increased at Contractor's option.

2.4 RECLAIMEDWATER EQUIPMENT IDENTIFICATION

A. All reclaimed water pipes, including pressure mainline pipe and non-pressure lateral pipe, valve boxes and appurtenances shall be identified to clearly distinguish between reclaimed water the potable water systems. Specific wording on identification tape, tags, etc. shall be as per the Texas Commission on Environmental Quality (TCEQ) and the San Antonio Water Systems (SAWS).

B. Refer to the San Antonio Water System Recycled Water User's Handbook for additional requirements.

C. Purple PVC Pipe for Reclaimed Water Pipelines:
   1. General: PVC pipe used for reclaimed water shall conform to the requirements within such specifications and shall be colored purple.
   2. PVC Pipe Coloring and Markings: PVC Pipe shall be purple, and shall be marked on both sides of the pipe with the wording (English and Spanish): "RECLAIMED WATER – DO NOT DRINK" and "AGUA DE RECUPERACIÓN – NO BEBER". Lettering shall be a minimum of ½-inch high black letters, and shall be repeacted every 12-inchs. The purple color shall be achieved by adding pigment to the PVC material as the pipe is being manufactured.

D. Identification Tags:
   1. Shall be manufactured from polyurethane Behr Desopan, incorporating an integral attachment neck and reinforced attachment hole and will be capable of withstanding 180 lbs. pull out resistance.
   2. The Identification Tag shall be approximately 3" x 4" in size and .0625" thick. All lettering is capable of withstanding outdoor usage. The standard alpha-numeric designations shall incorporate alpha-numeric lettering 1.125" in height. Special lettering,

designations or stampings will be the maximum size available & either hot stamped or laser printed based on the manufacturers judgment. The tag color will purple.

3. The marking tag will be double side stamped with "RECLAIMED WATER – DO NOT DRINK" on one side and "AGUA DE RECUPERACIÓN – NO BEBER" on the other.

E. Detectable Warning Tape:
1. Non-Detectable marking tape consists of a minimum 4.0 mil (0.004") thickness, linear low-density polyethylene, specifically formulated for extended use underground.
2. The legend/message continually repeats a minimum of every three feet.
3. The tape tensile strength shall be in accordance with ASTM D882 and not be less than 4100 MD (longitudinal direction) and 3650 TD (transversal direction).
4. Elongation properties are in accordance with ASTM D882 and will be greater than 550% + at the break point.
5. Tape flexibility is in accordance with ASTM D671 and remains pliable.
6. Tape composition shall be of virgin LLDPE/LDPE.
7. The color shall be purple.
8. Tape width is 3".
9. Tape shall include the following message: "RECLAIMED WATER – DO NOT DRINK" and "AGUA DE RECUPERACIÓN – NO BEBER".

F. Pipe (Above Ground)/ Controller/ Pump/ Landscape Injector Marking Decal:
1. Manufactured from a 3.5 mil flexible vinyl base with a permanent acrylic adhesive backing on a 90# stayflat liner.
2. Both the background and legend shall be printed with a UV cured vinyl ink.
3. The entire decal shall be clear flood over-printed for superior weathering and UV protection.
4. The decal shall be purple in color.
5. The decal shall include the following message: "RECLAIMED WATER – DO NOT DRINK" and "AGUA DE RECUPERACIÓN – NO BEBER".

G. Backflow and Riser Marking:
1. The marker shall be vinyl based with a top scratch resistant mylar coating.
2. The marker shall be purple in color with jet black printing.
3. The adhesive shall be all-weather in nature.
4. The marker shall be approximately 21/2" x 3".
5. The marker shall include the following message: "RECLAIMED WATER – DO NOT DRINK" and "AGUA DE RECUPERACIÓN – NO BEBER".

H. Approved Manufacturer:
1. T. Christy Enterprises, Inc., 655 E. Ball Rd., Anaheim, CA 92085, 1-714-597-3300 or equal.

2.5 SLEEVING

A. Provide sleeve beneath hardscape for irrigation pipe. Provide separate sleeve beneath hardscape for wiring bundle.

B. Provide PVC Schedule 40 pipe with solvent welded joints for sleeving material beneath hardscape.

C. Pipe shall be made from NSF approved, Type I, Grade II PVC compound conforming to ASTM resin specification D-1784. All pipes must meet requirements set forth in Federal Specification PS-22-70 (Solvent-Weld Pipe).

D. Sleeve sizing: A minimum of twice the nominal diameter of solvent-welded pipe or wiring bundle, or as indicated on drawings. Pipe sleeves installed under paving and walkways shall be PVC Schedule 40.

2.6 THRUST BLOCKS:

A. Use 3,000 PSI concrete. Use commercially pre-mixed concrete unless written approval is provided by City's Representative prior to construction.

B. Use 6 mil plastic protective sheeting.

C. Use No. 4 Rebar.

2.7 TRACER WIRES

A. A No. 12. Green Type TW plastic-coated copper tracer wire shall be installed with non-metallic main lines.

2.8 PVC PIPE (GENERAL)

A. All pipe to be permanently and continuously marked with manufacturer's name, pipe size (IPS) and schedule (D-1785-68 for schedule pipe), manufacturer's lot number and NSF approval. Pipe with dents, ripples, wrinkles, die or heat marks is not acceptable. Pipe shall be delivered to the site in 20 foot lengths.

B. Do not re-use existing PVC pipe.

C. All PVC reclaimed water pipe shall be a solid purple color only.

2.9 PRESSURE MAIN LINE PIPING

A. Pressure main line piping shall be solvent welded type.

B. Use Class 200, SDR-21, rated at 200 PSI, for all pipe diameter 4-inches and larger, conforming to:
   1. Dimensions and tolerances established by ASTM Standard D2241.
   2. Pipe shall be made from NSF approved Type I, Grade 1 PVC compound conforming to ASTM resin specifications D-1784 and d 1785. All pipe must meet requirements as set forth in Federal Specification PS-22-70, with an appropriate standard dimensions (S.D.R.), (Solvent-Weld Pipe).

C. Use Schedule 40, for all pipe diameter up to 3-inches, conforming to:

1. Pipe shall be Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM D1785 and D2665 (where applicable), consistently meeting and/or exceeding the Quality Assurance test requirements of these standards with regard to material, workmanship, burst pressure, flattening, and extrusion quality.

D. All PVC pipe must bear the following markings:

1. Manufacturer's Name.
2. Nominal Pipe Size
3. Schedule or Class
4. Pressure Rating in P.S.I.
5. NSF (National Sanitation Foundation) approval.
6. Date of Extrusion
7. U.P.C Shield Logo (IAPMO Approval)

E. Size as shown on drawings.

F. Use primer approved by pipe manufacturer. Use solvent cement conforming to ASTM Standard D2564.

G. No ring tight piping allowed – All connections to be solvent weld.

2.10 NON-PRESSURE LATERAL PIPING:

A. Non-pressure buried lateral line piping shall be PVC Class 200 with solvent-weld joints.

B. Pipe shall be made from NSF approved, Type I, Grade II PVC compound conforming to ASTM resin specification D-1784. All pipes must meet requirements set forth in Federal Specification PS-22-70 (Solvent-Weld Pipe)

C. Except as noted above, all requirements for non-pressure lateral line pipe shall be the same as for solvent-weld pressure main line pipe as set forth in item 2.2, sub-heading D through F.

2.11 PIPE FITTINGS:

A. Fittings to be standard weight, Schedule 40, injection molded PVC. Comply with ASTM – D17854, cell classification 1345B. Threads, where required, injection molded type. Tees and ells: side gated. Threaded nipples: Standard weight, Schedule 80 with molded threads.

B. All fittings shall bear the manufacturer's name, or trademark, material designation, size, applicable I.P.S. schedule and NSF seal of approval.

C. Threaded PVC nipples: Schedule 80, Type 1, 3 inch minimum length, except where detailed otherwise on drawings. PVC domestic main to drinking fountains shall be PVC Schedule 80 solvent welded plastic pipe; gray in color, meeting ASTM D-1785.

2.12 SOLVENT PRIMER AND CEMENT:

A. Primer: For PVC solvent weld connections shall be as recommended by the manufacturer of the PVC pipe. Primer shall be chemically compatible with the pipe, fittings and solvent. No primer need be used if "Christy's Red Hot Blue Glue" is used as solvent material.

B. External Surface Cement: For PVC solvent weld connections shall be as recommended by the manufacturer of the PVC pipe. Solvent shall be chemically compatible with the pipe, fittings and primer.

2.13 PIPE JOINT COMPOUND:

A. Joint compound to be non-hardening, formulated for threaded connections on water carrying pipe, Lasco Blue Pipe thread sealant or approved equal.

2.14 PIPE THREAD TAPE:

A. 100% virgin Teflon pipe thread tape.

2.15 CORROSION PROTECTION:

A. Provide polyethylene wrap a minimum of six (6) mils thickness for all metal pipe, fittings, tie-rods, valves, and other appurtenances. The raw material must meet or exceed:
   1. Type 1, Class A Grade E-1, in accordance with ASTM Standard Designation D-1248.
   2. Tensile Strength – 1,200 PSI minim.
   3. Elongation – 300% minimum.
   4. Dielectric Strength – 800 V/Mil thickness minimum.

2.16 BALL VALVES

A. Ball valves 2 inches or smaller shall have screwed joints and Schedule 80 plastic.

B. All ball valves shall have a minimum working pressure of not less than 150 PSI and shall conform to AWWA standards.

C. Manufacturer and model number as indicated on drawings or approved equal. Size per plans to match size of remote control valves.

2.17 ISOLATION GATE VALVES

A. 2-1/2”-inches and smaller: Bronze Body, full port, ISO-9002 compliant, 200 pound saturated steam rated; with screwed joints; non-rising stem; threaded bonnet solid disc, threaded ends complying with ANSI Standards B2.1. Provide with brass or bronze handwheel.

B. Isolation gate valves shall be manufactured by Matco-Norca (model per plans) or approved equal – (800) 935-5456.

2.18 REMOTE CONTROL VALVES

A. The remote control valve shall be normally closed 24 VAC solenoid actuated globe pattern, spring-loaded diaphragm type. The valve shall be pressure rated up to 200 PSI.

B. The valve shall have a 600-pound test fabric reinforced one-piece molded construction diaphragm with O-ring seal with self-cleaning orifice.

C. Valves shall be spring-loaded, self-cleaning, packless diaphragm activated, of a normally closed type.

D. Remote control valve body and bonnet shall be solid brass and the valve shall have solid brass control/shut-off stem and manual solid brass heavy duty drain cock operator.

E. Remote control valves shall be manufactured by Weathermatic, 3301 W. Kingsley Road, Garland, Texas, 75041-2207 / Tel: (888) 484-3776 or approved equal. Model as indicated on drawings or approved equal with ball valve and union before remote control valve, labeled with Christy ID tags or approved equal.

F. Drip Valve Assembly shall include: Pressure Regulators to be 1" Pre-Set Pressure regulator by Senniger or approved equal and Plastic Filter with140 mesh screen, by Amiad. Install as per detail.
   1. Plastic Filter should be sized as followed:
      a. 1 – 22 GPM, use 1-inch size
      b. 22 – 35 GPM , use 1-1/2-inch size
      c. 35 - 52 GPM, use 1-1/2-inch size "Long Filter.

2.19 QUICK COUPLER VALVES

A. Quick coupler valves shall be one piece type.

B. The valve body shall be constructed of red brass. The cover shall be a durable, protective self-closing rubber cover. The cover shall be a locking rubber cover (LRC).

C. The valve shall be opened and closed by a brass key of the same manufacturer. The valve throat shall have a key-way with detent positions for regulating water flow.

D. The quick coupling valve shall be as manufactured by Rain Bird Corporation, Azusa, California or approved equal.

2.20 MASTER CONTROL VALVE:

A. Shall be normally open master valve, with a voltage range from 17 to 40 VAC self cleaning slow closing iron and bronze construction with a 5 year warrantee.

2.21 BOOSTER PUMP ASSEBLY – GENERAL REQUIREMENTS

A. The pumping system must automatically maintain a constant discharge pressure regardless of varying flow demands within the station rating. The prefabricated pumping station must have a capacity as shown on the construction documents and a station discharge pressure downstream of all pump system components as shown on the construction documents.

B. The station shall be completely piped, wired, hydraulically and electrically tested on a structural steel skid before shipment to the job site.

C. Construction must include skid assembly to support all components during shipping and to serve as the installed mounting base. Base must be of sufficient size and strength to resist twisting and bending from hydraulic forces and support the full weight of pumps and motors. Skip welding is not acceptable during fabrication of the skid.

D. All pump station components shall be supplied by and be the responsibility of one manufacturer, even though some components were manufactured by others.

E. The pump station and related equipment shall meet all the general and technical specifications; shall be designed, fabricated and installed in a workmanlike manner; and shall be delivered within schedules negotiated between Contractor and manufacturer. The entire station must be U.L. Listed.

F. All components of the pumping system must be designed to function in an outdoor environment exposed to all of the elements. Furnish protective enclosures and covers as required for proper operation of the system.

G. Provide a factory-trained technician to supervise the installation of the pump station, pumps, and motors.
   1. In addition to the time required for installation supervision, the technician must provide a minimum of 1 day of training for the Owner's staff in the operation, maintenance, and programming of the pumping system.

H. Acceptable Suppliers/Manufacturers:
   1. As manufactured by Barrett Engineered Pumps and as supplied by Imperial Technical Services (Andrew Bolt, 209-404-1746).

I. Booster Pump Assembly #1 System Design Parameters:

IBGA5-1-2-1.5/VFD/NHMO15/ATT/EAL System Model Number	32 GPM System Design Flow Rate	80 PSI System Design Pressure	1 1/2 INCH System Piping Size
60 PSI Minimum Suction Pressure	208/230/460 VAC (Specify) System Electrical Voltage	1/3 PHASE 60 Hz System Electrical Phase and Frequency	
10GA5 – 1 ¼" Pump Model Number	32 GPM Pump Capacity (GPM)	60 FEET Pump Total Head (Feet)	
1 HP Pump Horse-power	3500 RPM Pump RPM	Undetermined System Full Load Amper-age	

J. Booster Pump Assembly #2 System Design Parameters:

IBGA5-1.5-2-1.5/VFD/NHMO15/ATT/EAL System Model Number	24 GPM System Design Flow Rate	80 PSI System Design Pressure	1 1/2 INCH System Piping Size
60 PSI Minimum Suction Pressure	208/230/460 VAC (Specify) System Electrical Voltage	1/3 PHASE 60 Hz System Electrical Phase and Frequency	
10GA5 – 1 ¼" Pump Model Number	24 GPM Pump Capacity (GPM)	60 FEET Pump Total Head (Feet)	
1 HP Pump Horsepower	3500 RPM Pump RPM	Undetermined System Full Load Amperage	

K. Booster Pump Assembly

1. A simplex water pressure booster system as designed and fabricated by Barrett Engineered Pumps (619) 232-7867. The system shall be a completely prefabricated system with pump, piping, electrical and structural elements. The entire booster pump assembly shall be UL Listed and Approved.
2. Pump shall be: (GA Series) Single stage end suction close coupled centrifugal, cast iron bronze fitted construction, equipped with mechanical shaft seal, back pullout design. Impeller shall be threaded directly to the end of the shaft. Pump shaft shall be stainless steel with no sleeve. Pump shall be directly coupled to a C-face electric motor.
3. Electric motor shall be of the squirrel cage induction type suitable for full voltage starting. Motor shall be ODP to aid in cooling. Electric motor shall be rated for continuous service. The motor shall have horsepower ratings such that the motor will carry the maximum possible load to be developed under the designed pumping conditions and not overload the motor beyond the nameplate rating of the motor. Motor shall have a 1.15 service factor. The motor shall conform to the latest NEMA Standards for motor design and construction.
4. Pump Control Panel shall have a NEMA 4X plain front non-metallic enclosure with padlock latches. This Includes power and control re-settable thermal circuit breakers, heavy duty magnetic starter with adjustable overload protection, Hand-Off-Auto switch to select mode of operation, and heavy duty numbered terminal strips for power and control wiring lead terminations.
5. Metal oxide varistor protected pump start relay(s) incorporated in panel to start pump with signal from each irrigation controller.
6. All system piping shall be type304 stainless steel. All fittings shall be stainless, with unions or flanges to allow for system disassembly or major component removal. System shall incorporate an integral full pipe size bypass line with isolation valve to allow for pump removal and repair without disrupting water supply to system.
7. Isolation valves shall be all brass quarter turn ball valves with hard chrome ball on lines 2" and less. Isolation valves shall be lug style butterfly valves with Buna-N elastomeric seats, ductile iron nickel coated disc, and stainless steel stem with handle and 10 position galvanized memory plate on lines 2½" and greater.
8. Gauges shall be 2½" diameter face, glycerin filled with stainless casing and brass internals.
9. Flow switch shall be a 316 stainless steel and solid state thermal sensor designed to measure change in flow velocity and in temperature. The flow switch shall include an

integrated bar graph with 10 LED lights and shall be capable of providing indication of flow (green), closed (orange), and open (red) conditions.

10. Pump system shall be mounted on a structural aluminum skid with mounting flanges on front and back to allow for mounting of skid to concrete pad. Skid equipped with pipe support on suction and discharge piping. All nuts and bolts and washers to be heavy zinc coated steel on skid and piping. Skid shall include mounting hardware for integral aluminum enclosure.
11. The system enclosure shall be vandal and weather resistant, marine grade aluminum alloy 5052-H32 construction with rectangular punch-outs for viewing and heat dissipation. The enclosure shall be low profile hinged top design with padlock provision. The cover shall be secured to the concrete pad with stainless steel hardware. The enclosure shall measure 48D" x 60W" x 40H" and concrete pad dimensions shall be 60" x 72" x 4". The enclosure shall be as manufactured by V.I.T. Products, Inc. and shall be UL Listed and Approved.
12. Pump Assembly shall include the following options:
    a. **(VFD)** Where specified by the System Design Parameters, a **Variable Frequency Drive** system to receive feedback signal from system mounted stainless steel pressure transducer, and in conjunction with internal software driven PID control loop maintain customer adjustable constant system discharge pressure by varying the speed of the pump in response to varying system load.
    b. **(ATT)** Where specified by the System Design Parameters, **Sound Attenuation** foam shall be installed on interior of enclosure with baffles on venting to reduce sound emanating from the booster system.
    c. **(EAL)** Where specified by the System Design Parameters, an **External Alarm Light** shall be pre-mounted on the booster pump enclosure and pre-wired to the control panel for the purpose of visually indicating an alarm condition from pump or system failure.
    d. **(NHMO15)** Where specified in the System Design Parameters, a **Hydrometer Combination Normally Open Master Valve/Flow Sensor** for the purpose of reacting to a high flow condition. The Hydrometer shall be 24 VAC activated, to serve as master valve, standard read water meter, and flow sensor and shall be 1 1/2" male pipe thread, cast iron construction with non-metallic meter rotating parts and standard mechanical switch pulse system. A Flow Computer/Transmitter shall be included to interface with the hydrometer for the purpose of reading flow and reacting excessive flow and signaling the master valve.
13. The services of a factory representative or trained service professional shall be made available on the job site to check installation and perform the startup and instruct the operating personnel. A startup report containing voltage and amperage readings, suction and discharge pressure readings, estimated flow conditions, and general operating characteristics shall be submitted to the Owner.
14. Two sets of operating and maintenance manuals shall be provided to the owner after startup and shall include parts manuals for major components, performance curve for pump, general sequence of operation, and electrical schematic for control panel.
15. The warranty period shall be a non-prorated period of 36 months from date of purchase.

2.22 LANDSCAPE INJECTION SYSTEM

A. Acceptable Suppliers/Manufacturers:

1. As manufactured by Landscape Injection Systems and as supplied by Imperial Technical Services (Andrew Bolt, 209-404-1746).

B. Landscape Injector System Design Parameters – POC #1:

FB1-5-53/F-200C System Model Number		.78 Acres Estimated Area	91 PSI System Design Pressure	2 1/2 INCH System Piping Size
53 Gal. Tank Size	120 VAC Elect. Voltage	1 PHASE 60 Hz System Electrical Phase and Frequency		

C. Landscape Injector System Design Parameters – POC #1:

FB1-5-53/F-200C System Model Number		.64 Acres Estimated Area	91 PSI System Design Pressure	2 1/2 INCH System Piping Size
53 Gal. Tank Size	120 VAC Elect. Voltage	1 PHASE 60 Hz System Electrical Phase and Frequency		

D. Metering Pump:

1. The Fertilizer Injection System shall use metering controls that allow the injection rate to be set through Stroke Speed: 1 – 300 strokes per minute (spm), Percentage: 1 to 100% and Injection rate: ml/min.
   a. Manual stroke length is adjustable from 20% to 100%.
   b. The metering control shall have onboard calibration to measure the actual discharge volume under the exact operating condition of the specific installation and chemical, then stores that value to ensure the correct injection rate.
2. The metering control shall be capable of Multi-pump proportional flow rate injection from a single direct flow sensor signal (pulse/analog).
3. The metering pump shall be capable of 2-point level control enables output of an alarm at the liquid level "low limit" and stops pump operation at the "low-low limit".
4. The metering pump shall be capable of batch injection allow for pump operation to start on a command signal. Operation automatically stops and operator is notified of completion when a preset count is reach.
5. Interval injection allows for repeated start and stop operation by a preset timed program. ON time and OFF interval can be easily set from 1-9999 minutes respectively.
6. The fertilizer injection system shall include low level sensing to insure that the metering pump shuts down in case of low tank fluid levels.
7. The metering pump shall be made of a PVC Head, Viton Valve Seat, Ceramic Check Ball, Telflon Diaphragm, and ½" FNPT Suction and Discharge Connections.
8. The fertilizer injection system shall operate on 120VAC.
9. The fertilizer injection system shall be capable of proportional injection to system flow by receiving a pulse signal from a flow sensor to the metering pump. The flow sensor shall signal the metering pump of the current volume of water flowing through the irrigation mainline piping at any given time. The flow sensor shall be sized according to mainline size and flow.

E. Tank:

1. The tank shall be made of durable corrosion-resistant polyethylene material to hold all typical chemical or biological materials used in fertigation and are dual-tanked for greatest containment. The tank size shall be determined according to the area irrigated.

2.23 AUTOMATIC IRRIGATION CONTROLLERS AND COMPONENTS

A. Automatic Irrigation Controllers shall be 2-wire system for a maximum of 48 stations. Manufacturer and model number as indicated on drawings. All two-wire operation shall include two-way communication between the controller and decoder to notify the user of any error in operation or electrical faults. Controller(s) shall be a four (4) program, stand-alone controllers capable of operating up to 48 remote control valves. Controllers shall be compatible with SLW series weather station for fully automatic adjustment of seasonal irrigation schedules.

B. Controller shall fully communicate and integrate with City's existing system. No known equal.

C. Operation:

1. Controller may be programmed to operate with either user supplied station run times or automatically calculated station run times based on SLW weather station data, sprinkler type, plant type, soil type and slope. Automatic water conservation shall be available using either twelve programmable monthly seasonal percentage adjustments or automatic ET based adjustments based on SLW series weather station real-time, on-site climate data. The user may select to move between timed station mode or ET mode without loss of programming information.
2. Each program shall have eight independent start times, calendar schedules, watering budgets, and cycles for varying sprinkler types and soil percolation rate.
3. Controller shall have a user-selectable cycle and soak feature, by program, and fully automatic cycle and soak based on sprinkler precipitation rates, soil type and slope for reduction of run-off. The controller shall be capable of storing a user-created default program which may be retrieved at a later date to replace any overrides or adjustments to scheduled operation.
4. Controller shall have a standard pump start or master valve output which shall be programmable to operate on demand from any selected controller station. A programmable pump start/master valve delay shall be included in the pump circuit.
5. Display shall be backlit for clear viewing in all lighting conditions. A standard rain, wind, or soil moisture interrupt input shall be standard to inhibit operation during conditions not desirable for irrigation.
6. Controller shall have one program able to operate concurrently with any other operating program. All other automatic programs will stack in sequence of earliest programmed start time.
7. Program schedules shall include options for daily, odd date, even date, select 7 day calendar, or intervals of 1 to 30 days. A ‘no water’ window shall be available to inhibit daily operations of a program between two selected times. Programs shall be capable of being inhibited by omission of any specified weekly calendar day.
8. Manual program operation shall be provided by program using a single button. Separate functions shall be available to operate a single zone or to test all zones for a user selected run time in seconds and minutes. Controller shall have self-diagnostic capability to detect open and shorted circuits, display solenoid holding current in milliamps, and chatter the solenoid actuator for remote valve location.
9. Non-volatile memory and a real-time clock shall maintain all programming and the date and time during all power losses for the duration of the product warranty. Date information shall be entered and maintained in an eight (8) digit format to automatically determine the correct day of week and Julian calendar day for any date. Controller shall have an RJ-11 quick connect for a TRC remote receiver and be fully compatible with TRC sidekick operation.

10. Controller shall have a modular output design including ability to operate as either a standard 24 VAC irrigation control or as a two-wire decoder system using decoders manufactured by Weathermatic Sprinkler Division of Telsco Industries.

D. Construction: Controller shall be enclosed in a U.L. listed rainproof enclosure for indoor or outdoor use. A test post for 24 volt operation shall be accessible with or without the microprocessor panel.

E. Electric: Controller shall be completely electric in operation. Controller shall be installed and wired in accordance with manufacturer's published instructions. Controller shall be capable of operating from an independent power supply. Controller shall be capable of operating 120-240VAC/50-60 Hz without modification. Controller shall include an internal junction box for all primary electrical connections. Input and output power surge protection shall be standard.

F. Valve decoders shall be model SLDEC (2) or (4) as manufactured by Weathermatic Sprinkler Division of Telsco Industries.

1. Decoders shall be reprogrammable on the job site using the SLM48DM module's programming port and shall be electrically compatible with any Weathermatic commercial grade 24 VAC low voltage solenoid over the full range of maximum rated operating pressures. Each decoder output shall be capable of operating up to a maximum of two electrical solenoid valves. Decoders shall have two way communications between the controller module and decoders allowing for self-diagnostic testing to indicate a solenoid short, open solenoid, and wire path over-current or communications errors. Each decoder shall have an indelible marking label that to indicate the color code and station for each valve operated by the decoder and that may be marked by the installer for identification.
2. Warranty: Decoders shall have a manufacturer's limited warranty of three (3) years only when installed with two wire cable model SLWIRE supplied by Weathermatic Sprinkler Division of Telsco Industries and connected using model SLCONN aluminum connectors and dry splice connections supplied with the decoders.

G. Decoder wire shall be Smartwire model slwire, as manufactured by Weathermatic. Wire size shall be a minimum of #14 gauge and should be sized as required for operation of furthest decoder from controller.

1. Construction:
   a. Conductors must be soft drawn, annealed, solid copper conforming to ASTM 33. Conductor insulation must be 4/64-inch thick polyvinyl chloride (PVC) conforming to UL #493.
   b. Two insulated conductors shall be laid in parallel and encased in a single outer jacket of 3/64-inch thick, high-density, sunlight resistant polyethylene conforming to ICEA S-61-402 and NEMA WC5, having a minimum wall thickness of .045-inch. The two conductors must be color-coded: normally one conductor red and the other black. Both conductors shall be the same size.
2. Operation: Wire shall be sized as either 12 or 14 AWG but shall not exceed manufacturer's published limits for maximum wire distances. All connections to the irrigation control wires along the two-wire path shall be made using SLCONN splice kits supplied by Weathermatic Sprinkler Division of Telsco Industries.

H. Lightning Protection shall be Weathermatic model SLGDT gas discharge tube lightning arrestors. The SLGDT lightning arrestor shall attach directly to the 2-wire system as per

manufacture's recommendations and helps dissipate static electricity generated by a nearby lightning strike. While Weathermatic components have lightning arresting features, the SLGDT provides an extra measure of protection.

I. Acceptable Suppliers/Manufacturers:
   1. As manufactured by Weathermatic Sprinkler Division of Telsco Industries and as supplied by Imperial Technical Services (Andrew Bolt, 209-404-1746).

2.24 WATERPROOF CONNECTORS

1. Waterproof connectors to be Model SLCONN aluminum connectors and dry splice kits as supplied by Weathermatic Sprinkler Division of Telsco Industries.

2.25 VALVE BOXES

A. Valve boxes unless otherwise noted shall be fabricated from a durable plastic material resistant to weather, sunlight and chemical action of soils. They shall be green in color. The cover shall be secured with a stainless steel bolt mechanism. The cover shall be capable of sustaining a load of 1500 PSI. Valve box extensions shall be by the same manufacturer as the valve box. All valve boxes shall be as manufactured by Brooks, Carson or an approved equal

B. Quick coupling valve boxes shall be round. The cover shall be heat branded with the letters "QCV," 2" high.

C. Gate valve boxes shall be round. The cover shall be heat branded with the letters "GV," 2" high.

D. Remote control valves shall be 12" X 18". The cover shall be heat branded with the letters "RCV" and the valve number in characters 2" high.

E. Splice boxes shall be 12" X 18". The cover shall be heat branded with the letters "SB," 2" high.

F. Traffic area boxes: concrete cast iron lid designed for vehicular traffic use.

2.26 SUB-SURFACE CAPILLARY IRRIGATION DRIPLINE

A. The pressure compensating dripline shall models shown on plans and as manufactured by KISSS America, Inc., 1200 S. Fordham St., Suite B, Longmont, CO., 80503, (800) 376-7161. No Known Equal. Contact John Ossa, National Accounts Director, (720) 445-3739.

B. The drip tubing shall be a pre-bonded emitter type. The tubing shall have emitters spacing and flow rates as indicated on irrigation legend.

C. The drip tubing shall have factory installed polypropylene dispersion layer on top to act as a boundary between the soil and the emitter and force the water into the geo-textile to begin the capillary action of water into the soil.

D. The drip tubing shall have a factory installed geo-textile that starts the capillary movement of water into the soil by providing infinite number of points along the textile where water makes

its way into the soil which has its own capillary movement of water. The geo-textile shall maintain moisture uniformity along its length providing a consistent and uniform source of water to the soil and to the root structure. The geo-textile fabric acts as a single, contiguous emitter.

E. The drip tubing shall be polyethylene tubing with pressure compensating emitters with check valves**.** The check-valve emitter shall be pressure compensating to maintain a uniform flow rate from the system while preventing downward drainage in highly sloped areas when the system is off.

F. The flexible polyethylene tubing shall have factory installed pressure-compensating, inline emitters spaced evenly per listed spacing. The flow rate from each installed inline emitter shall be .621 gallons per hour or .357 gallons per hour, as specified on plans, when inlet pressure is between 14 and 50 psi.

G. The inline emitter diaphragm shall have a large pre-entry filter area to screen particulate matter and shall be "self-flushing" at the beginning and at the ends of every irrigation event.

H. Specifications:
1. Outside diameter: 0.67" (17.00mm)
2. Inside diameter: 0.606" (15.39mm)
3. Wall thickness: 0.045" (.63mm)
4. Use with KISSS BFF fittings.

2.27 AIR/ VACUUM RELIEF VALVE

A. Air/ vacuum relief valve shall be an O-ring seal type with inlet threads of ½-inch (MIPT) capable of venting air until 4 PSI is achieved at system startup and vacuum relief when 4 PSI is reached during system shutdown.

B. The air/ vacuum relief valve shall be rated at a maximum operating pressure of 100 PSI. The air/ vacuum relief valve body and shuttle shall be constructed of corrosive-proof engineering thermoplastics.

C. The seal shall be a rubber O-ring.

D. The Air/Vacuum Relief Valve shall be as shown on irrigation legend or approved equal.

2.28 MANUAL FLUSH VALVE

A. Line Flushing Valve shall be installed as noted on plans.

B. The Line Flushing Valve shall be as shown on irrigation legend or approved equal.

2.29 DEEP ROOT WATERING SYSTEM

A. Deep root watering system shall be as shown on irrigation legend or approved equal.

2.30 ELECTRICAL REQUIREMENTS TO AUTOMATIC CONTROLLERS (120V)

A. Service to automatic controllers and final hook up shall be provided by electrical subcontractor.

B. Electrical equipment installed outside building shall be NEMA 4 type.

C. All connections between electrical services and equipment shall be in rigid galvanized electrical conduit, with conduit and wiring size as required.

D. To be complete in every respect to City Electrical Code, ready for use and in accordance with manufacturer's requirements. Provide separate power shut-off switch at panel for each controller. All wiring in galvanized conduit and fittings from source provided under the electrical section. No running threads accepted; use nipples. Conduit system shall be 660 volt insulation, NEC standard annealed copper wire and shall be minimum AWG #12 TW or RW. Protect each controller by a code approved ground connection. Supply to be 120 volts, 60 cycle, single phase, one amp. Use only galvanized steel fasteners in securing controllers in position. Install new controller as detailed on drawings.

2.31 REDUCED PRESSURE BACKFLOW PREVENTION DEVICE

A. Reduced pressure backflow prevention device models shall be as shown on plans and shall comply with the following specifications:

1. The Reduced Pressure Principle Backflow Preventer shall be ASSE® Listed 1013, rated to 180°F and supplied with full port ball valves. The main body and access covers shall be bronze (ASTM B 584), the seat ring and all internal polymers shall be NSF® Listed Noryl™ and the seat disc elastomers shall be silicone. The first and second checks shall be accessible for maintenance without removing the relief valve or the entire device from the line. If installed indoors, the installation shall be supplied with an air gap adapter and integral monitor switch.
2. Standard Compliance:
    a. ASSE® Listed 1013
    b. IAPMO® Listed
    c. UL® Classified (less shut-off valves or with OS&Y valves)
    d. C-UL® Classified
    e. CSA® Certified
    f. AWWA Compliant C511
    g. Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California.
    h. AWWA Compliant C511

B. See Plans for quantity, size and location.

C. Material List:

Part	Specification
1. Main Valve Body	Cast Bronze ASTM B 584
2. Access Covers	Cast Bronze ASTM B 584

3. Internals	Stainless Steel 300 Series
4. Elastomers	Silicone (FDA approved), Buna nitrile (FDA approved)
5. Polymers	Noryl, NSF Listed
6. Springs	Stainless Steel 300 Series

D. Backflow Enclosures shall be Model, SBBC-30ALI as manufactured by V.I.T. Products Inc., at 1-729-1314 or approved equal complying with the following specifications:

1. The backflow enclosure shall be of a vandal resistant nature manufactured entirely of marine grade aluminum alloy 5052-H32, with a wall thickness of one eighth inch.
2. The mounting base plate shall be manufactured of stainless steel and powder coated.
3. The main housing shall be of solid sheet construction with stainless carriage bolts used for assembling enclosure sides top and ends.
4. The enclosure shall have a drop down door with stainless hardware hidden beneath door frame. The enclosure body shall lift open, pivoting from the back edge mounted to base also with hidden stainless hardware. Enclosure shall stay secured to mounting base plate in open and closed positions.
5. Mounting Base shall have concrete anchor bolts to submerge into concrete leaving mounting base flush on concrete surface. The enclosure door shall have a recessed handle and provide a concealed hasp for a padlock.
6. Insulated Polar Beariers shall be used to protect backflow devices from freezing temperatures inside Strongbox Insulated Aluminum Enclosures. Polar Beariers protect to a R19 insulation rating using Radiant Barrier Foil (RBF) inserted between acrylic polyester and air bubble pack. These layers forming an insulated bag shall be impervious to moisture

2.32 WATER METER

A. Materials for service supply lines and fittings, meter, meter box, and appurtenances, installation and adjustment shall conform to the specifications contained within the latest revision of SAWS' Material Specifications.

2.33 OTHER COMPONENTS

A. Tools and Spare Parts: Furnish operating keys, servicing tools, test equipment, spare parts and other items indicated in drawings and specifications.

B. Other Materials: Provide other materials or equipment shown on drawings or installation details that are part of irrigation system, even though items may not have been referenced in specifications.

PART 3 - EXECUTION

3.1 GENERAL

A. All work shall be performed by competent, experienced workmen and in a manner to coincide with methods as set forth by the manufacturers of the equipment to be used and as acceptable to the Agency Representative. No consideration will be given to any design changes unless called for by the Agency Representative.

B. Contractor shall be responsible for damages caused during his operations to any existing underground utility lines including existing irrigation control wires, storm sewers, sanitary sewer systems, gas lines, potable water lines, irrigation lines, telephone cables, gasoline or oil lines, electrical cables, or any other systems (buried or overhead). If such damage should occur, Contractor shall immediately notify Landscape Architect, Agency, and department affected by such damages and shall pay all ensuing costs.

C. Where it is necessary to excavate adjacent to existing trees, use all possible care to avoid injury to trees and tree roots. Excavation in areas where 2 inches and larger roots occur shall be done by hand. Roots 2 inches and larger in diameter, except directly in the path of pipe or conduit, shall be tunneled under and shall be heavily wrapped in burlap, to prevent scarring or excessive drying. Where a ditching machine is run close to trees having roots smaller than 2 inches in diameter, the wall of the trench adjacent to the tree shall be hand trimmed, making clean cuts through. Roots 1 inch and larger in diameter shall be painted with two coats of Tree Seal, or equal. Trenches adjacent to trees would be closed within 24 hours. Where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas.

D. Comply with all governing construction and plumbing ordinances for all work under this contract.

E. All work shall be assembled to conform to details and notes on the drawings, whether or not mentioned in the specifications.

3.2 EXAMINATION

A. Examine site conditions for compliance with requirements and conditions affecting installation and performance prior to commencement of work. Note the extent and type of work to be done and field – verify quantity, location and condition of all existing improvements to remain and all new improvements. Should there be discrepancies between the contract documents and the actual site conditions, do not proceed with the installation without notifying the City's Representative. Proceeding without notification, the Contractor assumes full responsibility for all revisions and related costs

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Exercise care in excavation and working near existing utilities. Check existing utility locations. Contractor shall be responsible for damages to utilities which are caused by his operations or neglect.

B. Coordinate installation of the irrigation materials, including pipe, so there shall be no interference with the utilities or other construction or difficulty in planting trees, shrubs and ground covers.

C. Do not proceed with work until unacceptable site conditions are corrected or existing utilities are located and/or marked out in field.

D. Protection:

1. Provide barricades, coverings, warning signs, lights and other protection required by local code or OSHA to prevent damage to existing improvements to remain and protect the public.
2. Protect improvements on adjoining areas as well as those on the project site.
3. Restore any improvements damaged by this work to original condition, as acceptable to City's Representative or other parties or authorities having jurisdiction.
4. Protect existing trees and other vegetation to remain against damage. Do not stockpile construction or excavated materials within drip lines.

3.4 INSPECTIONS AND REVIEWS

A. Subsections of mainline pipe may be tested independently, subject to review of City's Representative.

B. Provide clean, clear water, pumps, labor, fittings, and equipment necessary to conduct tests or retests.

C. Site Inspections:

1. Before any work commences, a conference shall be held with the Agency's Representative and Contractor regarding general requirements of this work.

2. Prior to trenching, Contractor shall be responsible for verifying existing pressure at point of connection. If pressure varies from what is indicated on drawings, the Contractor shall immediately notify Agency representative.

3. Contractor's responsibility:
   a. Examine surfaces for conditions that will adversely affect execution, permanence and quality of work.
   b. Verify that grading has been completed and the work of this section can properly proceed.
   c. Exercise extreme care in excavating and working near existing utilities. Contractor is responsible for damages to utilities which are caused by his operations or neglect. Check existing utility drawings for locations.
   d. Notify the Agency's Representative in writing, describing unacceptable conditions.

e. Do not proceed with work until unacceptable site conditions are corrected or existing utilities are located.

4. Commencement of work implies acceptance of existing site conditions.

D. Verification of Dimensions

1. Verify all horizontal and vertical site dimensions prior to staking of heads. Do not exceed spacing shown on drawings for any given area. If such modified spacings demand additional or less materials than shown on the drawings, notify Architect before commencing work.

E. Utility Locates ("Call Before You Dig"):

1. Arrange and coordinate Utility Locates with local authorities prior to construction.
2. Repair underground utilities that are damaged during construction. Make repairs at no additional cost to contract price.

F. The Contractor shall request the presence of the City's Representative at least 48 hours (two working days) in advance of testing.

G. All hydrostatic tests shall be made only in the presence of the City's Representative. No pipe shall be backfilled until it has been inspected, tested and approved.

H. Contractor to furnish necessary force pump and all other test equipment.

I. Testing shall be performed after installation of all equipment or as noted below, but prior to the installation of plant material. No planting shall take place until coverage test has been approved in writing by the City's Representative. Tree planting may commence upon approval from City's Representative.

J. Failure of initial testing review will require additional review. Payment of costs, including travel expenses and site visits by City's Representative, for additional reviews that may be required due to non-compliance with the Construction Documents will be Contractor's responsibility.

K. Site inspections and notification time:

1. Pre-construction conference 7 days
2. Pressure line installation and testing 48 hours
3. Controller installation 48 hours
4. Lateral line and bubbler and subsurface dripline installation 48 hours
5. Coverage test 48 hours
6. Monthly maintenance walk 48 hours
7. Final inspection 7 days

L. No field inspections will commence unless record drawings are current and available for observation upon request by the City's Representative.

M. Mainline pipe may be subjected to pressure test at any time after partial completion of backfill. Allow irrigation pipe jointed with solvent-welded PVC joints to cure at least 24 hours before testing.

N. Provide clean, clear water, pumps, labor, fittings, and equipment necessary to conduct tests or retests.

O. Hydrostatic Pressure Test:

1. Subject mainline pipe (3-inch and smaller) to hydrostatic pressure equal to 140 PSI for two hours. Test with mainline components installed.
2. Center-load pipe with approved backfill to anchor pipe before testing to prevent pipe from moving under pressure. Do not cover couplings and fittings.
3. Purge air from mainline pipe before test. Attach pressure gauge to mainline pipe in test section.
4. Observe pressure loss on pressure gauge. If pressure loss is greater than 5 PSI, identify reason for pressure loss. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pressure loss is equal to or less than 5 PSI.
5. Visually inspect irrigation pipe for leakage and replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pipe passes test.
6. Cement or caulking to seal leaks is prohibited.

P. Pressure Line Observation:

1. Prior to any backfilling of any trench(s) Contractor shall call for field observation for verification of material, depths, clearances, and tracer wire by the City's Representative.
2. Any trenching covered that was not inspected or approved shall be made visible for observation at the cost of the Contractor.

Q. Lateral Line Testing:

1. Prior to backfilling of any trench(s) Contractor shall call for field observation for verification of material, depths and clearances by the City's Representative.
2. All irrigation distribution components and assemblies shall be made visible for observation for verification that all material has been installed per plans and specifications.
3. All sub-surface drip lines and assemblies shall be made visible for observation for verification that all material has been installed per plans and specifications.
4. Any trenching covered that was not inspected or approved shall be made visible for observation at the cost of the Contractor.

R. Operational and Coverage Test:

1. Activate each remote control valve in sequence from controller. Provide either one additional personal with radio or use handheld remote to activate remote control valves from controller. Manually activating remote control valve using manual bleed mechanism at remote control valve is not an acceptable method of activation. City's Representative will visually observe operation, water application patterns, and leakage. All irrigation sub-surface drip systems must provide 100% head to head (emitter to emitter) coverage. Any areas not receiving head to head (emitter to emitter) coverage shall be corrected and retested per the City's Representative.
2. Replace defective remote control valve, solenoid, wiring, or appurtenance to correct operational deficiencies.
3. Replace, adjust, or move water emission devices to correct operational or coverage deficiencies.

4. Replace defective pipe, fitting, joint, valve, or appurtenance to correct leakage problems. Cement or caulking to seal leaks is prohibited.
5. Repeat test(s) until each lateral passes all tests. Repeat tests, replace components, and correct deficiencies at no additional cost to City.

S. Communication and Sensor Cable:

1. Test for leaks to ground per manufacturer's recommendations. Test results must meet or exceed manufacturer's guidelines for acceptance.
2. Test cable for continuity if cable is being installed for future expansion of the irrigation system.
3. Replace defective wire, underground splices, or appurtenances. Repeat test until manufacturer's guidelines are met.

T. Automatic Irrigation Control System Grounding:

1. Test for proper grounding of control system per manufacturer's recommendations. Test results must meet or exceed manufacturer's guidelines for acceptance.
2. Automatic Irrigation Control System shall be grounded and conform to requirements of the National Electric Code, current edition as adopted by local code, and the manufacturer’s specifications. No solder connections will be allowed. Resistance to ground shall be no more than 25 ohms.
3. Test to verify proper grounding.
4. Replace defective wire, grounding rods, grounding plates, or appurtenances. Repeat test until manufacturer's guidelines are met.

U. Tracing Wire Test:

1. Pass current through wire and demonstrate that wire is capable of locating the pipe.
2. If wire will not pass current, locate break and test until tracing wire works in accordance with its intended use.

V. Engineered Booster Pump Testing:

1. Notify the Owner's Representative three days in advance of testing.
2. On completion of assembly of the pumping station, all discharge pipe and valves must be hydrostatically tested at 150% of the maximum pump shutoff head.
3. Bump manual motor starter controls to prove correct rotation and secure local inspection/approval.
4. Test, verify, and demonstrate to the Owner's Representative the proper operation of all control and safety shut off devices.
5. Verify flow and discharge pressure from the pump system and demonstrate to the Owner's Representative system performance based on the specified values.
6. All costs, including travel expenses and site visits by the City’s Representative, for any additional reviews that may be required due to non-compliance with the Construction Documents are the sole responsibility of the Contractor.
7. Coordinate water availability with the Owner’s Representative.
8. Verify proper operation and set points of the pressure relief valves.
9. Acceptance Test Prior to Final Inspection:
    a. Upon completion of construction and prior to Final Inspection, an Acceptance Test must be passed.
    b. Coordinate start of Acceptance Test with the Owner’s Representative.

c. During the Acceptance Test, the pumping system must be fully operational. The pumping system must operate with no faults for 14 consecutive days. If at any time during the 14 day test period, a system fault occurs, the source of the fault must be determined and corrected and the 14 day evaluation period will start again. If a system fault occurs, make repairs within 24 hours of notification from Owner's Representative. Document any faults in the proof of test report listing date of fault, fault, cause of the fault and the corrective action taken.

d. When the system has operated for 14 days without fault, contact the Owner's Representative to schedule Final Inspection.

W. Landscape Injector System:

1. System installation and operation:
   a. Location: The system shall be installed as per details and manufacturer recommendations, in the area noted on plans.

X. Final Irrigation Inspection:

1. All irrigation systems shall be tested in the presence of the City's Representative and under complete automatic operation and proven to be leak free, irrigating designated areas per plans and specifications with least amount of over spray as possible.
2. Contractor shall provide as-built record drawings and controller charts at final irrigation inspection for approval prior to Mylar transfer and laminating.
3. All irrigation turn over items shall be turned in to the City's Representative prior to the start of maintenance.

Y. Field Mock Up:

1. Fabricate an on-site example of the following assemblies for demonstration prior to construction. The mock-ups must be presented to the City's Representative and meet approval prior to construction.
   a. Tree Bubbler and Drip Remote Control Valve Assembly: Mock-up is to include remote control valve, wire splices, filters, pressure regulators, and isolation ball valves.
   b. Quick coupling valve assembly.
   c. Bubbler assemblies.
   d. Drip assemblies.

Z. When the irrigation system is completed, perform a coverage test in the presence of the City's Representative to determine if the water coverage for planting areas is complete and adequate. Furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from plan, or where the system has been willfully installed as indicated on drawings when it is obviously inadequate, without bringing this to the attention of the City's Representative. This test shall be accomplished before any ground cover planting is planted.

1. Upon completion of each phase of work, the entire system shall be tested and adjusted to meet site requirements

3.5 WATER SUPPLY:

A. Irrigation system shall be connected to water supply points of connection as indicated on the drawings.

B. Connections shall be made at approximate locations shown on drawings. Contractor is responsible for minor changes caused by actual site conditions.

3.6 INSTALLATION OF PIPE WARNING TAPE

A. Warning Tape: Warning tape shall be installed directly on the top of the pipe longitudinally and shall be centered. The warning tape shall be installed continuously for the entire length of the pipe and shall be fastened to each pipe length by plastic adhesive tape banded around the pipe and warning tape at no more than 5-foot intervals. Taping attached to the sections of pipe before laying in the trench shall have 5-foot minimum overlap for continuous coverage. All risers between the main line and control valves shall be installed with warning tape. The warning tape shall extend up into the valve boxes or other appurtenances a minimum of 12-inches, so that it can be read clearly by opening the box or enclosure.

3.7 INSTALLATION OF WARNING LABELS AND SIGNS AND TAGS

A. Method of Attachment: Warning labels shall be firmly attached using heavy-duty nylon fasteners, and shall be sized and installed at locations as shown on the plans.

B. Equipment Requiring Labels or Tags: Warning labels shall be installed on all appurtenances in valve boxes, such as, but not limited to, meters, remote control valves, and on designated facilities, such as, but not limited to, controller panels, and booster pumps.

C. Identification tags shall be securely attached using UV rated zip ties rated to hold 50 pounds.

3.8 SUB-SURFACE CAPILLARY IRRIGATION DRIPLINE LAYOUT:

A. Contractor shall layout dripline, etc. for approval from City's Representative.

B. Layout drip systems and make minor adjustments required due to differences between site and drawings. Where piping is shown on drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas.

C. Keep all driplines, headers (manifolds), and mainline piping free of dirt during installation because any contamination in these lines could plug the dripline emitters.

D. Check headers (manifolds) and dripline laterals for leaks before covering with soil.

E. Check pressure at the site and be sure to operate below the maximum rated pressure of 60 PSI. Check and record pressure at the supply header and flush header. Any changes in pressure can be used in future troubleshooting.

F. If core aeration is expected to be done in the turf where sub-surface dripline is installed, be sure the tine depth is less than the depth of the buried dripline. Depth of dripline is recommended to be 6-inches.

G. When using machinery for the installation:
1. Do not drive over the dripline; always keep a layer of soil between the dripline and machinery tires.
2. To help keep driplines in place, drive in the same direction as the dripline, not across the lines.
3. Avoid driving in the same places at the site or you will be creating heavily compacted areas.

H. Be sure there is uniform soil compaction all over the site after installation.

I. After installation, open the flush valves (one at a time) and collect some of the water to check to be sure that the installation is clean.

J. After installation and backfill, observe the first wetting pattern. Rapid puddling could indicate a leak or might mean that the driplines are not buried at the specified depth.

K. Allow for expansion and contraction of tubing.

L. Tie-Down Stake:
1. Stagger stakes every 3 feet in sand, 4 feet in loam, and 5 feet in clay.
2. At fittings where there is a change of direction such as tees or elbows, use tie-down stakes close to the fitting on each leg of the change of direction.
3. Insertion plow and trenched installations do not require tie down stakes.

M. Air/Vacuum Relief Valves
1. Locating at the highest point(s) of the dripline zone.
2. Install the valve in an exhaust header or a line that runs perpendicular to the lateral rows to ensure all rows of the dripline can take advantage of the air/vacuum relief valve.

N. Manual Line flush point:
1. Install the manual flush at a low point in the exhaust header of a grid layout, or at the mid-point of a Loop Layout.
2. Install a flush port with a threaded plug or a manual flushing valve in a valve box with a gravel sump adequate to drain approximately one gallon of water.
3. Manual flush points are normally installed as far away from the water source as possible.

O. Dripline Insert Adapter (only allowed on 1-1/2” or larger pvc pipe)
1. Drill hole using 5/8”hole saw size. Use low speed drill. Remove burrs from hole.
2. Remove shavings and place appropriate grommet firmly in hole with flange facing out.
3. Push dripline Insert Adapter into grommet until flange and grommet are flush.

P. Manufacturer Recommended Installation Methods:
1. Option A: Pre-graded Installation Method

a. Remove the soil to a depth as identified on irrigation legend below final grade; place the dripline on the soil surface.
b. Place the dripline grid on a uniform grade that is free of sharp rocks or other objects that may damage the dripline.
c. Make all connections to the supply header, flush header, flush valve, air relief valve, and control zone kit, and then check for leaks before backfill.
d. Use tie-down stakes to keep the dripline in place while replacing backfill.
e. Be sure to compact the backfilled soil with rubber-tired machinery or a heavy roller. Some amount of compaction is required for water to move through the capillaries in the soil.

2. Option B: Vibratory Plow (Single or Multi-Shank) Method:
   a. A single-shank or multi-shank vibratory plow can be used in new installations on bare soil, or to retrofit under existing turf.
   b. Cover the ends of the driplines after each pass to keep soil and debris from entering the lines before they are connected to the headers.

3. Option C: Line Pulling Method:
   a. Line-pulling equipment utilizes a pull blade which has an enlarged "bullet" at the base.
   b. This bullet opens a tunnel at the predetermined depth beneath the ground surface.
   c. Start by digging a hole for the line pulling blade (often called the “bullet”) to rest in where the tractor treads are still at finished grade level.
   d. Attach the dripline to this bullet by means of a chain and pulling grip.
   e. As you move forward from the starting hole, the pipe is pulled through this underground tunnel.
   f. Pipe pulling distance will vary, depending on factors such as, ground conditions, soil type and directness of the pulling route.

4. Option D: Rotary Trenching Method:
   a. A rotary trenching unit cuts a narrow trench approximately 1 inch wide by 6 inches deep.
   b. Suitable for subsurface shrub and ground cover installations.

5. Option E: Hand Trenching Method:
   a. Hand trenching maybe be utilized in areas too small for mechanical installation.
   b. Ideal for loamy and sandy soil sub-surface applications in turf grass and shrub bed installation.
   c. Establish finish grade.
   d. Hand dig trenches 6 inches deep to install sub-surface dripline.
   e. Cover trenches and rake level.
   f. If installing shrubs or groundcover, maintain flags to identify dripline location during planting.

Q. Dripline Flushing:
1. After all dripline feeder lines and risers are in place and connected, all necessary diversion work has been completed, and prior to the installation of any dripline, the control valves shall be opened and a full head of water used to flush out the lines and fittings.

2. Subsurface dripline shall be installed after flushing the system has been completed. Avoid contaminating dripline with debris.
3. Subsurface dripline shall be flushed prior to the installation of all flush valves
4. Flush the system every two weeks for the first 6 weeks and check the water that is flushed out for cleanliness.

5. Establish a regular flush schedule for the future after these initial checks.
6. Flush the system well after any repairs are made.
7. Check the pressure at the supply and flush headers on a regular basis and compare with the pressure readings taken right after installation.

R. Winterization:

1. Winterizing an irrigation system involves removing enough water to ensure that components are not damaged due to freezing weather.

2. Check the manufacturer's instructions for winterizing the valves, filters and backflow prevention devices.

3. If compressed air is used to blowout the lines:
   a. Compressed air may be used only be used with the flush valve open and with the air pressure at 40 psi or less.
   b. Dripline fittings are rated to 50 psi, so the air pressure must be adjusted below this pressure.
   c. It is air volume, not pressure, which is effective when blowing out the lines.
   d. The pressure-regulating valve that is part of the control zone regulates water, not air pressure.
   e. With all drain ports open, compressed air should be applied until no water is seen exiting the ports.
   f. After turning off the air, close all drain ports.

4. If compressed air is not used to blowout the lines:
   a. A drain port should be installed at all low points in the zone. These ports may be a tee or elbow with a threaded plug or a manual flush valve.
   b. If the zone is in a grid or closed loop system, the headers may contain a significant amount of water because they are either blank tubing, PVC, or poly pipe. It is important to provide drain ports for these components.
   c. If the zone has laterals that dead-end and are not connected to an exhaust header, the lateral ends should be opened to drain at the lowest point(s).

3.9 PUMPS AND MOTORS

A. Shipping, off-loading and the technical start up shall be furnished by the pump station manufacturer. Location and mounting details shall be furnished to the Contractor by the pump station manufacturer.

B. Electrical connection by others shall consist of a single conduit with conductors from the electrical service disconnect to the pump station main disconnect.

C. Provide technical start up procedures by the pump station manufacturer including:

1. Station start up and pressurization
2. Pressure, flow, and programming adjustments
3. Monitoring of park irrigation cycle when possible. Technician will instruct operations personnel as to the operation, adjustment and maintenance of the pump station.

3.10 DIAGRAMMATIC INTENT:

A. The drawings are essentially diagrammatic. The size and location of equipment and fixtures are drawn to scale where possible. Provide offsets in piping and changes in equipment locations as necessary to conform to structures and to avoid obstructions or conflicts with other work.

3.11 GRADES:

A. Prior to commencing any work the Contractor shall carefully check all grades and verify that after all irrigation work and soil preparation completed, all grades will be per specified depth as per the landscape Contractor's scope of work with a plus or minus of 1/10-inch. Grades around existing tree crowns to drain away from tree crown.

3.12 DISCREPANCIES:

A. In the event of discrepancy, notify the City's Representative.

B. Do not proceed with installation in areas of discrepancy until all discrepancies have been resolved.

3.13 FIELD MEASUREMENTS:

A. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. Contractor shall coordinate the installation of all irrigation materials with all other work.

3.14 TRENCHING

A. Dig trenches straight and support pipe continuously on bottom of ditch. Lay pipe to an even grade. Trenching excavation shall follow layout indicated on drawings to the depths below finished grade and as noted. Where lines occur under paved area, these dimensions shall be considered below subgrade.

B. Provide a minimum cover of 18 inches for all pressure supply lines.

C. Provide a minimum of cover of 12 inches for all non-pressure lines.

D. Provide a minimum cover of 18 inches for all control wires.

E. Provide a minimum cover of 4 inches for all subsurface drip lines.

F. Provide a minimum cover of 18 inches for all cable wiring in conduit, and 24 inches for all direct burial cables.

G. Provide a minimum cover of 24 inches between the top of the pipe and the bottom of the aggregate base for all pressure and non-pressure piping installed under all paving. Sleeves as per specifications.

H. Trenches located under areas where decomposed granite paving, asphaltic concrete paving, concrete paving, or concrete walks will be installed shall be backfilled with sand (a 6 inch layer below the pipe and 6-inch above the pipe) and compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in a firm unyielding condition. All trenches shall be left flush with the adjoining grade. The sprinkler irrigation Contractor shall set in place, cap and pressure test all piping under paving prior to beginning work.

3.15 BACKFILLING

A. The trenches shall not be backfilled until all required tests are preformed. Trenches shall be carefully backfilled with the clean excavated materials approved by City's Representative for backfilling, consisting of earth, loam, sandy clay, sand or other approved materials, free from large clods of earth or stones.

B. A fine granular material backfill will be initially placed on all lines. No foreign matter larger than ½ inch in size will be permitted in the initial backfill.

C. Backfill shall be mechanically compacted in 4-inch layers under the pipe and uniformly on both sides for full width of the trench and full length of the pipe in landscape areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill will conform to adjacent grades without dips, sunken areas, humps or other surface irregularities. Materials shall be sufficiently damp to permit thorough compaction, free of voids.

1. Backfill: Free of rocks over 2 inches, metal and trash.
2. Sand bedding for pressured pipe: Not less than 6 inches below and above pipe. Note: Avoid introduction of dissimilar materials, which may result in a galvanic reaction.

D. Flooding of trenches will be permitted only with the approval of City's Representative.

E. If settling occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn planting, or other construction are necessary, the Contractor shall make all required adjustments without cost to City.

F. Jetting and settling of trenches is preferred.

G. Under no circumstances shall truck wheels be used to compact soil.

3.16 PIPING

A. General:

1. Maintain a minimum horizontal distance of 3'-0" between control valves that are installed side by side.
2. Maintain a minimum 1'-6" distance between fittings installed in main line.
3. Crossing fittings are not allowed.

B. Generally, piping under existing walks is done by jacking, boring or hydraulic driving; where only cutting or breaking of sidewalks and/ or concrete is necessary, it shall be done and replaced by the Contractor as part of the contract cost. Permission to cut or break of sidewalks and/or concrete shall be obtained from the City's Representative. No hydraulic driving will be permitted under concrete paving or A.C. paving.

C. Carefully inspect all pipe and fittings before installation, removing dirt, scale, and burrs and reaming; install pipe with all markings up for visual inspection and verification.

D. Exercise care in handling, loading, unloading, and storing plastic pipe and fittings; store plastic pipe and fittings under cover until ready to install; transport plastic pipe on a vehicle with a bed long enough to allow the pipe to lay flat, avoid undue bending and any concentrated external load.

E. Remove all dented and damaged pipe sections.

F. Contractor shall install concrete thrust blocking at all changes of direction and terminal points of pressure pipe.

G. All lines shall have a minimum clearance of 6 inches from each other and 12 inches from lines of other trades.

H. Parallel lines shall not be installed directly over one another.

I. In solvent welding, use only the specified primer and solvent cement and make all joints in strict accordance with the manufacturer's recommended methods; allow solvent welds at least 15 minutes setup time before moving or handling and 24 hours curing time before filling. 360 degree applicators shall be used to apply primer and solvent on sizes 2-1/2 inches and larger.

J. Center-load pipe with approved backfill to anchor pipe before testing to prevent pipe from moving under pressure. Do not cover couplings and fittings.

K. All threaded plastic-to-plastic connections shall be assembled using Teflon tape.

L. For plastic-to-metal connections, work the metal connections first. Use a non-hardening pipe dope on all threaded plastic-to-metal connections, except where noted otherwise.

3.17 PIPE SLEEVING AND BORING

A. All sleeving shall be 2 times the diameter of the pipe used. Sleeving for control wires shall be 2 inches in diameter minimum.

B. All trenches for sleeving must be compacted to 95% compaction using manual or mechanical taping device.

C. Contractor shall be responsible for the installation of all sleeves required for the irrigation system not listing in the drawings.

D. Bore for sleeves under obstructions that cannot be removed. Employ equipment and methods designed for horizontal boring

3.18 THRUST BLOCKS

A. Use thrust blocks for fittings on pipe greater than or equal to 3-inch diameter.

B. Size, orient, and place cast-in-place concrete against undisturbed soil as shown on installation details.

C. Wrap fitting or component with plastic to protect fitting from concrete. Do not bury fitting or component in concrete.

D. Commercially delivered concrete requires a 3,000 PSI mix.

E. If pre-mix bags are used, mix per manufacturer's recommendations (maximum 1 gallon of water to 80-pound bag of pre-mix).

F. Contractor is responsible for performing a slump test (minimum of 2-inches to a maximum of 4-inches) if requested by City's Representative.

3.19 VALVES AND VALVE BOXES

A. Provide at all locations indicated. Install only one valve per box, minimum 6" clearance from bottom of valve to soil level. Valve must be fully enclosed within box allowing space for maximum opening of flow control.

B. When grouped together allow at least 12 inches between valves.

C. Fill area under box at each corner with supporting brick.

D. All remote control valves to be installed with SCH 80 threaded fittings, with ball valve and union. To be threaded from main.

E. Contractor shall brand all valve boxes.

3.20 IDENTIFICATION

A. Identify valves, valve boxes, quick couplers, outlets and related appurtenances with Christie ID tags.

3.21 AUTOMATIC CONTROLLER

A. Install as per manufacturer's instruction. Remote control valves shall be connected to controller in numerical sequence as shown on drawings.

3.22 HIGH VOLTAGE WIRING FOR AUTOMATIC CONTROLLER

A. 120-volt power connection to the automatic controller from electrical source connection shown on electrical drawings shall be provided by Contractor.

B. All electrical work shall conform to local codes and ordinances and shall be in accordance with the National Electrical Code, most recent edition.

3.23 LOW VOLTAGE WIRING

A. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible

B. Install wiring along side main line. Bundle and tape to side of main line at an interval of 10 – feet on center. Install wires in conduit from controller location to main line.

C. When more than one wire is placed in a trench, tape wires together at maximum 10-foot intervals.

D. Use a continuous wire between controller and remote control valves.

E. Provide each controller with separate ground wire.

F. A spare control wire of a different color shall be looped through every valve on the system.

G. An expansion curl should be provided within 3 feet of each wire connection and at each change of direction. Provide a two foot expansion loop for every 100 feet. Expansion curls shall be formed by wrapping at least five (5) turns of wire around a 1" diameter pipe, then withdrawing the pipe.

H. No wire splices shall be permitted unless run is longer than 2500 feet or approved by City's Representative. Field splices between the automatic controller and electrical control valves will not be allowed without prior approval of City's Representative.

I. All splices shall be sealed with waterproof connectors and waterproof sealant by Weathermatic or approved equal.

J. Contractor shall provide one extra wire for every three (3) valves and two (2) wires shall be provided for every valve in any isolated area and the extra wires shall extend past the last valve in a group and as indicated on plans. Extra wires shall be orange in color and looped in every valve box and made accessible for future if needed.

3.24 FLUSHING THE SYSTEM (General)

A. After all new lateral pipe lines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of bubbler heads or subsurface driplines, the control valves shall be opened and a full head of water used to flush out the system.

B. Subsurface dripline shall be installed only after flushing of the system has been accomplished to the complete satisfaction of the City's Representative.

3.25 REDUCED PRESSURE BACKFLOW PREVENTION DEVICE

A. Backflow Prevention Unit shall be installed above grade in accordance with the drawings and the requirements of all applicable codes, including the San Antonio Water System Standard Specifications and Drawings or Construction.

3.26 WATER METER

A. Water meters shall be installed in accordance with the San Antonio Water System Standard Specifications and Drawings for Construction.

3.27 INSTALLATION OF OTHER COMPONENTS

A. Tools and Spare Parts: Prior to Review at completion of construction, supply to City operating keys, servicing tools, spare parts, test equipment, and other items indicated in General Notes on the drawings.

B. Other Materials: Provide other materials or equipment shown on drawings or installation details that are part of irrigation system, even though items may not have been referenced in specifications.

3.28 ADJUSTING THE SYSTEM

A. The entire system shall be operating properly before any planting operations commence.

B. Verify 100% coverage with a minimum of 70% overlap in shrub areas.

3.29 MAINTENANCE

A. The entire irrigation system shall be fully operational prior to any planting.

B. The City reserves the right to waive or shorten the operation period.

C. Landscape irrigation system shall be fully maintained by the Contractor for a period of 90 days prior to final acceptance by the City. This period may be extended if the maintenance provisions are not met.

3.30 COMPLETION CLEAN-UP

A. Upon completion of work, the Contractor shall smooth all ground surfaces. Refuse and excess dirt, excess materials, rubbish, debris, etc. shall be removed from the site. All walks, adjacent streets, parking lots, curbs, gutters, and trails shall be broomed or washed down; any damage sustained on the work of others shall be repaired to original conditions. Remove construction equipment from the premises.

3.31 FINAL FIELD OBSERVATIONS PRIOR TO ACCEPTANCE

A. The Contractor shall operate each system in it's entirely for the City at time of final field inspection. Any items deemed not acceptable shall be reworked to the complete satisfaction of the City.

B. The Contractor shall show evidence that the City has received all charts, accessories, record drawings and equipment as required before final field observation can occur.

C. End of maintenance shall occur only on the written acceptance of the City.

3.32 CLEANUP AND PROTECTION

A. During the duration of the project, keep adjacent paving and construction clean and work area in an orderly condition.

3.33 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off the project site.

3.34 GUARANTEE

A. The Contractor shall guarantee the entire irrigation system against defects in materials and workmanship for a period of one (1) year from the date of acceptance of the work. The Contractor shall furnish a Faithful Performance Bond in the amount of 10% of the amount bid for the installation of the irrigation system to be in force for the one (1) year guarantee period.

B. A copy of the guarantee form shall be provided at the time of contract award and shall also be included in the Operations and Maintenance Manual.

C. The guarantee form shall be retyped onto the Contractor's letterhead and contain the following information.

GUARANTEE FOR IRRIGATION SYSTEM

We hereby guarantee that the irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the Drawings and Specifications. We agree to repair or replace all defects in material or workmanship which may

develop during the period of one year from date of acceptance and also to repair or replace all damages resulting from the repair of such defects at no additional cost to the Agency. We shall make such repairs or replacements within a reasonable time, as determined by the Agency, after receipt of written notice. In the event of our failure to make such repairs or replacements within a reasonable time after receipt of written notice from the Agency, we authorize the Agency to proceed to have said repairs or replacements made at our expense, and we will pay the costs and charges therefore upon demand.

PROJECT:
LOCATION:
CONTRACTOR/COMPANY:
LICENSE NO.:
ADDRESS:
PHONE:
DATE OF FINAL ACCEPTANCE:
SIGNED:
DATE:

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Water Tap and Meters installation, including service supply lines and fittings, meters, meter boxes and appurtenances will be measured by the unit of the various types and sizes of meters, meter boxes, service supply lines and fittings, and appurtenances installed.

B. Backflow Prevention Devices, including piping and fittings, enclosure and appurtenances will be measured by the unit type and size of backflow prevention device, enclosure, piping and fittings and appurtenances installed.

C. Irrigation Booster Pump System, including piping and fittings, enclosure, controls and appurtenances will be measured by the unit and size of booster pump systems, piping and fittings, and appurtenances installed.

D. Landscape Injector Systems, including piping, flow sensors, master valves, storage tank, controller and appurtenances will be measured by the unit of the various types and sizes of landscape injector systems, piping and fittings, and appurtenances installed.

E. Automatic Irrigation Controllers, including enclosure, flow sensors, master valves, concrete pads, conduits, wiring, junction boxes and appurtenances will be measure by the controller unit type, flow sensor sizes, master valves sizes, concrete pad size, conduits sizes, wiring type and sizes, junction box size and appurtenances installed.

F. Control wires, including splice kits and junction boxes will be measured by the linear foot for each size and type installed. Measurements will be from automatic irrigation controller to wire ends in the field. Measurements will also be between the center line intersection of runs and branches of wire.

G. Irrigation sleeves will be measured by the linear foot for each size and type installed. Measurements of each line of sleeve of each size will be continuous and shall include full laying lengths of all fittings.

H. Irrigation Pressure Mainline, including tracer wire and splice kits, installed will be measured by the linear foot for each size and type installed as noted below:

1. Measurements will be from the center line intersection of runs and branches of tees to the end of the valve of a dead end run.
2. Measurements will also be between the center line intersection of runs and branches of tees.

The measurement of each line of pipe of each size will be continuous and shall include the full laying lengths of all fittings and valves installed between the ends of such line except that the laying length of reducers will be divided equally between the connected pipe sizes.

I. Irrigation Isolation Gate Valves, including valve boxes, will be measured by the unit of each such assembly of the various sizes of gate valves and valve boxes, fittings and appurtenances installed to the finished grade.

J. Irrigation Quick Coupler Valves, including valve boxes, will be measure by the unit of each such assembly and quick coupler valves and valve boxes, fittings and appurtenances installed to the finished grade.

K. Tree Root Watering Systems, including swing joints, canister, bubbler and pvc lateral piping, will be measured by the unit of each such assembly of tree root watering systems, piping, and fittings installed to the finish grade.

L. Sub-Surface Drip Irrigation, including drip tubing and fittings, staking materials, manual flush valves, air/ vacuum relief valves, and non-pressure supply lines will be measured by a lump sum method, acceptably performed and completed.

M. Remote Control Valves, including valve boxes, 2-wire decoders, wire splices, will be measured by the unit of each assembly of the various types and sizes of control valves, valve boxes, decoders, pipe and fittings, and appurtenances installed.

N. Drip Remote Control Valves, including valve boxes, 2-wire decoders, wire splices, in-line filters and pressure regulators, will be measured by the unit of each assembly of the various types and sizes of control valves and filters, pressure regulators, valve boxes, decoders, pipe and fittings, and appurtenances installed.

4.2 PAYMENT

A. Payment for Water Tap and Meter work performed and materials furnished will be made at the unit price bid for each water meter in accordance with this item and measured under “Measurement”. Such payment shall also include excavation, trench excavation protection, hauling and disposition of surplus materials, sand backfill, copper tubing and fittings of the various sizes used in the service line connection, furnishing tools, equipment, testing, labor, and incidentals required to install the water meters meeting the requirements of the plans, specifications and SAWS’s standards and requirements.

B. Payment for Backflow Prevention Device work performed and materials furnished will be made at the unit price bid for each backflow prevention device in accordance with this item and measured under "Measurement". Such payment shall also include excavation, trench excavation protection, hauling and disposition of surplus materials, sand backfill, brass tubing and fittings of various sizes used in the connection of device to irrigation mainline and water meter, furnishing tools, equipment, testing, labor and incidentals required to install backflow prevention devices meeting the requirements of the plans and specifications.

C. Payment for Booster Pump System will be made at the unit price bid for each booster pump system in accordance with this item and measured under "Measurement". Such payment shall also include excavation, hauling and disposition of surplus materials, concrete pad and aggregate base, piping and fittings of various sizes used in the connection to irrigation mainline, connection to electrical power source, furnishing tools, equipment, testing, labor, and incidentals required to install the booster pump systems meeting the requirements of the plans and specifications.

D. Payment for Landscape Irrigation will be made at the unit price bid for each landscape injector system in accordance with this item and measured under "Measurement". Such payment shall also include excavation, hauling and disposition of surplus materials, piping and fittings of various sizes used in the connection to irrigation mainline and tank, connection to electrical power source, furnishing tools, equipment, testing, labor, and incidentals required to install the landscape injector systems meeting the requirements of the plans and specifications.

E. Payment for Automatic Irrigation Controllers will be made at the unit price bid for each automatic irrigation controller in accordance with this item and measured under "Measurement". Such payment shall also include excavation, hauling and disposition of surplus materials, appurtenances, conduits, connection to electrical power source, furnishing tools, equipment, testing, labor, incidentals, and final connection of remote control wires to controller as required to install the automatic irrigation controllers meeting the requirements of the plans and specifications.

F. Payment of Control Wires will be made at the unit price bid per linear foot of the various sizes installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, backfill and compaction where required, conduit where required and as required to install control wires meeting the requirements of the plans, specifications and manufacturer's recommendations.

G. Payment of Irrigation Sleeves will be made at the unit price bid per linear foot of various sizes installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, selected embedment material, backfill, compaction, hauling and disposition of surplus materials, furnishing tools, labor, and incidentals as required to install sleeves meeting the requirements of the plans and specifications.

H. Payment of Irrigation Pressure Mainline will be made at the unit price bid per linear foot of various sizes and types, and trace wire type installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, selected embedment material, backfill, compaction, hauling and disposition of surplus materials, furnishing tools, labor, and incidentals as required to install mainline meeting the requirements of the plans and specifications.

I. Payment of Irrigation Isolation Gate Valves, complete with valve box, will be made at the unit price bid for each assembly of various sizes of gate valves and valve boxes installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, selected embedment material, anti-corrosion embedment when specified, hauling, and disposition of excavated surplus material, backfill, concrete collar at the valve box where subjected to vehicular traffic, riser pipe or valve box extension, furnishing tools, labor, and incidentals as required to install gate valves meeting the requirements of the plans and specifications.

J. Payment of Quick Coupler Valve, complete with valve box, will be made at the unit price bid for each assembly of quick coupler valves and valve boxes installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, selected embedment material, hauling, and disposition of excavated surplus material, backfill, concrete collar at the valve box where subjected to vehicular traffic, furnishing tools, labor, and incidentals as required to install coupler valves meeting the requirements of the plans and specifications.

K. Payment of Tree Root Watering Systems, complete with including swing joints, canister, bubbler and pvc lateral piping will be made at the unit price bid for each assembly of tree root watering systems installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, selected embedment material, hauling and disposition of excavated surplus material, backfill, adjustments after settling, pvc lateral piping and connection to associated remote control valves, furnishing tools, labor, and incidentals as required to install root watering system meeting the requirements of the plans and specifications.

L. Payment of Sub-Surface Drip Irrigation, including drip tubing and fittings, staking materials, manual flush valves and boxes, air/ vacuum relief valves and boxes, and non-pressure supply lines will be made by a lump sum method, acceptably installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, backfill, connection of drip tubing to lateral piping, fittings, manual flush valves and air vacuum/ relief valve fittings and valve boxes and connection to lateral piping, furnishing tools, equipment, testing, labor and incidentals required to install complete sub-surface drip distribution system meeting the requirements of the plans and specifications.

M. Payment of Remote Control Valves, complete with valve box, will be made at the unit price bide for each assembly of various sizes of valves and valve boxes installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, selected embedment material, hauling, and disposition of excavated surplus material, backfill, concrete collar at the valve box where subjected to vehicular traffic, decoders, furnishing tools, labor, and incidentals as required to install control valves meeting the requirements of the plans and specifications.

N. Payment of Drip Remote Control Valves, complete with valve box, will be made at the unit price bide for each assembly of various sizes of valves and valve boxes and filters installed in accordance with this item and measured under "Measurement". Such payment shall also include excavation, selected embedment material, hauling, and disposition of excavated surplus material, backfill, concrete collar at the valve box where subjected to vehicular traffic, decoders, in-line filters and pressure regulators, furnishing tools, labor, and incidentals as required to install control valves meeting the requirements of the plans and specifications.

Bid Items:

Item 9006.1 - Water Tap and Meters – per unit price

Item 9006.2 – Backflow Prevention Devices – per unit price

Item 9006.3 – Irrigation Booster Pump System – per unit price

Item 9006.4 – Landscape Injector System – per unit price.

Item 9006.5 – Automatic Irrigation Controller – per unit price.

Item 9006.6 - Control Wires – per linear foot.

Items 9006.7 to 9006.9 – Irrigation Sleeves – per linear foot.

Items 9006.10 to 9006.11 – Irrigation Pressure Mainline – per linear foot.

Items 9006.12 to 9006.13 – Irrigation Isolation Gate Valves – per unit price.

Item 9006.14 – Irrigation Quick Coupling Valve – per unit price.

Item 9006.15 – Tree Root Watering System – per unit price.

Item 9006.16 – Sub-Surface Drip Irrigation – per lump sum.

Item 9006.17 – Remote Control Valve – per unit price.

Item 9006.18 – Drip Remote Control Valve – per unit price.

ITEM 9007

Planting

PART 1 - GENERAL

1.1. SUMMARY

A. Section Includes:

1. Ordering and delivering of planting materials
2. Planting soils
3. Trees, shrubs, vines, perennial and groundcovers.
4. Tree stabilization.
5. Replacement of all unsatisfactory plant materials
6. Cleanup, preliminary inspection and approval
7. Protection, maintenance and warranty

B. RELATED SECTIONS:

1. See Civil plans for topsoil stripping and stockpiling.
2. See Civil plans for excavation, filling, backfilling, and rough grading.
3. Section 9006 "Planting Irrigation"

C. APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Standard for Nursery Stock ANSI Z60.1
2. American Standards for Tree Care Operations ANSI A300
3. Building Soil Manual: Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13, Washington State Department of Ecology, www.buildingsoil.org
4. Landscaping Guide: Resource Efficient Natural Landscaping, Seattle Public Utilities, www.buildingsoil.org
5. OMRI Products List (Organic Materials Review Institute – www.OMRI.org)
6. Standard Specifications for Topsoil ASTM D 5268
7. TMECC (Test Methods for the Examination of Composting and Compost), from USCC (US Composting Council)

1.2. REGENERATIVE LANDSCAPE PRINCIPLES AND OBJECTIVES

Contractor shall maintain the specified landscape using an integrated approach, consistent with the principles set forth in the River-Friendly Landscape Guidelines, www.RiverFriendly.org. River-Friendly approach is a Natural Landscaping approach which applies to all landscapes which exist in a watershed.

The seven River-Friendly principles are:

1.) **Landscape locally** – The Project landscape is part of a larger natural ecosystem. The materials and methods used to maintain the Project can support the health, diversity and sustainability of the area.

2.) **Landscape for less to the landfill** – Reducing waste starts with not generating plant debris in the first place by fertilizing, irrigating and pruning judiciously, grasscycling, mulching and composting plant debris. Using recycled content, salvaged, durable or local materials conserves resources and reduces the amount of energy consumed by the landscape.

3.) **Nurture the soil** – Create a healthy soil that supports a healthy landscape by protecting the soil from compaction and erosion, replenishing organic matter and mulching, using slow-release and organic fertilizers and minimizing use of chemicals that harm beneficial soil organisms.

4.) **Conserve water** – Use water supply efficiently by reducing irrigation requirements, irrigating according to plant need, maximizing irrigation system performance, increasing the water holding capacity of the soil and using recycled water.

5.) **Conserve energy** – Conventional landscapes are fossil fuel consumptive. Nationally it is estimated that lawn mowers consume 400 million gallons of gas. Look for opportunities to conserve fuel and energy by choosing and maintaining materials and equipment for fuel conservation.

6.) **Protect water and air quality** – Reduce runoff, reduce contaminants in runoff through an integrated pest management (IPM) program, and increase the soil's ability to remove pollutants from runoff through steps such as mulching bare soil. Reduce air pollution by reducing fossil fuel consumption, recycling plant debris on–site and planting trees to remove CO2 and absorb air pollutants.

7.) **Protect and maintain wildlife habitat** – The Project may provide food, water, shelter and nesting sites for birds, butterflies, beneficial insects and animals that contribute to the ecological diversity of the watershed. Methods to protect them include minimizing application of chemicals by implementing an integrated pest management (IPM) program, and conserving flowers, berries, fruits, seed heads, low branch cover, and natural vegetation in open space areas.

1.3. DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Compost: A mixture of microbially balanced, biologically active, aerobically decayed organic matter, used to improve soil structure, balance soil biology, and provide nutrients.

C. Compost Tea – Actively Aerated Compost Tea (AACT): An aerobic, microbially balanced, biologically active liquid solution containing living beneficial microbes, made by actively aerating compost extract in water under controlled conditions. Used to balance soil and plant biology

D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when

removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

E. Crown: Also called "trunk flare" or "root flare": base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

F. Finish Grade: Elevation of finished surface of planting soil.

G. Natural Landscaping: A sustainable approach to landscape management that works in harmony with the natural conditions of the watershed. Natural Landscaping practices foster soil health, conserve water and other valuable resources while reducing waste and preventing pollution.

H. OMRI: In the US, the Organic Materials Review Institute maintains list of approved organic products that can be used in certified organic crop production (www.OMRI.org).

I. Organic Fertilizer: A fertilizer made of natural materials that undergoes little or no processing and includes plant, animal, and/or mineral materials. Organic fertilizers do not contain any chemicals or synthetic compounds.

J. Organic Soil Amendment: A soil amendment made of natural materials that undergoes little or no processing and includes plant, animal, and/or mineral materials. Organic soil amendments do not contain any chemicals or synthetic compounds.

K. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

L. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

M. Planting Area: Areas to be planted.

N. Planting Soil: Existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or topsoil that is modified with soil amendments to produce a soil mixture best for plant growth.

O. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, or herbaceous vegetation.

P. River-Friendly: A sustainable approach to landscape management that works in harmony with the natural conditions of the watershed. River-Friendly is a 'Natural Landscaping' approach that fosters soil health and conserves water and other valuable resources while reducing waste and preventing pollution.

Q. Sheet Mulch: A layered mulch system for suppressing weed growth, optimizing soil microbial activity, reducing maintenance and improving nutrient and water retention in the soil.

R. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

S. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

T. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

U. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

V. Topsoil: Soil material used as a medium for establishing and sustaining healthy plant growth. Topsoil is obtained from the soil horizons normally designated as "A" or "B" as defined by the Soil Science Society of America.

1.4. SUBMITTALS

A. Product Data and Certificates: For each type of product indicated

1. Plant Materials ordering certificates: Include quantities, sizes (caliper, head, and container), quality, and sources for plant materials.
2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
3. Organic Soil Amendment products: OMRI listed soil amendments only. Submit Manufacturer’s certificate.
4. For any manufactured products include Manufacturer's certified analysis of standard products.

B. Samples for Verification: For each of the following:

1. Organic Compost: ½ pound required; in sealed plastic bag labeled with composition of materials by percentage of weight and source. Sample shall be taken from the compost delivered to the site immediately after delivery; provide an accurate representation of color, texture, and organic makeup.
2. Mulch: ½ pound required; in sealed plastic bag labeled with composition of materials by percentage of weight and source. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
3. Organic Soil Amendments: sample of each with manufacturer’s certificate required, in sealed plastic bags or jars labeled with source of product.
4. Mycorrhizal fungi granular inoculant: sample with manufacturer’s certificate required, in sealed plastic bag labeled with source of product.
5. Worm Castings: 4 ounces required, in sealed plastic bag labeled with source information. Submit at least 2 weeks before commencement of work.
6. Cardboard for use in Sheet Mulching: Width of roll by 12 inches.

C. Qualification Data: For qualified Landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience implementing the 'Natural Landscaping' approach, including Sheet Mulching. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons. Include verification of River-Friendly Qualification or equivalent, such as Green Gardener or G3 Certification.

D. Compost Analysis: Before delivery of the compost, the supplier will submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's CAP and is using the approved Test Methods for the Evaluation of Composting and Compost (TMECC).

E. Water Quality Report: Submit written Water Quality Report from water source that will be used for irrigation at least 30 days prior to commencement of work.

F. Soil Test Reports (Post Installation): Soil Fertility Test and Biological Full Foodweb Assay are required for standardized ASTM D 5268 topsoil, existing native surface topsoil, existing in-place surface soil and imported or manufactured topsoil.

1. Soil Fertility Test: For all soils submit soil fertility analysis after recommended soil amendments have been incorporated during soils preparation work. Provide soil fertility analysis from an approved testing laboratory per Section on Soil Testing.

1.5. QUALITY ASSURANCE

A. Applicable standards and Best Management Practices (BMP's).

1. Contractor shall adhere to applicable professional standards as defined by a professional organization including:

a. American National Standard for Tree Care Operations – ANSI A300, Part 1
b. International Society of Arboriculture BMP for Tree Pruning
c. Irrigation Association BMP's

B. Installer Qualifications: A qualified Landscape Installer whose work has resulted in successful establishment of plants.

1. Contractor must have a valid Texas Contractor's License authorized by the State of Texas.

2. The Contractor shall have assigned to the project at least one employee who has experience or training in 'Natural Landscaping' practices or equivalent training.

3. Experience: At least three comparable landscape installation projects which include Sheet Mulching.

4. The Contractor shall have assigned to the project at least one employee who is a Certified Arborist or Certified Tree Worker (International Society of Arboriculture).

5. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress. Supervisor shall be a Qualified Landscape Professional, familiar with 'Natural Landscaping.'

C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

D. Substitutions: For plants other than trees, the contractor shall contract with a nursery or nurseries to grow any plants, for which the contractor cannot provide a guarantee of availability at the start of planting. Within 21 days of start of construction, if any specified plants or products are not obtainable, or cannot be grown/manufactured by contract, the contractor shall submit to Landscape Architect proof of non-availability and proposal for use of equivalent.

E. Plant Material Observation: Landscape Architect shall be given the opportunity to observe plant material either at place of growth or at site before planting to check for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect shall observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.
2. Parkway trees are subject to inspection by Department of Zoning and Bureau of Forestry to confirm compliance with the Landscape Ordinance.

F. Pre-installation Conference: Conduct conference at Project site.

1.6. SOIL TESTING

A. PRE-INSTALLATION Soil Fertility Analysis (See 1.6, D for analysis requirements):

1. The Contractor shall obtain soil fertility tests for the following:
    a. Imported topsoil or manufactured soil proposed for use.
    b. Any native topsoil to be used in planting areas.

B. POST-INSTALLATION Soil Fertility Analysis (See 1.6, D for analysis requirements):

1. The Contractor shall obtain soil fertility tests of Existing in-place soils, native surface topsoil, and imported or manufactured soil.
2. Soil Fertility Analysis shall be performed after soil amendments have been incorporated during soil prep work.

C. POST-INSTALLATION Soil Foodweb Biological Analysis Requirements

1. The Contractor shall provide for quantitative microbial Full Foodweb Assay of soil, from soil samples taken 2-3 weeks after installation of plants and mulch system.
2. For each unamended soil type, furnish quantitative Full Foodweb Assay and a written report by a qualified soil biology testing laboratory stating quantities of active bacteria, total bacteria, active fungi, total fungal biomass, protozoa, and nematodes.
3. The tests shall be performed at Contractor's expense. The results of these tests shall be submitted to the Landscape Architect within two weeks from completion of plant installation.
4. Take soil samples as directed by the lab from the proposed topsoil and the in-place soil; with depth, location, and number of samples to be taken to be determined with consultation from Landscape Architect. A minimum of three representative samples

shall be taken from varied locations for each soil to be used or amended for planting purposes.

5. The lab shall perform a quantitative Full Foodweb Assay. The test results must bear the project name and date.

6. Quantitative Soil Foodweb analysis shall be performed by:
   Soil Foodweb Oregon, Corvallis, OR
   (Test: Full Foodweb Assay)
   Phone: 541-752-5066 http://www.oregonfoodweb.com/

D. Soil Fertility Analysis Requirements:

1. For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; salinity, nitrate, ammonium, phosphate, potassium, calcium, magnesium, boron, sodium absorption ratio (SAR); deleterious material; heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium; pH; agricultural suitability, infiltration rate, and mineral and plant-nutrient content of the soil.

2. Take soil samples as directed by the lab; with depth, location, and number of samples to be taken to be determined with consultation from Landscape Architect. A minimum of three representative samples shall be taken from varied locations for each soil that is used or amended for planting purposes.

3. The tests shall be performed at Contractor's expense. The results of these tests shall be submitted to the owner's representative for review by the Landscape Architect to decide whether to accept the soil.

4. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed. Contractor shall request that the laboratory make soil amendment recommendations based on an 'Organic' approach to soil and landscape management, including the use of Greenwaste compost. Request that lab state the amount of compost that is required to bring soil organic matter content to a minimum of 5%.

5. Lab shall report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, lab shall provide additional recommendations for corrective action.

1.7. DELIVERY, STORAGE, STOCKPILING, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants or under tree canopies.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk organic soil amendments with appropriate certificates.

C. Soil and compost

1. Suitable topsoil that is to be removed during construction shall be stockpiled for reuse on site. Stockpile location shall be approved by Landscape Architect.
2. Compost shall be delivered to site at least 2 weeks prior to commencement of work, and sample submitted to Landscape Architect.
3. Compost that is warm to the touch shall be rejected as unfinished.
4. Soil and compost that is to be stockpiled for longer than two weeks shall not be placed in mounds higher than 6 feet.
5. Soil and compost that is stockpiled shall be covered at least two weeks prior to installation to prevent excess moisture from saturating the soil stockpile. Check moisture content at least two days prior to soil installation.
6. Soil materials shall not be handled or hauled, placed, or compacted when it is wet, as during or after rain, nor when frozen.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Deliver plants to site after preparations for planting have been completed, and install immediately after approval. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Notify Landscape Architect to inspect plants upon delivery. Plants not accepted shall be tagged for removal, and shall be removed from site immediately.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.8. PROJECT CONDITIONS

A. Notify Landscape Architect at least 4 working days prior to installation of plants.

B. Protect existing utilities, paving, irrigation and other facilities from damage caused by landscape operations. Contractor shall contact the local utility companies for verification of the

location of all underground utilities, and shall be responsible for all damage resulting from neglect or failure to comply with this requirement.

C. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

D. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by the owner unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify owner no fewer than five business days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without owner's written permission.

E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Planting shall not be done while soils are wet, as after or during rain. Planting shall not be done when temperature is above 90 degrees Fahrenheit. Apply soil amendments during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.9. WARRANTY

A. Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:
    a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by owner, or incidents that are beyond Contractor's control.
    b. Structural failures including plantings falling or blowing over.
    c. Faulty performance of tree stabilization.
    d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Periods from Date of Planting Completion:
    a. Trees, Shrubs, and Ornamental Grasses: 12 months.
    b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
3. Include the following remedial actions as a minimum:
    a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
    b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
    c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.

d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.10. MAINTENANCE SERVICE

A. Initial Maintenance Service for all Trees, Shrubs and Perennials: Follow River-Friendly Guidelines or Natural Landscaping Guidelines. Provide maintenance by skilled employees of Landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: Twelve months from substantial completion of project. Continuing Maintenance: Follow Natural Landscape Guidelines and consultation of Soil Foodweb advisor. For ongoing yearly maintenance, starting on date initial maintenance service is concluded.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.

C. Tree caliper measurements shall be taken on the trunk 6 inches above the natural ground line for trees up to and including 4 in. in caliper, and 12 inches above the natural ground line for trees over 4 in. in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to branch tip.

D. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

E. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

F. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

G. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including

genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

H. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

I. Substitutions of plant materials will not be permitted unless authorized in writing by the landscape architect. If proof is submitted in writing that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety, with a corresponding adjustment of the contract price.

2.2 PLANTING SOILS

A. All planting areas shall provide a minimum depth of eighteen inches of uncompacted soil except where tree roots limit the depth.

B. Native Topsoil

1. Shall be on-site existing topsoil after all rocks over two inches and all foreign debris have been removed. Native topsoil shall be free of any substance harmful to plant growth and shall have organic material and soil characteristics capable of sustaining healthy plant life. Heavy clay soil shall not be considered for use as topsoil. Suitable native topsoil shall be stockpiled for re-use where required to replace existing topsoil.
2. Topsoil shall be tested in accordance with Section “Soil Fertility Testing”.
3. If the stockpile of existing topsoil is not adequate to meet the requirement to place minimum of 18 inches of topsoil in all planting areas, import topsoil shall be used to meet the requirement.

C. Import Topsoil

1. Imported Topsoil or Manufactured Topsoil: shall be sandy loam, or a mixture of sandy loam and aged compost, screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including bermuda grass, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
2. All imported topsoil shall have an agricultural suitability test, dated within thirty (30) days of delivery and indicating compliance with these specifications, by a qualified soils laboratory prior to delivery to the job site. Results shall be sent to the Landscape Architect.

3. Bioretention Planter Mix: Bioretention Soil for use in Stormwater planters shall be sandy topsoil composed of:

    - 50% Sand
    - 20% Sandy Loam
    - 30% Compost

a. Sand for Bioretention Planter mix shall be analyzed by an accredited lab using ASTM D 422, and meet the following gradation:

U.S. Sieve No.	Percent Passing by Weight
# 3/8"	100
# 4	90 – 100
# 8	70 – 100
# 16	40 – 95
# 30	15 – 70
# 40	5 – 55
# 100	0 – 15
# 200	0 – 5

b. The Sandy Loam shall be tested and meet the following criteria:

	ITEM	PERCENT BY WEIGHT	TESTING METHOD
1.	Sand (2.0 - 0.050 mm)	50 - 60%	AASHTO T88
2.	Silt (0.050 – 0.002 mm)	0 - 25%	AASHTO T88
3.	Clay (less than 0.002 mm)	10 - 20%	AASHTO T88
4.	Organic Matter	5 - 7%	AASHTO T194

c. Compost for BioRetention Soil shall be analyzed by an accredited lab using ASTM D 422, and meet the following gradation, as well as the qualifications described in Section 2.3B:

U.S. Sieve No.	Percent Passing by Weight
# 1"	99-100
# ½"	90 – 100
# ¼"	40 – 90
# 200	2-10

d. All Bioretention Soil shall have a laboratory soil analysis, dated within thirty (30) days of delivery, by a qualified soils laboratory as above. Soil analysis shall show 10"-15" per hour percolation rate. Results shall be sent to the Landscape Architect.

D. Soil fertility test results:

1. Planting soil that does not meet the following will not be accepted:

   a. Organic content not less that 2% by weight.

   b. Texture: Sandy loam

   c. pH value between 6 and 7.0 with no excess lime.

   d. Saturation extract solution must show that salinity is less that 3.0 DF/ and Boron is less than 1.0 ppm

   e. Particle Size: One composite, representative sample of existing soil shall be taken and analyzed for particle size only.

   f. Soil should meet USDA specifications for the desired texture with at least 100% passing 25.4 mm screen and at least 90% passing 9 mm screen. At least 85% of the sand fraction should fall within the medium fine and very fine sand range (0.05 to 0.5 mm).

1.) Fertility: Follow all recommendations of the Landscape Architect based on the Soil Fertility Test results.

2.) Pests: If imported soil has been used for agricultural purposes within the prior 12 months, it shall be tested for parasitic nematodes.

3.) Herbicide contamination: If herbicide contamination is suspected then a radish/ryegrass growth trial must be performed. Consult with Landscape Architect prior to decision to test or not.

2.3 ORGANIC SOIL AMENDMENTS AND FERTILIZERS

A. Organic Soil Amendments shall be first quality organic agricultural products approved for use in organic crop production by OMRI (Organic Materials Review Institute), see www.OMRI.org. Soil amendments that are not approved or are restricted for use shall be applied only after review and written approval by the Landscape Architect. The Landscape Architect shall determine appropriate amendments for the species of plants to be established following review of the soil fertility test results.

B. Organic Compost: Compost shall be a well decomposed, fully stabilized, weed free organic matter source. The product shall be certified through the US Composting Council's (USCC) Seal of Testing Assurance Program (STA) Program (a compost testing and information disclosure program). It shall be derived from agricultural or food waste or yard trimmings. The product shall contain no substances toxic to plants, will possess no objectionable odors and shall not resemble the feedstock (the original materials from which it was derived).

1. The submitted lab report shall verify:
   a. Feedstock Materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
   b. Organic Matter Content: 50% - 65% by dry wt. preferred, 35-70% acceptable
   c. Carbon and Nitrogen Ratio: C:N < 25:1 plus at least one measure of stability and at least one measure of toxicity.

d. Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable. In addition any one of the following is required to indicate stability
   1) Oxygen Test < 1.3 O_2 / *unit TS / hr*
   2) Specific oxy. Test < 1.5 O2 / unit BVS / hr
   3) Respiration test < 8 C / unit VS / day
   4) Dewar test < 20 Temp. rise (oC)
   5) Solvita® > 5 *Index value*

e. Toxicity: any one of the following measures is sufficient to indicate non-toxicity.
   1) NH4- : NO3-N < 3
   2) Ammonium < 500 ppm, dry basis
   3) Seed Germination > 80 % of control
   4) Plant Trials > 80% of control

f. Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.
   1) Total Nitrogen content 0.9% or above preferred.
   2) Boron: Total shall be <80 ppm; Soluble shall be <2.5 ppm

g. Salinity: Must be reported; may vary but < 4.0 mmhos/cm preferred. Soil should also be tested: <2.5 mmhos/cm is preferred for soil/compost blend but may vary with plant species.

h. pH: pH shall be between 6.5 and 8. May vary with plant species.

i. Particle size: 95% passing a 1/2" screen.

j. Bulk density: shall be between 500 and 1100 dry lbs/cubic yard

k. Moisture Content shall be between 35% - 55% of dry solids.

l. Inerts: compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 0.1 % by weight or volume.

m. Weed seed/pathogen destruction: provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

n. Select Pathogens: Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.

o. Trace Contaminants Metals (Lead, Mercury, Etc.) Product must meet US EPA, 40 CFR 503 regulations.

C. Mycorrhizal Fungi: Dry, granular, water soluble inoculant containing at least 5300 spores per pound of vesicular-arbuscular mycorrhizal fungi and 95 million spores per pound of ectomycorrhizal fungi, and a maximum of 5.5 percent inert material.

D. Worm Castings: available through www.garden-ville.com/products/47/Native-Mulch.htm Phone: 1-888-655-6115

E. Additional amendments and/or fertilizers as required based on the soils report.

1. Additional amendments and fertilizers that are approved for use by the Organics Materials Research Institute (OMRI) for use in crop production may be approved for use by the Landscape Architect. See www.omri.org. Fertilizers that are not approved or are restricted for use by OMRI shall be applied only after review and written approval by the Landscape Architect.

2. Soil Amendment Application Rates: Rates shown are FOR BIDDING PURPOSES ONLY. The Landscape Architect or Soil Foodweb Consultant shall establish amendment application rates that are appropriate for the plant species to be established after review of the soil test results. The contract price shall be adjusted up or down to reflect the actual soil amendments required. For estimating purposes, assume the listed rates of application:
   a. Azomite - 6 pounds per 1000 square feet
   b. Compost - 3 cubic yards/ 1000 square feet
   c. Humic Acid – TurfPro: Apply 6-8 ounces of Turf and Garden Pro product per 1000 square feet of lawn
   d. Worm castings – ½ Cubic Yard per 2500 square feet
   e. Mycorrhizal Fungi - Use 1 tsp/5cc for small trees and shrubs; 1-4 tablespoons for larger trees.

2.4 ROOT BARRIER

A. Root barrier shall be durable polyethelene with ultraviolet inhibitors that provides a water barrier integrated with root deflecting ribs with self interlocking connections. Root barrier shall be Century Root Barrier CR-PE Series 36-20, or approved equal, http://www.centuryrootbarrier.com/

2.5 MULCH

A. Organic Mulch material shall be locally produced arbor chip mulch from tree and shrub trimming, 100% recycled material, with no color additive. The mulch shall not contain significant amounts of trimmings from pine or cedar unless well aged. The mulch shall not contain any noxious weeds, plants with thorns or spines, or invasive plants. The largest allowable pieces not larger than 3" in any direction. Bark mulch shall not be used.
Organic mulch shall be "Native Mulch" from Garden-Ville, San Antonio, Texas, or approved equal:
www.garden-ville.com/products/47/Native-Mulch.htm
Phone: 1-888-655-6115

B. For rock mulch, refer to Division 32 Section "Crushed Stone and Gravel."

C. Sheet Mulching shall be employed for all areas as feasible using 100% recycled B flute cardboard. Cardboard is available in 3' - 5' wide corrugated rolls from Eco-Box, San Antonio, Texas: www.ecobox.com. Phone: 210-267-1614

2.6 PESTICIDES

A. No synthetic or chemical pesticides will be allowed.

B. An Integrated Pest Management (IPM) program shall be implemented when needed to monitor for the presence of pests, evaluate pest impact to plant health and appearance and nuisance to the public, and provide control treatments that have minimal negative effects on all but the pest and that protect air and water quality and human health. Preference shall be given to non-toxic biological methods and non-pesticide alternatives when considering the use of pest control agents.

C. Cultural controls and Mechanical or Physical methods will be used as the first choice in weed management and eradication.

D. Sheet mulching, a layered system of non-synthetic weed barrier overlain by mulch, shall be employed where possible as a weed deterrent.

E. For weed control non-chemical herbicides using Fatty acids, Acetic and Citric acids, or Clove, Citrus, Mint and Thyme oil may be employed by Contractor as a last resort. These may include:

1. Fatty acid potassium salts (e.g. Safer's Superfast Weed and Grass Killer)
2. Acetic and citric acids (e.g. Nature's Glory Weed and Grass Killer RTU)
3. Clove, citrus, mint and thyme oil (e.g. Matran II, Burnout, Xpress)

2.7 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. For all 2-1/2" caliper trees, no staking or guying is required.
2. For trees in tree wells with crushed stone/decomposed granite mulch, provide tree guard (see Item 9003) and stabilize tree with rubber strap attached to tree guard.
3. For all other 3" caliper trees, provide a 9' Reddystake by J.R. Partners
4. For all other 4" caliper trees, provide a Megastake by J.R. Partners

2.8 EROSION-CONTROL MATERIALS

A. Compost Blankets: A 1"-3" thick layer of loosely applied compost or composted material placed on the soil.

B. Compost Filter Berms: A dike of compost or a compost product, trapezoidal in cross section, is placed perpendicular to sheet-flow runoff.

C. Compost Filter Sock: A compost filter sock is a type of contained compost filter berm. It is a mesh tube filled with composted material that is placed perpendicular to sheet-flow runoff to control erosion and retain sediment in disturbed areas.

D. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

E. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

2.9 MISCELLANEOUS PRODUCTS

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area. If foreign or deleterious material is found remove the soil and contamination as directed by Owner’s Representative and replace with new planting soil.
2. Do not mix or place soils and soil amendments in frozen, wet, rainy, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures as needed to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkway

3.3 PLANTING AREA SOIL PREPARATION

A. Planting area soil where soil must be loosened to alleviate compaction:

1. Subsoil, rip, scarify or till soil to less than 200 psi to a total depth of 20 inches below final topsoil grade.

2. Subsoiling shall form a two-directional grid with channels spaced a minimum of 12 inches apart.
3. Do not subsoil, scarify or till within drip line of existing trees to be retained.
4. Do not subsoil, scarify or till over utility installations within 30 inches of the surface, or where trenching or drainage lines are installed.
5. Incorporate organic soil amendments into the top six inches of soil after subsoiling has taken place.

B. Planting areas that will receive imported soil (non-stormwater bioretention planting areas):

1. Before adding imported topsoil, scarify subsoils to less than 200 psi to a depth of 20 inches below final topsoil grade.
2. Do not scarify or till within drip line of existing trees to be retained.
3. Place first lift of three inches of imported topsoil on scarified surface and till into subsoil.
4. Place second lift of three inches or more of imported topsoil on surface to achieve a minimum depth of 20 inches of friable soil.

C. Planting area soil in Stormwater Bioretention Planters

1. Excavate to depth necessary to accommodate gravel drainage layers (see construction details).
2. Place engineered soil medium in 6” lifts on top of gravel drainage layers until final grade is reached.
3. Do not place filter fabric between soil and gravel.

D. Planting beds are to be graded smooth and level, 3” minimum below adjacent paving to accommodate sheet mulch.

E. Verify that all planting beds shall have a minimum depth of twelve inches of uncompacted soil except where tree roots limit the depth. Soil compaction may be measured using a soil cone penetrometer.

F. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off the property.

G. Phase the installation of the soil such that equipment does not have to travel over already installed topsoil or planting mixes.

H. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

I. Remove any noxious or invasive weeds and dispose of them off site.

J. Lay out trees and large shrubs at locations and at spacing indicated on plans. Stake locations of individual trees and shrubs and outline areas for multiple plantings. Adjust locations when requested, and obtain Landscape Architect’s acceptance of layout before excavating or planting. Make minor adjustments as required.

K. Water entire planting area thoroughly. This may be done the day before planting.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches:

1. Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Excavate so that base of planting pit is approximately two times as wide as ball diameter for container-grown stock.
2. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Planting pit shall be at a depth that will ensure that the root flare will be 5 to 6 inches above adjacent finish grade in all areas that will be sheet mulched. Where sheet mulching will not be employed the root flare shall be 3 to 4 inches above finish grade. Scarify sides of planting pit smeared or smoothed during excavation. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
3. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
4. Maintain supervision of excavations during working hours.
5. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

B. Subsoil and topsoil removed from excavations shall be used for backfill if suitable.

C. Obstructions: Notify owner if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Detrimental soil conditions: The landscape architect is to be notified, in writing, of soil conditions encountered, including poor drainage or unexpected water seepage, that the contractor considers detrimental to the growth of plant material. When detrimental conditions are observed, planting shall be discontinued until instructions to resolve the conditions are received from the landscape architect.

3.5 DRAINAGE TEST AND AUGER HOLES

A. Requirements: After tree pits are dug and before planting operations, tree pits shall be water tested for drainage. One location per 80 square feet of tree pit shall be tested. In addition, test all tree pits in any area where a test tree pit does not drain within 24 hours, such as in hardpan areas, rocky ground, construction backfill, compacted areas, flat ground, low spots, and the like, in order to ensure that pits in those areas will drain properly.

B. Tests: Fill tree pits with water. Check holes after 24 hours to determine if water has drained out. If the water has not drained out, bring this to the attention of the Owner for remedial course of action. Adjustment of pit size, adjustment of pit location, or addition of auger holes will be required by the Owner if a drainage problem exists.

C. Auger Holes: Auger one 6-inch diameter hole through the bottom of each excavated plant hole that does not drain within the specified 24 hour period. Depth of the drill measured from the bottom of the excavation to the bottom of the drill hole shall be 4 feet. Backfill auger holes with 3/4-inch diameter, well-graded drain rock up to bottom of the plant hole.

3.6 ROOT BARRIER INSTALLATION

A. Install root barrier according to manufacturer's instructions.

3.7 TREE AND SHRUB PLANTING (5 GALLON SIZE AND LARGER)

A. All plants 5 gallon size and larger shall be planted before installation of the Sheet Mulching System.

B. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

C. Set container-grown stock plumb and in center of planting pit or trench with root flare of trees 5 to 6 inches above adjacent finish grades and root flare of shrubs 3 to 4 inches above adjacent finish grades in all areas that will be sheet mulched. Set root flares of trees 4 inches and shrubs 3 inches above adjacent finish grades in areas that will not be sheet mulched.

1. Use unamended native soil for backfill if planting in native soil.
2. Use imported soil for backfill if planting in imported soil.
3. Carefully remove root ball from container without damaging root ball or plant.
4. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.8 TREE AND SHRUB PRUNING

A. Prune, thin, and shape trees and shrubs only if approved by Landscape Architect, according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

B. All broken branches and exposed roots two (2) inches in diameter or greater of significant, heritage or mitigation trees shall be cut cleanly and in accordance with ANSI-A300 standards. In the case of oak species, in order to prevent infection by oak wilt spores, wounds must be

painted with an acceptable wound dressing within thirty (30) minutes. Clean all tools with bleach following each cut.

3.9 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Install Tree stakes as shown on drawings; avoid penetrating root balls or root masses.
2. Support trees with bands of flexible ties as shown on drawings. Allow enough slack to avoid rigid restraint of tree.

3.10 ORGANIC SOIL AMENDMENT AND FERTILIZER APPLICATION

A. Apply organic soil amendments after tree and shrub planting at rates recommended by Landscape Architect directly to surface of planting area without removing weeds or tilling soil. Cover with layer of compost. Do not till soil amendments into soil. Sheet mulch will be applied directly over compost layer.

B. Compost Tea (AACT) shall be applied after planting (see Section 3.12).

3.11 SHEET MULCH INSTALLATION (COORDINATE WITH SURFACE DRIP IRRIGATION, IF USED)

A. If organic soil amendments have not been applied yet (see 3.3 PLANTING AREA PREPARATION), Apply organic soil amendments after tree and shrub planting at rates recommended by Landscape Architect directly to surface of planting area without removing weeds or tilling soil. Cover with layer of compost. Do not till soil amendments into soil. Sheet mulch will be applied directly over compost layer.

B. After the planting area has been thoroughly watered, the organic soil amendments, including compost, have been applied to surface of planting areas, and the 5 gallon and larger plant materials have been planted, the Sheet Mulch shall be installed

C. Apply a minimum of two layers of 100% recycled B flute cardboard as a bio-degradable weed barrier to the entire planting area, completely covering all existing soil and vegetation.

1. If subsurface drip irrigation is used, apply cardboard to surface after subsurface irrigation system has been installed.
2. Wet cardboard thoroughly while applying to prevent it from blowing away.
3. Avoid walking on wet cardboard.
4. Do not allow any loose soil to remain on top of cardboard.
5. Edges of the sheets of Cardboard shall overlap a minimum of 8”.
6. Cardboard shall abut directly against edge of pavement, curbs and boulders.

7. Cardboard shall be applied to the edge of installed plant root balls without covering any part of the top of the root ball / root crown area.
8. Excess cardboard shall be folded under itself when abutting against hardscape objects or root crown areas, as opposed to being cut, to avoid excessive cardboard scraps. This folding under process is greatly aided when the cardboard is wet.
9. Keep all cardboard scraps separate from other construction debris for depositing at a local recycling facility.

D. Apply mulch to top of cardboard:

1. Apply 1"layer of arbor chip mulch on top of the cardboard to protect cardboard during the planting of 1 gallon and smaller pots and the laying out of irrigation drip lines (if surface drip irrigation is used). If surface drip irrigation is not being used, skip to D-4.
2. If surface drip irrigation is used, install drip irrigation lines on top of first 1" application of mulch.
3. If surface drip irrigation is used, apply 3" of additional arbor chip mulch on top of first application of mulch and drip lines.
4. If bubblers, spray, or subsurface drip irrigation is used, apply 4" inches of arbor chip mulch directly on top of cardboard.

E. Do not place mulch or compost within 6 inches of trunks or stems.

F. Where planting areas are adjacent to paving, gradually taper depth of mulch so that top of mulch meets top of paving.

3.12 SMALL SHRUB, GROUND COVER AND PERENNIAL PLANTINGS

A. Any plants less than 5 gallon size shall be installed after sheet mulching.

B. Set out and space ground cover and plants smaller than 5 gallon size as indicated on plans in even rows with triangular spacing.

C. Plant 1 gallon plants through the cardboard mulch, pushing extra soil under the cardboard layer. Take care not to allow any soil to remain on top of cardboard or mulch.

D. Plant 4" and smaller plants into the mulch on top of the cardboard without cutting through the cardboard. Backfill around plants with several handfuls of compost.

E. Use unamended native soil for backfill for larger plants.

F. Do not leave excess soil on top of sheet mulch. Push excess soil under cardboard.

G. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

H. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

I. Keep mulch 6" min. from root crown.

J. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.13 COMPOST TEA AND LIQUID BIOLOGICAL AMENDMENT APPLICATION

A. After all plants have been planted the AACT (Actively Aerated Compost Tea) and other liquid biological amendments (as determined by Soil Foodweb Advisor) shall be applied. AACT shall be applied using a dedicated AACT sprayer designed to deliver live biologicals at less than 100 p.s.i.

B. AACT must be applied within four hours removal from aeration.

C. AACT may be diluted if desired up to 1:4, however if chloramine-treated water is used for dilution the water must be pre-treated using aquarium procedures or with the addition of humic acid as directed by Soil Foodweb Advisor or Landscape Architect.

D. Apply AACT at a rate of 20 gallons per acre, completely covering all soil, mulch, and foliage of plants.

E. AACT may be mixed with other liquid foods with approval from the Landscape Architect or Soil Foodweb Advisor.

3.14 PLANT MAINTENANCE

A. At completion of all planting a preliminary review of the project for the purpose of 'punch-list' will be conducted by the Owner's representative. Upon completion of all punch-list items to the satisfaction of the Owner the project will be deemed to be substantially complete to begin the maintenance period.

B. Contractor shall maintain the planting for a period of twelve month.

C. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing with organic fertilizers as need is shown by soil testing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings to meet City Landscape Ordinance

E. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

F. Mulch shall be replenished as needed to maintain a depth of 4"**.** Additional cardboard under mulch or thicker mulch may need to be used for persistent weeds.

G. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.15 FERTILIZERS AND PESTICIDES

A. No chemical fertilizers, herbicides, pesticides or other disease control chemicals to be used. Only materials approved for organic crop production by the Organic Materials Review Institute (OMRI) may be used, and only with approval from Landscape Architect or Soil Foodweb Advisor. See www.omri.org. Integrated Pest Management (IPM) practices shall be used.

3.16 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

D. Any shrubs or trees to be removed shall be chipped on site and used for mulch. All resulting mulch shall meet requirements of this specification.

E. Weeding, Cultivating, and Cleanup: Planting areas shall be kept neat and free from debris at all times. All areas shall be weed free at the end of the plant establishment and maintenance period.

F. Disposal: Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash and debris and dispose of them off Owner's property.

PART 4 - MEASUREMENT AND PAYMENT

1.2 MEASUREMENT

A. Work described in this item shall be measured as follows:

1.) Trees and plants shall be measured by the each according to size (caliper or container size).

2.) Planting area soil shall be measured by square foot.

3.) Planting area sheet mulch shall be measure by square foot

4.) Stormwater planter soil shall be measured by square foot.

5.) Stormwater planter sheet mulch shall be measured by square foot

6.) Tree stabilization shall be measured by the each according to size

7.) Soil fertility testing shall be a lump sum

8.) Soil food web testing

9.) Plant maintenance and warranty shall be measured by lump sum

Only the planting areas located as shown on the plans or approved by the Engineer will be measured for payment.

1.3 PAYMENT

A. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid as described below:

1.) Provision and installation of trees and plants, including any pruning or trimming

2.) Provision and installation of soil for planting areas and soil trenches, including soil preparation, erosion control measures, drainage testing, root barrier, and soil amendments

3.) Provision and installation of planting area sheet mulch, including cardboard, arbor mulch, and compost

4.) Provision and installation of stormwater planter soil, including soil preparation, erosion control measures, drainage testing, root barrier, soil amendments, and gravel

5.) Provision and installation of stormwater planter sheet mulch, including cardboard, rock mulch, and compost

6.) Provision and installation of tree stabilization

7.) Provision of soil fertility testing

8.) Provision of soil food web testing

9.) Execution of tree and plant maintenance and warranty

This price is full compensation for furnishing the tools, equipment, materials, testing, labor, and incidentals required to meet the requirements of the plans and specifications.

Bid Items:

9007.1 Trees: 2.5" caliper

9007.2 Trees: 3" caliper

9007.3 Trees: 4" caliper

9007.4 Shrubs, groundcover, and perennials: 1 gallon

9007.5 Shrubs, perennials: 2 gallon

9007.6 Shrubs, perennials: 5 gallon

9007.7 Shrubs, perennials: 15 gallon

9007.8 Planting area soil

9007.9 Planting area sheet mulch

ITEM 9008

Subsurface Drainage for Landscape Areas

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Perforated and solid pipe and fittings for stormwater planter underdrain.
2. Cleanouts for stormwater planter underdrain.
3. Geotextile filter fabrics.

1.2 SUBMITTALS

A. Product Data: For geotextile filter fabrics.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

2.2 Perforated PE Pipe and Fittings: ASTM F 405 or AASHTO M 252, Type CP.

A. Soil materials as specified in Item 9007 "Planting," and civil drawings.

2.3 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.

B. Structure Type: Nonwoven, needle-punched continuous filament.

1. Survivability: AASHTO **M 288 Class 2**.
2. Styles: Flat and sock.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in the Civil plans.

3.2 STORMWATER PLANTER DRAINAGE INSTALLATION

A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with **adhesive**.

E. Lay perforated pipe with perforations down.

F. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

G. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

H. Add drainage course to width of at least 6 inches (150 mm) on side away from wall and to top of pipe to perform tests.

I. After satisfactory testing, cover drainage piping with drainage course to elevation lowest drain rock course in stormwater planter, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

3.3 PIPE JOINT CONSTRUCTION

A. Join perforated PE pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.

B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.4 CLEANOUT INSTALLATION

A. Comply with requirements for cleanouts specified in Division 33 Section "Storm Utility Drainage Piping."

B. Cleanouts for Stormwater Planter Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction, as shown on plans. Install fittings so cleanouts open in direction of flow in piping.
2. In nonvehicular-traffic areas, use NPS 4 (DN 100) **PVC** pipe and fittings for piping branch fittings and riser extensions to cleanout. See construction details for cleanout frame materials and products. Set top of cleanout 1 inch above grade.

3.5 CONNECTIONS

A. Connect low elevations of subdrainage system to stormwater planter's solid-wall-piping storm drainage system (see drainage plans).

3.6 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.7 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Subsurface drainage shall be measured as follows:
1. Pipe shall be measured by the linear foot, to the nearest foot.
2. Cleanouts shall be measured by the each

Only the subsurface drain lines and cleanouts located as shown on the plans or approved by the Engineer will be measured for payment.

4.2 PAYMENT

A. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid as described below:

1. Provision and installation of perforated drain pipe at stormwater planters and tree wells, including trenching, drain rock and filter fabric, and connections to the storm drain
2. Provision and installation solid drain pipe at tree wells, including trenching, drain rock, and filter fabric, and connections to the storm drain.
3. Provision and installation of cleanouts for underdrain lines

This price is full compensation for furnishing the tools, equipment, materials, testing, labor, and incidentals required to meet the subsurface drainage requirements of the plans.

Bid Items:

9008.1a Perforated Pipe at Stormwater Planters and Tree Wells, with trenching, drain rock and filter fabric

9008.1b Solid Pipe at Tree Wells with trenching, drain rock, and filter fabric

9008.1c Cleanouts for underdrain lines

SPECIAL SPECIFICATION 9016

Storm Water Planters

9016.1. Description. Furnish, construct, and install one-cell, two-cell, or three-cell storm water planters as shown on the storm water planter structural details, roadway details, and plan/profiles.

9016.2. Materials.

A. General. Furnish materials in accordance with the following:

- TxDOT Item 420, "Concrete Structures"
- TxDOT Item 421, "Hydraulic Cement Concrete"
- TxDOT Item 440, "Reinforcing Steel"
- TxDOT Item 464, "Reinforced Concrete Pipe."

Provide cast-in-place or precast, formed or machine-made, storm water planters. Use Class C concrete with and for all other cast-in-place Storm Water Planters. Furnish concrete for machine-made precast storm water planters in accordance with ASTM C 1433. When sulfate-resistant concrete is required, do not use Class C fly ash.

B. Fabrication.

1. Cast-in-Place. Meet TxDOT Item 420, "Concrete Structures."

2. Formed Precast. Meet TxDOT Item 424, "Precast Concrete Structures (Fabrication)."

3. Machine-Made Precast. Furnish machine-made precast storm water planters in accordance with ASTM C 1433. Ensure that concrete is placed uniformly in the forms. Compact by mechanical devices to ensure dense concrete. Mix concrete in a central batch plant or other approved batching facility from which the quality and uniformity of the concrete can be ensured. Do not use transit-mixed concrete.

C. Testing.

1. Cast-in-Place. Provide test specimens that meet TxDOT Item 421, "Hydraulic Cement Concrete."

2. Formed Precast. Produce test specimens in accordance with Tex-704-I.

3. Machine-Made Precast. Make test specimens in test cylinders at the same time and in the same manner as the sections they represent. Make a minimum of 4 test cylinders for each day's production run and each mix design. Cure test cylinders in the same manner and for the same times as the sections they represent. Test the specimens in accordance with Tex-704-I.

4. Testing Equipment. The producer must furnish all equipment required for testing concrete for storm water planters produced in a precasting plant.

D. Lifting Holes. For precast storm water planters, provide no more than 4 lifting holes in each section. Lifting holes may be cast, cut into fresh concrete after form removal, or drilled. Provide lifting holes of sufficient size for adequate lifting devices based on the size and weight of the storm water planter section. Do not use lifting holes larger than 3 in. in diameter. Do not cut more than 1 longitudinal wire or 2 circumferential wires per layer of reinforcing steel when locating lift holes. Repair spalled areas around lifting holes.

E. Marking. Mark precast storm water planters with the following:

- name or trademark of the producer;

- date of manufacture;
- stormwater planter size; and
- match marks for proper installation, when required, under TxDOT Section 462.2.F, "Tolerances."

Indent markings into the storm water planters or paint them with waterproof paint.

F. Tolerances. Ensure that precast sections of either type meet the following requirements:

- The inside vertical and horizontal dimensions do not vary from plan requirements by more than 1/2 in. or 1%, whichever is greater.
- The horizontal or vertical plane at each end of the storm water planters does not vary from perpendicular by more than 1/2 in. or 1%, whichever is greater, measured on the inside faces of the section.
- The sides of a section at each end do not vary from being perpendicular to the top and bottom by more than 1/2 in. or 1%, whichever is greater, when measured diagonally between opposite interior corners.

Ensure that wall thicknesses are not less than shown on the plans except for occasional deficiencies not greater than 1/4 in. or 5%, whichever is greater. If proper jointing is not affected, thicknesses in excess of plan requirements are acceptable.
Deviations from the above tolerances will be acceptable if the sections can be fitted at the plant or job site and the joint opening at any point does not exceed 1 in. Use match marks for proper installation on sections that have been accepted in this manner.

G. Defects and Repair. Fine cracks on the surface of the member that do not extend to the plane of the nearest reinforcement are acceptable unless the cracks are numerous and extensive. Repair cracks that extend into the plane of the reinforcing steel in an approved manner. Excessive damage, honeycomb, or cracking will be subject to structural review.

H. Storage and Shipment. Store precast sections on a level surface. Do not place any load on the sections until design strength is reached and curing is complete. Shipment of sections is permissible when the design strength and curing requirements have been met.

9016.3. Construction.

A. Excavation, Shaping, Bedding, and Backfill. Excavate, shape, bed, and backfill in accordance with TxDOT Item 400, "Excavation and Backfill for Structures. For all storm water planters where joints consist of materials other than mortar, immediate backfilling is permitted. Take precautions in placing and compacting the backfill to avoid any movement of the storm water planters or damage to the joints. Remove and replace storm water planters damaged by the Contractor at no expense to the City.

B. Placement of Stormwater Planters. When precast storm water planters are used, place them in conformance with the plans or as directed. Place material to be used between storm water planters as shown on the plans or as directed. Unless otherwise authorized, start the laying of storm water planters on the bedding with the abutting sections properly matched. Fit, match, and lay the storm water planters to form a smooth, uniform storm water system true to the established lines and grades. Remove and re-lay, without extra compensation, storm water planters that are not in alignment or that show excessive settlement after laying. Form and place cast-in-place storm water planters in accordance with TxDOT Item 420, "Concrete Structures."

C. Jointing. Unless otherwise shown on the plans, use any of the jointing materials in accordance with the jointing requirements specified in TxDOT Item 464, "Reinforced Concrete Pipe."

D. Connections and Stub Ends. Make connections of storm water planter sub-drains to pipes, storm drains, inlets or storm drain appurtenances as shown on the plans. Connect storm water planters to any required walls, inlets, curbs, riprap, or other structures as shown on the plans or as directed. Repair any damage to the existing structure resulting from making the connections. Plug any holes in the wall of the storm water planter to be placed by the street (not the shorter web-walls) with mortar or concrete and cure.

9016.4. Measurement. This Item will be measured by the foot. Measurement will be made between the ends of the storm water planters. Where inlets, walls, manholes, junction chambers, or other structures are included in lines of storm water planters, the length of storm water planter section tying into the structure wall will be included for measurement, but no other portion of the structure length or width will be included. This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal. Additional measurements or calculations will be made if adjustments of quantities are required.

9016.5. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Storm Water Planters" of the size specified. This price is full compensation for constructing, furnishing, and transporting sections; preparation and shaping of the bed; backfill material; jointing of sections; jointing material; connections to new or existing structures; breaking back, removing and disposing of portions of the existing structure and replacing portions of the existing structure as required to make connections; concrete and reinforcing steel; and equipment, labor, materials, tools, and incidentals. Protection methods for excavations greater than 5 ft. deep will be measured and paid for as required under CoSA Item 550, "Trench Excavation Safety Protection," or TxDOT Item 403, "Temporary Special Shoring." Excavation, shaping, bedding, and backfill will be paid for in accordance with TxDOT Item 400, "Excavation and Backfill for Structures."

9016.6. BID ITEM:

9016.1 CONCRETE STRUCTURE (STORM WATER PLANTER – 5'-6' WIDE) – PER LINEAR FOOT.

9016.2 CONCRETE STRUCTURE (STORM WATER PLANTER – 6'-7' WIDE) – PER LINEAR FOOT.

9016.3 CONCRETE STRUCTURE (STORM WATER PLANTER – 7'-8' WIDE) – PER LINEAR FOOT.

9016.4 CONCRETE STRUCTURE (STORM WATER PLANTER – 8'-15' WIDE) – PER LINEAR FOOT.

Table of Updated Plan Sheets		
Sheet #	**Sheet Title**	**Update Description**
2	Index of Sheets (1 of 3)	Added sheets in the index
4	Index of Sheets (3 of 3)	Added sheets in the index
15	COSA Supplemental General Notes	Updated note 13, 27, and 28
18	Quantity Estimate (1 of 2)	Removed
19	Quantity Estimate (2 of 2)	Removed
20	Roadway and Removal Quantities (1 of 2)	Updated quantities
21	Roadway and Removal Quantities (2 of 2)	Updated quantities
22	Illumination Quantities	Updated quantities
23	Earthwork Quantities	Updated quantities
35-36	Traffic Control Notes & Narrative	Updated narrative
47-52	Traffic Control Plan Phase 1 Step 1	Updated TCP
133	Removal Layout	Added callouts
170-174	Market St Plan and Profile	Removal of improvements along south side of Market
175-177	Commerce St Plan and Profile	Updated type and width of curb
179	East Frontage Raod Plan and Profile	Updated type and width of curb
180	SB Exit to Commerce Plan and Profile	Updated type and width of curb
181-193	West Frontage Road Plan and Profile	Updated type and width of curb
213	Connector Drive Plan and Profile	Updated type and width of curb
220	Roadway Details	Added sidewalk toe-down detail
221	Roadway Details	Updated curb and gutter and stormwater planter detail
225-226	Storm Water Planter Structural Details	Updated size and dimensions
230-233B	Market St Cross Sections	Updated cross sections with current design and utilities
234-238	Commerce St Cross Sections	Updated cross sections with current design and utilities
241-263	West Frontage Road Cross Sections	Updated cross sections with current design and utilities
264-270	Montana St Cross Sections	Updated cross sections with current design and utilities
271-274	SB Entrance Ramp from Cesar Chavez Cross Sections	Updated cross sections with current design and utilities
301	Drainage Summary	Updated quantities
314-318	Storm Sewer System "A" P&P	Removal of storm water planters and PVC underdrain
333-334	Storm Sewer System "B/C" P&P	Updated proposed chilled water and gas location
337	Storm Sewer System "C" P&P	Updated proposed chilled water and gas location
339	Storm Sewer System "A" Inlet Cross Sections	Removal of storm water planters and sidewalk
352	Junction Box - Node B120	Revised note
387	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
388	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
389	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
390-390C	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
391-391B	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
392	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
393	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
394	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
395	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
396	SWPP Plan Phase 1 Step 1	Updated based on TCP sheets
397	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
398	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
399	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
400	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
401	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
402	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
403	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
404	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
405	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
406	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
407	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
408	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
409-409B	SWPP Plan Phase 1 Step 2	Updated based on TCP sheets
474	Pedestrian Bridge Layout	Updated notes
566	Pavement Marking Summaries	Updated quantities
569	Sign Summaries	Updated quantities
575	Signing and Pavement Markings	Removed Market St improvements
585-586	Signing and Pavement Markings	Removed Market St improvements
593	Tree Protection Plan	Added notes
701	Landscape Site Plan	South of Market info. deleted from contract
702	Landscape Site Plan	South of Market info. deleted from contract
703	Landscape Site Plan	South of Market info. deleted from contract
704	Landscape Site Plan	South of Market info. deleted from contract
724	Landscape Site Plan	All work this sheet deleted from contract
726	Irrigation Legend	Changes to reflect recycle water use
727	Irrigation Plan	Irrigation deleted south side of Market
728	Irrigation Plan	Irrigation deleted south side of Market; new recycled POC and associated equipment changes
729	Irrigation Plan	Irrigation deleted south side of Market
730	Irrigation Plan	Irrigation deleted south side of Market
731	Irrigation Plan	Changes to coordinate with irrigation deletion at exit ramp
735	Irrigation Plan	Irrigation added at Median
736	Irrigation Plan	New irrigation stubout/sleeve location to coordinate w/change to recycled water
737	Irrigation Plan	Changes to coordinate with change to recycled water

Table of Updated Plan Sheets		
Sheet #	**Sheet Title**	**Update Description**
738	Irrigation Plan	Changes to coordinate with change to recycled water
740	Irrigation Plan	Adjust irrigation at Ped. Bridge to coordinate with change to recycled water
748	Irrigation Plan	Changes to coordinate with change to recycled water
750	Irrigation Plan	Delete all irrigation at exit ramp
751	Irrigation Details	Detail 5 changes to coordinate with change to recycled water
753	Irrigation Details	Detail 6 changes to coordinate with change to recycled water
764	Plant List	Fraxinus size note changed
766	Planting Plan	Planting/trees deleted south side of Market
767	Planting Plan	Planting/trees deleted south side of Market; misc. plant quantity edits
768	Planting Plan	Planting/trees deleted south side of Market; misc. plant quantity edits
769	Planting Plan	Planting/trees deleted south side of Market; misc. plant quantity edits
772	Planting Plan	Updated notes
774	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
775	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
776	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
777	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
778	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
779	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
780	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
781	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
782	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
783	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
784	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
785	Planting Plan	Misc. plant quantity edits to accommodate wider StrmWtr planting area
786	Planting Plan	Misc. plant quantity/species edits
791	Construction Details	Detail #3 and #4 modified to better reflect civil SWP detail
794	Construction Details	Detail #1 deleted from contract
797	Landscape Quantities Summary	Multiple quantities updated to accommodate plan changes
811	Illumination Layout Area Map	Removed Market St improvements
814-822	Illumination Layout	Updated quantities and removed Market St improvements
825	Illumination Layout	Updated quantities and removed Market St improvements
827	Illumination Layout	Updated quantities and removed Market St improvements
829	Illumination Layout	Updated quantities and removed Market St improvements
831	Illumination Layout	Updated quantities and removed Market St improvements
833	Illumination Layout	Updated quantities and removed Market St improvements
835	Illumination Layout	Updated quantities and removed Market St improvements
837	Illumination Layout	Updated quantities and removed Market St improvements
839	Illumination Layout	Updated quantities and removed Market St improvements
841	Illumination Layout	Updated quantities and removed Market St improvements
843	Illumination Layout	Updated quantities and removed Market St improvements
845	Illumination Layout	Updated quantities and removed Market St improvements
847	Illumination Layout	Updated quantities and removed Market St improvements
849	Illumination Layout	Updated quantities and removed Market St improvements
851	Illumination Layout	Updated quantities and removed Market St improvements
853	Illumination Layout	Updated quantities and removed Market St improvements
855	Illumination Layout	Updated quantities and removed Market St improvements
858	Illumination Layout	Updated quantities and removed Market St improvements
860	Illumination Layout	Updated quantities and removed Market St improvements
862	Illumination Layout	Updated quantities and removed Market St improvements
863	Electrical Service Data Summary	Updated quantities
864-865	Roadway Illumination Electrical Schematics	Updated schematics
867	Street Light Detail in Storm Water Planter	Updated detail
894-895	Illumination Standards	Added standards
896	Utility Legend and Miscellaneous Details	Updated TW and IT trench detail
898	Utility Layout	Updated TW and IT trench detail
917	Water Line Quantity Table	Updated quantities
952	Chilled Water Summary of Quantities	Updated quantities
973	Chilled Water Line B Plan and Profile	Updated asphalt replacement area
974	Chilled Water Trench Deetails	Updated details
1086-1088	Bid Alternate 2: Landscape Sheets	Moved RW 7 area improvements to Bid Alternate 2

SPECIAL PROVISION
TO
SPECIAL SPECIFICATION
6834--001
Portable Changeable Message Sign

For this project, Special Specification Item 6834, "Portable Changeable Message Sign," is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 2. **Materials, Section A. Minimum Luminance Requirements**, is voided and not replaced.

Article 2. **Materials, Section C. Changeable Message Sign.** The second paragraph is voided and replaced by the following:

Provide a sign with 3 separate lines of text and 8 characters per line minimum. Provide spacing between message lines that are between 50 and 75 percent of the letter height. Provide a minimum 18 in. character height. Provide a 5 x 7 character pixel matrix. Provide a message legibility distance of 600 ft. for nighttime conditions and 800 ft. for normal daylight conditions. Provide for manual and automatic dimming light sources.

ITEM 9020

Street Light Foundation

9020.1 Description. This item shall consist of furnishing and installing street light foundations.

9020.2 Materials. The Street Light Foundation shall be a CPS Energy Steel Anchor Foundation 18-inch diameter and 5-feet deep with CPS Energy material number 1033433. All references to ASTM specifications on the plans are to the latest revision. The Hubbell direct embedded foundation shall be Hubbel Catalog number T112-0899 or approved equal and shall be installed as shown in the plans.

9020.3. Installation and Construction. The installation of the five-foot x 18-inch diameter CPS Energy Steel Anchor Foundation with five-foot long Hubbell Direct Embedded Street Light Foundation shall be performed in accordance with the plans and the manufacturer's directions. An additional 4-feet 6-inch class C concrete column extension shall be constructed on top of the CPS energy foundation if the street light foundation is installed inside a storm water planter. This additional column is not included in Item 9020. This will provide for the street light pole base to be installed above the top of the storm water planter as shown on the plans.

9020.4 Submittals. The contractor shall submit product data, material certificates, maintenance data, and shop drawings.

9020.5 Measurement. Item 9020 will be measured and paid for by each unit.

9020.6 Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Street Light Foundation" of the size specified. This price is full compensation for constructing, furnishing, transporting, placing; and equipment, labor, tools, and incidentals.

9020.7 Bid Items.

Item 9020 – STREET LIGHT FOUNDATION – per EACH.

SPECIAL SPECIFICATION

6834

Portable Changeable Message Sign

1. **Description.** Furnish, operate, and maintain portable trailer mounted changeable message sign (PCMS) units.

2. **Materials.** Furnish new or used material in accordance with the requirements of this Item and the details shown on the plans. Provide a self-contained PCMS unit with the following:

   - Sign controller
   - Changeable Message Sign
   - Trailer
   - Power source

   Paint the exterior surfaces of the power supply housing, supports, trailer, and sign with Federal Orange No. 22246 or Federal Yellow No. 13538 of Federal Standard 595b, except paint the sign face assembly flat black.

   A. Minimum Luminance Requirements. All PCMS units shall meet the following luminance requirements measured at the character level in candela as is published in Report 4940-2, "Photometric Requirements for Portable Changeable Message Signs," conducted by the Texas Transportation Institute. Luminance will be tested in accordance with Tex-880.

   - Minimum Daytime Character Luminance of 4000cd/m2 with a contrast ratio of 5.
   - Minimum Nighttime Character Luminance of 30/cd/m2.

   B. Sign Controller. Provide a controller with permanent storage of a minimum of 75 pre-programmed messages. Provide an external input device for random programming and storage of a minimum of 75 additional messages. Provide a controller capable of displaying up to 3 messages sequentially. Provide a controller with adjustable display rates. Enclose sign controller equipment in a lockable enclosure.

   C. Changeable Message Sign. Provide a sign capable of being elevated to at least 7 ft. above the roadway surface from the bottom of the sign. Provide a sign capable of being rotated 360° and secured against movement in any position.

   Provide a sign with 3 separate lines of text and 8 characters per line minimum. Provide a minimum 78 in. high x 126 in. wide sign housing. Provide a minimum 18 in. character height. Provide a 5 x 7 character pixel matrix. Provide a message visibility distance of 750 ft. Provide for manual and automatic dimming light sources.

   The following are descriptions for 3 screen types of PCMS:

- **Character Modular Matrix.** This screen type comprises of character blocks.
- **Continuous Line Matrix.** This screen type uses proportionally spaced fonts for each line of text.
- **Full Matrix.** This screen type uses proportionally spaced fonts, varies the height of characters, and displays simple graphics on the entire sign.

D. Trailer. Provide a 2 wheel trailer with square top fenders, 4 leveling jacks, and trailer lights. Do not exceed an overall trailer width of 96 in. Shock mount the electronics and sign assembly.

E. Power Source. Provide a diesel generator, solar powered power source, or both. Provide a backup power source as necessary.

F. Cellular Telephone. When shown on the plans, provide a cellular telephone connection to communicate with the PCMS unit remotely.

3. Construction. Place or relocate PCMS units as shown on the plans or as directed. The plans will show the number of PCMS units needed, for how many days, and for which construction phases.

Maintain the PCMS units in good working condition. Repair damaged or malfunctioning PCMS units as soon as possible. PCMS units will remain the property of the Contractor.

4. Measurement. This Item will be measured by each PCMS or by the day used. All PCMS units shall be set up on a work area and operational before a calendar day can be considered measurable. When measurement by the day is specified, a day shall be measured for each PCMS set up and operational on the worksite.

5. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Portable Changeable Message Sign." This price is full compensation for PCMS units; set up; relocating; removing; replacement parts; batteries (when required); fuel, oil, and oil filters (when required); cellular telephone charges (when required); software; and equipment, materials, tools, labor, and incidentals.