



SAN ANTONIO WATER SYSTEM
C5 Culebra – Castroville to Laredo & C28 Zarzamora Creek – San
Gabriel to NW 23rd Street
PHASE 1B
SAWS Job No. 15-4503
Solicitation No. CO-00058


ADDENDUM NO. 4


May 20, 2016

BID OPENING DATE: May 25, 2016

10:00 a.m. Central Standard Time

ENGINEER SEALS & FIRM INFORMATION

	<p>CP&Y, Inc. TBPE Registration No.: F-1741 12500 San Pedro, Suite 450 San Antonio, Texas 78216 Tel. (210)494-8004</p>
	<p>SAWS Job No. 15-4503</p>

	<p>Apache Creek Trail North: Terra Design Group 816 Cameron, Suite 103 San Antonio, Texas 78212</p>
	<p>Apache Creek Trail North</p> <p>Questions 44 through 48, Section 01010 and Appendix B, Drawing S2.03 only</p>

To: All Document Holders of Record

This addendum, applicable to work referenced above, forms a part of the Contract Documents and modifies the original Contract Documents dated April 2016. Acknowledge receipt of this addendum by entering the addendum number and issue date in the spaces provided on submitted copies of the proposals. Failure to do so may subject Respondent to disqualification.

Addendum No. 4 consists of 51 items outlined in 13 pages. In addition to these 13 pages, Conformed Specification and Conformed Drawings incorporating the addendum changes are being reissued as part of this addendum. Addendum No. 4 Conformed Specifications and Conformed Drawings include 13 re-issued or new documents (Listed under Paragraph C), and include 44 re-issued or new sheets (Listed under Paragraph D). The revised construction cost estimate is \$11,181,212.

ADDENDUM NO. 4

A. GENERAL QUESTIONS

1. Question: There is an additional set of plans attached to the invitation for bid for Apache Creek Trail (North). Was this included in error? Please advise.

Response: The Apache Creek Trail (North) improvements are being joint bid with the SAWS water and sewer improvements. This was not an error.

2. Question: What section would I be best searching to find the amount of Contract time given for the contract?

Response: Contract time is 548 days and is noted within the Bid Proposal and the Proposal Certification.

3. Question: "I am looking at the specifications for HDPE (#15089). I see that the specifications call out DIPS and a DR of 32.5. Does this apply to all of the HDPE pipe sizes shown – 15", 18", 21" and 24"?"

Response: The DR ratio for all pipe sizes should be DR 17. This addendum revises Section 15089 to address this.

4. Question: The Special Provisions and specifications 03200, 03300, and 03301 are missing per the Table of Contents.

Response: The Table of Contents has been corrected and is attached to this addendum.

5. Question: Sheets 35, 36 and 37 show the 33" sewer pipe to be PVC while the bid item list shows the 33" to be FRP. Please clarify.

Response: The 33" sanitary sewer is to be FRP. The plan sheets have been corrected per this addendum.

6. Question: On sheet G-09, it states that the sanitary sewer PVC pipe to be used on this project shall conform to SDR26 ASTM D-2241. This is a pressure class pvc Pipe but if we go by that spec, They do not make a 15" and 21" is this type of pipe. What kind and size of pipe do you want to use?

Response: PVC for gravity sanitary sewer is to be SDR 26 meeting ASTM D3034. Sheet G-09 has been corrected per this addendum.

7. Question: Is the pre-bid meeting only mandatory for general/prime contractors?

Response: Anyone can attend the meeting, but if they wish to bid as prime they must attend to represent their company and sign in.

8. Question: Is there any geotech information on this project?

Response: Geotech Report is available during the advertisement period for informational purposes only. See the Special Conditions for instructions on requesting the geotech report.

9. Question: On plan sheet, C-B-16, MH B-37 (STA 162+77.92) and MH B-37-1 (STA 163+04.48) are shown on the plan view as "Drop Manholes", yet the profile view does not show them to be "Drop Manholes". In addition, the "Sheet Quantity Summary" for sheet, C-B-16, does not show these manholes as T-Base Fiber Reinforced Drop Manholes. Please clarify.

Response: These are not drop manholes. See addendum for revisions to call outs.

10. Question: On plan sheet, C-B-24, MH B-48 (STA 512+91.08) indicates to have a 12" PVC lateral connection. Please confirm this T-Base Manhole is not a "Drop Manhole".

Response: MH B-48 does not show a 12" PVC lateral connection. MH is correct as shown on plans.

11. Question: Regarding General Note #17 on plan sheet G-08, please confirm it's the bidding Contractor's responsibility to formulate a SW3P plan, including measures used and quantities?

Response: For the SAWS water and sewer work, the contractor is responsible. For the Apache Creek Trail work a SWPPP has been provided. Appendix B is revised and attached to this addendum.

12. Question: Also, please confirm if General Note #17 and the associated SW3P will be paid under bid item #24-Stormwater Pollution Prevention Plan.

Response: Preparation and implementation of the SWPPP for the SAWS sanitary sewer and water line work will be paid for under SAWS sanitary sewer and water bid item 24. Implementation of the SWPPP for the Apache Creek Trail will be paid for under a separate Apache Creek Trail (North) bid item 148.

13. Question: Regarding the General Notes on sheets G-08 & G-09 related to permits, typically the Owner and Engineer provide these permits; for consistency amongst all bidders, will the Owner/Engineer specify which specific permits the Contractor will be responsible for obtaining?

Response: Owner has obtained the Floodplain Development Permit and the Tree Permit. All other permits are the responsibility of the Contractor

14. Question: Will the Owner allow 24-hour tunneling operations? If not at all locations, can 24-hour tunneling be authorized for the tunnels in excess of 300' in length?

Response: Contractor may submit a request. Approval in writing will be required by SAWS and CoSA.

15. Question: Please confirm the use of liner plate in lieu of steel casing is acceptable on this project.

Response: Per S856 included in the contract documents, Liner Plate is not acceptable.

16. Question: Regarding the HDPE siphon lines, will deflection testing by mandrel be required? If so, what tolerance will be given to account for the "lips" generated from fusing the HDPE together?

Response: Mandrel testing will be required. The internal "beads/lips" do not need to be removed. The mandrel size tolerance will need to fit within the "beads/lips."

17. Question: Regarding the HDPE siphon lines, can the Owner/Engineer provide a detail for the collar or side-fused-branch-saddle referenced in section 15089-3.05.B? If no detail is available, will the Owner/Engineer specify acceptable collars or side-fused-branch-saddles and the required dimensions?

... Response: Specification language has been revised in the addendum to address this.

18. Question: MH-B-6: 8" lateral shown in riser but not called a drop MH on the plans, please clarify.

Response: This is not a drop manhole. The existing 8" is being removed as part of the project. This is clarified in the addendum.

19. Question: MH-B-9: please confirm this MH contains two (2) 8" drop connections. If so, should another bid item be added for tee-base MHs with two (2) drop connections?

Response: Confirmed this manhole has two 8" drops. A separate bid item is not provided. Account for this in your price for drop manholes.

20. Question: MH-B-37: called drop MH in the plans but no existing 8" or 12" line is shown. Is this for a future connection? Please clarify

Response: See response to question 9.

21. Question: MH-B-37-1: called drop MH in the plans but no existing 8" or 12" line is shown. Is this for a future connection? Please clarify

Response: See response to question 9.

22. Question: MH-B-44-1: called drop MH in the plans but no existing 8" or 12" line is shown. Is this for a future connection? Please clarify.

Response: This is not a drop manhole. This is clarified in the addendum.

23. Question: MH-B-45: called drop MH in the plans but no existing 8" or 12" line is shown. Is this for a future connection? Please clarify.

Response: This is not a drop manhole. This is clarified in the addendum.

24. Question: Regarding MH-B-14: will the Owner/Engineer add a Lateral Profile sheet for the connection (5' of 36" FRP SS) between the existing siphon structure and proposed manhole B-14? Should bidding Contractors assume this will be a drop connection due to the estimated 7' difference in flowline elevations?

Response: Confirmed this is a drop manhole. Lateral has been provided, on C-LP-01 in the addendum.

25. Question: Has the Phase 1A Contractor installed the +/- 48 LF of 36" FRP SS lateral where Phase 1B starts (STA 100+44.40)? If not, does the Phase 1A Contractor's baseline construction schedule indicate when the lateral will be installed?

Response: Lateral has not been installed. Phase 1A is currently under construction. Coordination with Phase 1A Contractor and Owner will be required.

26. Question: Regarding the existing 36" FRP SS lateral installed by the Phase 1A Contractor, does the FRP lateral contain a wall ring or will the Phase 1B Contractor be required to install the wall ring on the FRP pipe outlet penetration?

Response: Phase 1A contractor will provide a 36" stub out with cap. Phase 1B contractor will be required to provide the wall ring.

27. Question: Will the Contractor be required to backfill the excavations for the siphon boxes with flowable fill?

Response: See sheet C-B-01 and Structural Sheets S-B-01 through S-B-05 for backfill requirements.

28. Question: Regarding Note #1 on plan sheet #C-B-01, was the 12" SS abandon in place with or without fill?

Response: The 12" sanitary sewer will be abandoned in accordance with SAWS Standard Specification 862 which does not require 12" abandoned lines to be grouted.

29. Question: For consistency amongst all bidders, will the Owner/Engineer add a bid item for the removal and disposal of existing manholes?

Response: Removal and disposal of existing manholes is subsidiary to the work.

30. Question: Will the Contractor be allowed to have multiple traffic control set-ups ("phases") in place during construction, specifically when tunneling?

Response: Contractor may submit a request. Approval in writing will be required by SAWS and CoSA.

31. Question: Please confirm Bid Item #502.1 – Concrete Sidewalks will be paid when working within close proximity to existing sidewalk and curb, such as on plan sheet #31, when laying pipe down the outside southbound lane of SW 19th St. (center of pipe is 5' from edge of curb). Concrete replacement hatching is shown but no quantity call-out is listed on the plan; however, for this specific plan sheet 170 SY is assessed in the quantity summary table.

Response: Concrete sidewalk replacement limits are identified for payment where construction is anticipated to impact sidewalks, such as along SW 19th St. Limits are hatched and beginning and ending stations are called out on plans at the beginning and end of the hatching.

32. Question: Please note that, after visiting the site and walking/driving the proposed alignment, we observed new construction currently underway consisting of new curb, sidewalk, and driveways along NW 19th ST., Monterey St., Shore Dr., NW 20th St., Buena Vista St., and NW 21st St. Please confirm the Owner will overrun pay item quantities for items requirement replacement as some are not called out to be replaced, hatched, or listed in the quantity summary sheet.

Response: Quantities have been increased on bid proposal, which has been revised as part of this Addendum. Bidders should use this version when submitting a bid for this project. Any overruns will need to be evaluated and approved by the Owner.

33. Question: Will the Owner/Engineer disclose the pipe material of the existing sanitary sewer lines that are to be removed/replaced and abandoned?

Response: See Attachment 1, Existing Sanitary Sewer Pipe Material, for a table of existing pipe materials.

34. Question: Will the Owner/Engineer disclose the pipe material of the existing sanitary sewer lines that need to be televised prior to construction?

Response: See Attachment 1, Existing Sanitary Sewer Pipe Material, for a table of existing pipe materials.

35. Question: Should the Contractor foresee safety concerns while working in the limited 18-foot of space, such as on Potosi St. and Houston St., can the Contractor submit an alternate traffic control plan closing the entire road to increase work space?

Response: Contractor may submit a revised traffic control plan. Approval in writing will be required by SAWS and COSA.

36. Question: Regarding the encasement of tee-base manhole sections, please confirm reinforcement is required up to the inside edge of FWC couplings, but the encasement around the FWC coupling contains no reinforcement. We ask because there are conflicting notes we need clarification on for detail A (tee-base fiberglass manhole detail) on sheet D-01. Conflicting notes are: "Concrete encasement (non-reinforced)(NSPI)**" and "Reinforced concrete encasement w/#5 bars @ 12" O.C.E.W. (not shown)(NSPI)**"

Response: The detail has been revised, see sheet D-01 attached to this addendum.

37. Question: Regarding the 90-degree bends for drop manholes, does the Owner/Engineer have a preference between short-sweep and long-sweep 90-degree bends? If so, please specify

Response: Please provide long sweep 90-degree bends.

38. Question: Please confirm there are no vented manholes on this project.

Response: There are vented manholes. See addendum for locations. Vented manholes are paid for under the same bid item as non vented manholes, price accordingly.

39. Question: Please confirm the spacing and location requirement for grout ports in steel casing and liner plate to facilitate contact grouting.

Response: Spacing and location of grout ports is contractor's methods and means. Per response to question 15, liner plate is not allowed.

40. Question: MH B-6 (STA 114+99.33), Please clarify this manhole is not a "drop manhole", but has an 8" lateral connection at the Manhole riser section.

Response: This is not a drop manhole. See addendum for clarification to sheet C-B-04.

41. Question: MH B-9 (STA 117+07.6), please clarify if this Manhole has two 8" Drop Connections.

Response: Confirmed, B-9 has two 8" drop connections.

42. Question: For the following Manholes: MH B-37-1 (STA 163+04.48), MH B-44-1 (STA 180+92.82), MH B-45 (STA 500+11.38); Please clarify the PVC pipe size to be used for the drop connections.

Response: These are not drop manholes. See addendum for clarification.

43. Question: Reference S848-1 to 7 of the current Bid Specs: We respectfully request that US Composite Pipe South, LLC of the Thompson Pipe Group, manufacturer of Flowtite an approved FRP product for SAWS, be included in the spec for this job as an approved manufacturer in Section S848 Part 2.01.A. Currently, it is a sole source for FRP.

Over 75,000 LF of Flowtite pipe has been installed within the SAWS system over the past 14+years. The quality of the pipe is well established with SAWS as well as around the world. And all contractors that have installed Flowtite Pipe within SAWS are in good standing with SAWS and are bidding this job as well

Response: At this time, no change will be made to the approved FRP product for the project.

B. CLARIFICATIONS

44. It is confirmed there is a local shop that can galvanize large members such as the roof structure. If need be, galvanizing half at a time or dipping one end at a time is acceptable. Fabricating in three bolted sections is not acceptable
45. To avoid drilling holes into the tubes, it is acceptable to weld a plate to the 2x4 tubes at each seat and bolt it to the W beams.
46. In reference to Sheet DT 1.04, DT 1.05 and S2.03. The contractor will need to have the frames built. The sign manufacturer only provides the signage panels
47. In reference to DT 1.04, 1.05 and S2.03. All frames are to be primed and painted. See addendum for revised sheet S2.03.
48. Conductor size required to run to the under bridge lights is a #10 minimum. Contractor shall verify the existing circuit voltage at each location before ordering fixtures and shall order the appropriate fixture voltage.
49. Attachment 1 – Existing Sanitary Sewer Pipe Material is provided at the end of this addendum document.

C. SPECIFICATIONS

50. See attached conformed specifications which include the following revised or new specifications. These revised or new specification should be used when preparing bids:

a. TABLE OF CONTENTS

- b. BID PROPOSAL – BIDDERS MUST USE THIS VERSION OF THE BID PROPOSAL WHEN SUBMITTING A BID FOR THIS PROJECT
- c. SUPPLEMENTAL CONDITIONS
- d. SUPPLEMENT TO ITEM NO. 540 TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION AND CONTROL PREVENTION
- e. SECTION 01015 SUMMARY OF WORK FOR SANITARY SEWER AND WATER LINE WORK
- f. SECTION 01150 MEASUREMENT AND PAYMENT
- g. SECTION 15089 HDPE PIPING
- h. SECTION 15113 STOP LOGS AND FRAMES
- i. SUPPLEMENT TO ITEM NO. 849 AIR AND DEFLECTION TESTING
- j. SUPPLEMENT TO ITEM NO. 852 SANITARY SEWER MANHOLES
- k. SPECIAL PROVISION TO ITEM NO. 864 BYPASS PUMPING
- l. SECTION 01010 SUMMARY OF WORK
- m. APPENDIX B – STORM WATER POLLUTION PREVENTION PLAN

D. DRAWINGS

51. See attached conformed drawings. These revised or new drawings should be used when preparing bids. Revisions include the following:

- a. DRAWING NO. G-02 - Replaced
- b. DRAWING NO. G-03 - Replaced
- c. DRAWING NO. G-04 - Replaced
- d. DRAWING NO. G-05 - Replaced
- e. DRAWING NO. G-09 - Replaced
- f. DRAWING NO. C-B-01 - Replaced

- g. DRAWING NO. C-B-02 - Replaced
- h. DRAWING NO. C-B-04 - Replaced
- i. DRAWING NO. C-B-05 - Replaced
- j. DRAWING NO. C-B-09 - Replaced
- k. DRAWING NO C-B-10 - Replaced
- l. DRAWING NO. C-B-11 - Replaced
- m. DRAWING NO. C-B-12 - Replaced
- n. DRAWING NO. C-B-14 - Replaced
- o. DRAWING NO. C-B-15 - Replaced
- p. DRAWING NO. C-B-16 - Replaced
- q. DRAWING NO. C-B-17 - Replaced
- r. DRAWING NO. C-B-18 - Replaced
- s. DRAWING NO. C-B-19 - Replaced
- t. DRAWING NO. C-B-20 - Replaced
- u. DRAWING NO. C-B-21 – Replaced
- v. DRAWING NO. C-B-22 – Replaced
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- y. DRAWING NO. C-B-25 – Replaced
- z. DRAWING NO. C-BC-01 - Replaced
- aa. DRAWING NO. C-LP-01 - Replaced
- bb. DRAWING NO. C-WTR-01 – Replaced

- cc. DRAWING NO. C-WTR-02 – Replaced
- dd. DRAWING NO. C-WTR-03 – Replaced
- ee. DRAWING NO. C-WTR-04 – Replaced
- ff. DRAWING NO. C-WTR-05 – Deleted
- gg. DRAWING NO. M-B-01 – Replace
- hh. DRAWING NO. M-B-02 – Replaced
- ii. DRAWING NO. M-B-03 – Replaced
- jj. DRAWING NO. M-B-04 – Replaced
- kk. DRAWING M-B-05 – Added
- ll. DRAWING NO. S-B-01 – Replaced
- mm. DRAWING NO. S-B-02 – Replaced
- nn. DRAWING NO. S-B-03 – Replace
- oo. DRAWING NO. S-B-04 – Replaced
- pp. DRAWING NO. S-B-05 - Replaced
- qq. DRAWING NO. S-B-05 - Replaced
- rr. DRAWING NO. D-01 - Replaced
- ss. DRAWING NO. D-03 – Replaced
- tt. DRAWING NO. S2.03 - Replaced

END OF ADDENDUM

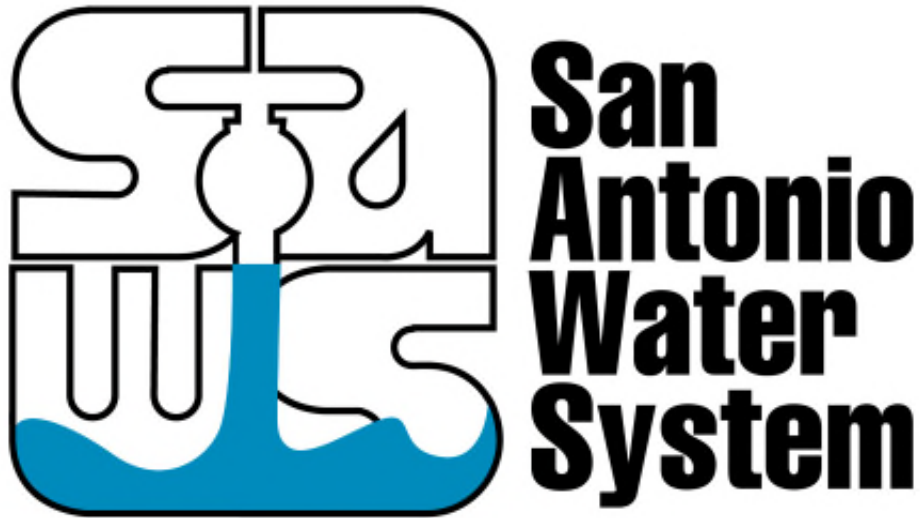
Attachment 1

Existing Sanitary Sewer Pipe Material

<i>Existing SS Pipe Size</i> ¹	<i>Approximate Limits</i>	<i>Pipe Material</i> ¹
8"	C-BC-02	CLAY
	C-BC-03	
	C-BC-04	
36"	C-B-02	RCP
	C-B-03	
	C-B-04	
	C-B-05	
	C-B-06	
12"	C-B-06	CLAY
	C-B-07	
	C-B-08	
	C-B-09	
8"	C-B-09	CLAY
	C-B-10	
12"	C-B-09	CLAY
	C-B-10	
	C-B-11	
	C-B-12	
8"	C-B-12	CLAY
	C-B-13	
	C-B-14	
	C-B-15	
	C-B-16	
	C-B-17	
24"	C-B-17	CLAY
	C-B-18	
10"	C-B-18	CONCRETE
	C-B-19	
24"	C-B-19	RCP
	C-B-20	
	C-B-21	
21"	C-B-21	CLAY
	C-B-22	
24"	C-B-21	CIPP
	C-B-22	
	C-B-23	
	C-B-24	
24"	C-B-24	RCP
	C-B-25	
21"	C-D-01	PVC
	C-D-02	
	C-D-03	
	C-D-04	

1. Pipe size and material based on available record information. It is not field verified and may not include all sanitary sewer lines in the project limits. Actual conditions may differ.

SAN ANTONIO WATER SYSTEM





**CONFORM
CONTRACT
DOCUMENTS**


**C_5 CULEBRA – CASTROVILLE TO LAREDO
& C_28 ZARZAMORA CREEK – SAN
GABRIEL TO NW 23RD ST
PHASE 1B
SAWS Job No. 15-4503
SAWS Solicitation No. CO-00058**

May 2016

ENGINEER SEALS & FIRM INFORMATION

	<p>CP&Y, Inc. TBPE Registration No.: F-1741 12500 San Pedro, Suite 450 San Antonio, Texas 78216 Tel. (210)494-8004</p>
	<p>SAWS Job No. 15-4503 Excluding Division 3 and Division 5</p>

	<p>CP&Y, Inc. TBPE Registration No.: F-1741 12500 San Pedro, Suite 450 San Antonio, Texas 78216 Tel. (210)494-8004</p>
	<p>SAWS Job No. 15-4503 Division 3 and Division 5 only</p>

	<p>Apache Creek Trail North: Terra Design Group 816 Cameron, Suite 103 San Antonio, Texas 78212</p>
	<p>Apache Creek Trail North only</p>

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Contractor's Bid Packet Checklist (<i>Rev. 1/11/2016</i>) BC
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Proposal Certification (<i>Rev. 3/2014</i>). PC-1
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Contractor Security Procedures Exhibit "C" (<i>Rev. 3/14</i>) SP-10
Request for Taxpayer Identification Number and Certification Form (<i>Rev. 12/2014</i>). W-9
Instructions for Completing the ACORD Certificate of Liability Insurance (<i>Rev. 2/16/2016</i>) ICS
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SAWS SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION (April 2014)	

SPECIFICATIONS FOR SAWS JOB NO. 15-4503 SANITARY SEWER AND WATER LINE WORK SECTION

Specification for SAWS Job No. 15-4503 Sanitary Sewer and Water line Work are provided by reference from CoSA STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (Latest Edition) and SAWS SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION (April 2014)

The following additional specifications for SAWS Job No. 15-4503 Sanitary Sewer and Water line Work are supplied as complete documents

Division 1

Summary of Work for Sanitary Sewer and Water Line Work	01015
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Division 3 (For Siphon Inlet and Outlet Structures)

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DESCRIPTION

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SAWS Specification for use Apache Creek Trail are provided by reference from SAWS SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION (April 2014)

Site Specifications:

DESCRIPTION

Division 1

Summary of the Work for Apache Creek Trail North. SECTION 01010

Division 2

Demolition SECTION 02060

Grading SECTION 02210

Concrete Removal SECTION 02212

Excavating, Backfilling, and Compacting for Site SECTION 02220

Tree Protection and Trimming SECTION 02231

Irrigation System SECTION 02810

Trees, Plants, and Ground Cover SECTION 02950

Landscape Maintenance SECTION 02970

Division 3

Concrete Formwork SECTION 03100

Division 4

Reinforced Unit Masonry SECTION 04230

Stone Masonry SECTION 04400

Stone Veneer and Stone Walls SECTION 04450

Cast Stone SECTION 04720

Division 5

Steel & Welding SECTION 05118

Structural Steel Framing SECTION 05120

Architecturally Exposed Structural Steel Framing SECTION 05121

Metal Fabrications SECTION 05500

Division 6

Rough Carpentry SECTION 06100

Division 7

Metal Roofs SECTION 07610

Sheet Metal Flashings and Trim SECTION 07620

Sealants and Caulking. SECTION 07920

Division 9

Anti-Graffiti Coating SECTION 09860

Painting	SECTION 09912
Elastomeric Coating	SECTION 09963
Exterior Painting	SECTION 099113

Division 16

Basic Materials and Methods	SECTION 16050
Raceways	SECTION 16110
Wire Cable and Related Materials	SECTION 16120

Appendix A: Stormwater Management Report

Appendix B: Stormwater Pollution Prevention Plan (SWPPP)

INVITATION TO BIDDERS

Solicitation No. CO-00058

Sealed bids are requested by the San Antonio Water System for the construction of approximately 12,700 linear feet of sanitary sewer and 2,450 of water line for the C5 Culebra – Castroville to Laredo & C28 Zarzamora Creek – San Gabriel to NW 23rd Street Phase 1B Project, SAWS Job No. 15-4503.

To view additional project information, as well as obtain the plans and specifications for this project, visit our website located at www.saws.org and click on the Business Center. Then select Bidder, Consultant, and Vendor Registration, which is located on the left-hand side of the screen. Select the Register Now button and proceed with registration.

For difficulties downloading plans and specifications, contact the Contracting Department at 210-233-3894.

For questions regarding this solicitation, technical questions or additional information, please contact Rosalee Arcos, Contract Administrator, in writing via email to: **Rosalee.Arcos@saws.org** or by fax to **(210) 233-4493 until 12:00 PM (CT) on May 12, 2016**. Answers to the questions will be posted to the web site by **4:00 PM (CT) on May 20, 2016** as a separate document or included as part of an addendum.

A **mandatory** pre-bid meeting will be held at **10:00 AM (CT) on May 11, 2016** at the San Antonio Water System's Customer Service Building, 1st floor, **Conference Room C154**, 2800 U.S. Hwy 281 North, San Antonio, Texas. Please be advised that under no circumstances shall any late or non-attendee(s) to the Mandatory Pre-Bid Meeting be allowed to submit a bid for the project.

Sealed bids will be received by the Contract Administration Division, 2800 U.S. Hwy 281 North, Customer Center Building, Suite 171, San Antonio, Texas 78212, **until 10:00 AM (CT), May 25, 2016**. Bids will then be publicly opened and read aloud by Contract Administration, in **Conference Room C137**, Customer Center Building, 2800 U.S. Hwy 281 North, San Antonio, Texas. Each bid must be accompanied by a cashier's check, certified check, or bid bond in an amount not less than five percent of the total bid price.

INSTRUCTIONS TO BIDDERS

1. Bids will be submitted in accordance with the following:
 - a. Sealed bids will be received by the office of **Contract Administration Division, San Antonio Water System, 2800 U.S. Hwy 281 North, Customer Center Building, Suite 171, San Antonio, Texas 78212**, until the time specified in the Invitation to Bidders.
 - b. If the submittal of a sealed bid is by any means other than personal/hand delivery, then it is the bidder's sole responsibility to ensure the bid is delivered to the exact location specified above, no later than the exact time specified in the Invitation to Bidders.
 - c. All bids errantly submitted or delivered to a location other than the exact location stated above will be returned unopened.
 - d. All bids received after the exact time set for the bid opening in the Invitation to Bidders will be returned unopened.
 - e. The San Antonio Water System Contracting Office may, at its sole discretion, without waiver of rights or authority, in equity or at law, return unopened, any bid not meeting the exact requirements as stated above.
2. Bids will be opened in accordance with the following:
 - a. Bids will be opened in a public setting and read aloud by a Contract Administration representative.
 - b. The lowest bid received at the time of the bid opening shall be designated as the "apparent low bid," whether announced in that manner or not, and shall not represent an acceptance of an offer.
 - c. All bid results are unofficially, tentative and subject to verification on the day of the bid opening.
 - d. No bid may be withdrawn after the scheduled bid opening time without the written consent of a Contract Administration representative.
 - e. The "official" bid results will be tallied on a "bid tabulation sheet" and may, within 10 business days of the bid opening, be posted on the San Antonio Water System's web site.
3. All bids must be accompanied by Certified or Cashier's Check or an approved Bid Bond in the amount of not less than five percent (5%) of the total bid, payable without recourse to the San Antonio Water System. Surety shall provide a copy of the Power of Attorney authorizing the Executing Agent the authority to execute the bid bond documents and bind the Surety to the bid bond conditions. The bid bond shall have a corporate Surety that is licensed to conduct business in Texas and authorized to underwrite bonds in the amount of the bid bond. ***Submission of an Individual Surety is not acceptable for purposes of bonding a bid bond.*** Bid Bonds, Certified or Cashier's checks will be retained for the first, second, and third lowest bidders until the contract is executed.
4. Bids must be submitted on the original bid form attached herein and shall be sealed in an envelope plainly marked on the outside with job number, the date and time of the bid opening, and the name of project bid on.

5. Bids will be prepared in accordance with the following:
- (a) The Bidder shall thoroughly examine the drawings, specifications, schedule, instructions and all other documents.
 - (b) Bidder shall make all investigations necessary to be informed thoroughly regarding plant and facilities for delivery of material and equipment as required by the bid conditions. No plea of ignorance by the Bidder of conditions that exist, or that may hereafter exist as a result of failure or omission on the part of the Bidder to make the necessary examinations and investigations to fulfill in every detail the requirements of the contract documents, will be accepted as the basis for varying the requirements of the San Antonio Water System or the compensation to the Contractor. Bidders are required, prior to submitting the Bid Proposal, to review the plans and read the specifications, special provisions and or special conditions, any addendums issued, proposal, contract and bond forms carefully; to visit the site of the work; to examine carefully local conditions; to inform themselves by their independent research, tests and investigations of the difficulties to be encountered and judge for themselves the accessibility of the work and all attending circumstances affecting the cost of doing the work or time required for its completion; and to obtain all information required to make an intelligent proposal. Bidders shall rely exclusively upon their own estimates, investigations, tests and other data which are necessary for full and complete information upon which the proposal may be based. Any bidder, by submitting his Bid Proposal, represents and warrants: that he has prepared his bid in accordance with the specifications, with full knowledge and understanding of the terms and provisions thereof; that he has reviewed, studied and examined the bid prior to the signing and submission of same; and that he was cognizant of the terms of his proposal, verified his calculations and found them to be correct and agrees to be bound thereby; and that he has visited the site of work, has fully familiarized himself with the local and on-site conditions under which the work is to be performed and has correlated his observation with the requirements of the contract documents. In addition, the Bidder represents that he has satisfied himself as to subsurface conditions at the site of the work. Information, data and representations contained in the contract documents pertaining to the conditions at the site, including but not limited to subsurface conditions, are for information only and are not warranted or represented in any manner to accurately show the conditions at the site of the work. All risks of differing conditions at the site, including but not limited to subsurface conditions shall be borne solely by the Bidder.
 - (c) The Bidder shall furnish all information required by the bid form. The Bidder shall print or type his name and manually sign the Bid Proposal in the required area of the document.
 - (d) The Bidder is required to submit a Good Faith Effort Plan form and all SMWB Certification Certificates for the bidder or their subcontractors as part of the bid package. Bidder and/or their agents may contact the SMWB Program Manager, Marisol V. Robles, at 210-233-3420 for assistance or clarification with issues specifically related to the Small, Minority, and Woman Business (SMWB) Program policy and/or completion of the Good Faith Effort Plan form.
 - (e) The Bidder is required to submit a completed Conflict of Interest Questionnaire (CIQ Form). Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that persons, or their agents, who seek to contract for the sale or purchase of property, goods, or services with SAWS shall file a completed Conflict of Interest Questionnaire (CIQ) with SAWS. The CIQ Form will be submitted as part of the bid. This form is available from the Texas Ethics Commission at www.ethics.state.tx.us. Please consult your own legal advisor if you have questions regarding the statute or form. To report suspected ethics violations impacting The San Antonio Water System, please call 1-800-687-1918.

- (f) The Bidder is required to submit as part of the bid a letter from the insurance provider stating provider's commitment to insure the Contractor for the types of coverage's or an Insurance Certificate to be in conformance with the types of coverage's noted in General Conditions Section 5.7 – Contractor's Insurance Requirements, if awarded the contract.
- (g) Pursuant to Section 151.311 of the Texas Tax Code, as amended, in order for the San Antonio Water System to continue to benefit from its status as a State Sales and Use Tax Exempt Organization, construction contracts must be awarded on a "separated contract" basis. A "separated contract" is one that distinguishes the value of the tangible personal property (materials such as pipe, bricks, lumber, concrete, paint, etc.) to be incorporated into the project from the total contract price. Under the "separated contract" format, the contractor in effect becomes a "seller" to the San Antonio Water System of materials that are to be physically incorporated into the project realty. As a "seller", the contractor will issue a "Texas Certificate of Resale" to the supplier in lieu of paying the sales tax on materials at the time of purchase. The contractor will also issue a "Certificate of Exemption" to the supplier demonstrating that the personal property is being purchased for resale and that the resale is to a department of the City of San Antonio, Texas, which is a sales tax exempt entity. Contractors should be careful to consult the most recent guidelines of the State Comptroller of Public Accounts regarding the sales tax status of supplies and equipment that are used and consumed during project work but that are not physically incorporated into the project realty. Contractors that have questions about this law are asked to inquire with the State Comptroller of Public Accounts, at (512) 463-4600. Bidders will not include any federal taxes in bid prices since the San Antonio Water System is exempt from payment of such taxes. "Texas Certificates of Exemption", "Texas Certificates of Resale" and "Texas Sales Tax Permits" are forms available to the contractor through the regional offices of the State Comptroller of Public Accounts.
6. Any catalogue or manufacturer's reference used in describing an item is merely descriptive, and not restrictive unless otherwise noted, and is used only to indicate type and quality of material. When items proposed differ in any way from those specified, Bidders are required to state exactly what they intend to furnish. Otherwise, they shall be required to furnish the items as specified.
7. The work shall be done and completed in accordance with the following Contract Documents as furnished by the San Antonio Water System:
- a. The Invitation to Bidders
 - b. The Instructions to Bidders
 - c. The Bid Proposal
 - d. The Payment Bond
 - e. The Performance Bond
 - f. The General Conditions of the Contract
 - g. The Supplemental Conditions of the Contract
 - h. The Special Conditions of the Contract
 - i. The Construction Specifications
 - j. The Standard Drawings
 - k. Addenda
 - l. Change Orders
 - m. Good Faith Effort Plan
 - n. Conflict of Interest Questionnaire
8. The successful Bidder will be required to execute the standard San Antonio Water System Contract

Agreement, Performance and Payment Bonds as outlined in the General Conditions. These forms will be prepared and furnished by the San Antonio Water System. Surety shall provide a copy of the Power of Attorney authorizing the Executing Agent the authority to execute the bond documents and bind the Surety to the bond conditions. These bonds shall have a corporate Surety that is licensed to conduct business in Texas and authorized to underwrite bonds in the amount of the project. Contractor agrees that all Performance and Payment Bonds required shall be submitted in accordance with General Conditions, Sections 3.4 & 3.5. If the contract amount does not exceed \$25,000.00, then the Performance and Payment Bonds will not be required.

9. Where there is an error in the extension, the San Antonio Water System Contracting Office will extend the written unit price and make any corrections necessary. Any error will be corrected, and the correct amount will be the basis for determining the bid position.
10. Bidders are advised that estimated quantities of anticipated requirements during the contract period are not calculated with certainty. It is the policy of the Board, however, as a matter of prudent buying and contracting, to establish in advance of actual purchase or performance of the work, the price of the work which is anticipated, and the price on certain items calculated on the maximum number of a particular item which it might need during a contract period. Bidders are advised that during such period, the Board may determine not to purchase any of the items or may delete any or all of the work listed in a bid or invitation. Under such a contract, the Board's only commitment is to purchase the items from or proceed with the work by the successful Bidder at the price bid if the Board should, in fact, decide to purchase such items during the contract period or proceed with such work as proposed. On all bids, the Board reserves the right to reject a bid, which in the Board's judgment is "unbalanced." An "unbalanced bid" is defined as one in which a particular item or a class of items is bid at a figure sufficiently less than or higher than either general market price or Bidder's cost, so as to make the Bidder low on the overall bid but high on a significant number of other items. The Board reserves the right to exercise its judgment and reject such a bid as unqualified. If the Board nevertheless accepts such an unbalanced bid and the contract is awarded, the Board reserves the right to delete any or all of such items from the purchases to be made or work to be done.
11. The SAWS will provide all necessary rights-of-way or easements for the project.
12. No owner, stockholder, partner, officer, or employee of the Bidder, or any person who has a financial interest in this contract in any way, whether direct or indirect, shall be an officer or employee of the San Antonio Water System or the City of San Antonio at the time of bidding on this contract, or during the life of this contract. Any violations of this provision will render the bid or contract void.
13. The Contractor will establish a San Antonio address and telephone number and file that information with the Contracting Officer prior to starting work. If the contractor does not have a local office then they must submit the address and telephone number of the field office established for this project. The Contractor's address and telephone number will be maintained until the work is completed and accepted by the owner.
14. In case of ambiguity, duplication or obscurity in the bids, the San Antonio Water System Contracting Office reserves the right to construe and apply the meaning thereof. The San Antonio Water System Contracting Office reserves the right to reject any and all bids and to waive formalities.
15. The San Antonio Water System Contracting Office reserves the right, subject to the Contractor's approval, to extend any annual contract for an additional period of not more than one year, subject to the same terms and conditions as enumerated in the invitation and instruction to Bidders and at a price or prices not to

exceed the prices quoted.

16. It is anticipated that the contract will be awarded within **60** days after bid opening to the **Responsible Bidder** whose bid, conforming to the invitation for bids, is most advantageous to the San Antonio Water System. Bidders are advised that the awarding of contracts on a bid basis is a requirement of state law and city charter. The purposes of such requirements are: (1) to prevent the historic abuses of negotiated purchases; (2) to enable the Board to use its purchasing power to buy at the lowest possible prices for the benefit of the system and the public; and (3) to enable the Board to award the contract to other than the low Bidder when, in the Board's judgment, the low Bidder is not qualified. Bidders are advised that it is not the intention of the Board, necessarily, to award contracts on the basis of differences in the bids other than differences in basic "price of the item." The Board reserves the right to take whichever action as may, in the judgment of the Board, to be its best interest as follows:
 - (1) Reject all bids;
 - (2) Award the bids by the drawing of lots; or
 - (3) Award the bids on the basis of differences other than price.

Bidders are advised that the awarding of bids is a matter solely within the jurisdiction of the Board of Trustees. The San Antonio Water System reserves the right to accept any items or groups of items in this bid. Execution of written acceptance of a bid by the San Antonio Water System shall constitute an award.

17. The San Antonio Water System Contracting Office may reject the apparent low Bidder when: (a) the Bidder misstates or conceals any material fact in the bid, or if (b) the Bidder does not conform with the law or the bid, or if (c) the bid is conditional, or if (d) the bid is unbalanced, or when (e) the lowest Bidder is not, in the Board's judgment, qualified, or when (f) the lowest bid is not, in the Board's judgment, the lowest and best bid, or if (g) the Bidder fails to acknowledge in the final bid price of the bid any and all addendums issued on the bid proposal prior to bid opening.

It will be the full responsibility of each Bidder to visit the SAWS web site to verify the existence of and acknowledge on the bid proposal, any and all addendums issued by the San Antonio Water System. The San Antonio Water System Contracting Office reserves the right to reject any and all bids, to accept any bids, or parts thereof, considered by the San Antonio Water System to be to its best interest, and to waive formalities or irregularities.

18. The Bidder in preparing his bid, shall take cognizance of the difficulty of distinguishing between boulders and ledge rock, the difficulty of accurately classifying all material encountered in making the subsurface investigations, the possible erosion of stream channels and banks after survey data has been obtained, and the unreliability of water elevations other than those for the date recorded. Claims for additional compensation due to variations between conditions actually encountered in a construction and as indicated in the plans will not be allowed.
19. All contracts in excess of \$10,000 with contractors or suppliers having 15 or more employees will include the clauses listed below:
 - (a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, sexual orientation, national origin, political belief or affiliation, age, disability or genetic information. The Contractor will assure that employees or applicants for employment are treated in a fair and equitable manner in such actions which shall include but not be limited to the following: Employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of

compensation, and selection for training including apprenticeship. The Contractor will post in conspicuous places for the benefit of the employee and applicants for employment notices setting forth the provisions of this nondiscrimination clause.

- (b) Upon request, the Contractor will furnish to the San Antonio Water System all information and reports and will permit access to the books, records, and accounts for the purposes of an investigation to ascertain compliance with rules and regulations set forth by this organization.
- (c) If a Contractor is found not to be in compliance with the nondiscrimination clause of this contract, the contract may be canceled, terminated, or suspended in all or in part and the Contractor may be debarred from further contracts with the San Antonio Water System.
- (d) All Bidders or prospective Contractors or Subcontractors will be required to submit a statement in writing signed by an authorized official or agent in behalf of the company to the effect that the signer's practices and policies do not discriminate on the grounds of race, color, religion, sex, or national origin.

The Contractor shall comply with all provisions of Executive Order 11246, Equal Employment Opportunity, dated 24 September 1965 or as amended and with Section 3 of the Housing and Urban Development Act of 1968 covering opportunities for business and lower financed HUD assisted projects.

Statement on President's Executive Orders

Has your firm previously performed work subject to the President's Executive Orders Numbers 11246 and 11375 or any preceding similar executive orders (Numbers 10925 and 11114)?

Yes No

Contractors/Consultants/Vendors on work paid by federal funds will be required to comply with the president's executive order no. 11246, "Equal Employment Opportunity," as amended by executive order no. 11375, "amending executive order 11246 relating to equal employment opportunity," and as supplemented by regulations at 41 CFR part 60, Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department Of Labor.

- 20. Approval of Plans and/or Specifications by an employee of SAWS shall not constitute an assumption of liability by the San Antonio Water System or such employee for any inaccuracy of computation or deficiency of design therein.
- 21. Bidder shall not offer, confer, or agree to confer any benefit or gift to any San Antonio Water System Employee, Officer, or Trustee of the Board of the San Antonio Water System and Water System employees are prohibited from soliciting, accepting or agreeing to accept any gifts from outside sources; please see Section M. – Gifts or Benefits of the Water System's Code of Ethical Standards. Section M of the Water System's Code of Ethical Standards regarding Gifts or Benefits is available on the SAWS Business Center website.
- 22. Bidders or their representatives are prohibited from communicating with any City of San Antonio officials to include:
 - (a) City Council members (as defined by the City of San Antonio Ethics Code),
 - (b) City Council member's staff, and

- (c) San Antonio Water System (SAWS) Board of Trustees regarding the bid from the time the project is released until it has been acted upon by the Board of Trustees.

Bidders or their representatives are prohibited from communicating with SAWS employees regarding this bid, except as provided under "Technical Questions," from the time the project is released until the contract is awarded.

This includes "thank you" letters, phone calls, emails, and any contact that results in the direct or indirect discussion of the project and/or proposal submitted by Bidders.

Violation of this provision by the Bidder and/or their agent may lead to disqualification of the bidder's proposal from consideration.

- 23. Contractor shall comply with the "WORKERS COMPENSATION INSURANCE COVERAGE REQUIREMENTS" as noted on Section 5.7 CONTRACTOR'S INSURANCE REQUIREMENTS of the General Conditions for further clarification.
- 24. To assist the San Antonio Water System Contracting Office in performing the bidder evaluation and subsequent recommendation of award, the apparent low bidder will submit the following items within one (1) day of the bid opening. Failure to provide the required information within the specific time, may result in determining a non-responsive bidder:
 - (a) An information packet on company showing experience, organization and equipment.
 - (b) A statement regarding ability to complete the project within the schedule taking into account existing commitments.
 - (c) Record of performance on three (3) similar projects completed within the last 5 years including name of project, amount of project, project duration, name, address, and telephone number of contact person for each project.
 - (d) A completed and signed W-9 Request for Taxpayer Identification Number and Certification form.
 - (e) **For projects with a construction estimate of \$10,000,000 or greater:**
A complete financial statement for your organization that was prepared within the past 12 months, by an independent Certified Public Accountant, and a point of contact for your banking institution.

Workers' Compensation Insurance Coverage

A. Definitions:

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

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

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

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

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

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

E. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

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

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

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

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

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

I. The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

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

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

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

(4) obtain from each other person with whom it contracts, and provide to the contractor:

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

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

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

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

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

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

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

CONTRACTOR'S BID PACKET CHECKLIST:
C-5 Culebra – Castroville to Laredo & C_28 Zarzamora Creek – San Gabriel to
NW 23rd St. Phase 1B Project
SAWS Job No. 15-4503
SAWS Solicitation No. CO-00048

Items to be included for Submittal with Bid:

- Bid proposal (Addendum 4) and Acknowledgement of All Addendums
- Proposal Certification; page PC-1
- Bid Bond/Cashier's Check
- Statement on President's Executive Orders – Page IB 6 or 7
- Good Faith Effort Plan
- Conflict of Interest Questionnaire - Form CIQ (*Rev. 11/30/2015*)
- Proof of Insurability (Letter from Insurer or Sample Certificate of Insurance)
- W-9
- Record of Performance/Similar Projects

Items to be submitted by Apparent Low Bidder (see Instructions to Bidders, Page IB-7, #24):

- Financial Statement Company Information Packet
- Statement regarding ability to complete the project

BID PROPOSAL

PROPOSAL OF _____, a corporation
a partnership consisting of _____
an individual doing business as _____

THE SAN ANTONIO WATER SYSTEM:

Pursuant to Instructions and Invitation to Bidders, the undersigned proposes to furnish all labor and materials as specified and perform the work required for the project as specified, in accordance with the Plans and Specifications for the following prices to wit:

(PLEASE SEE ATTACHED PDF LIST OF BID ITEMS)

TOTAL BID PRICE \$ _____

Mobilization and Prep of ROW shall be limited to the maximum percentage shown. **If the percentage exceeds the allowable maximum stated for mobilization and or preparation of ROW, SAWS reserves the right to cap the amount at the percentages shown and adjust the extensions of the bid items accordingly.**

BIDDER'S SIGNATURE & TITLE

FIRM'S NAME (TYPE OR PRINT)

FIRM'S ADDRESS

FIRM'S PHONE NO. / FAX NO.

FIRM'S EMAIL ADDRESS

The Contractor herein acknowledges receipt of the following:
Addendum Nos. _____

OWNER RESERVES THE RIGHT TO ACCEPT THE OVERALL MOST RESPONSIBLE BID.

The bidder offers to construct the Project in accordance with the Contract Documents for the contract price, and to complete the Project within **548** calendar days after the start date, as set forth in the Authorization to Proceed. **The bidder understands and accepts the provisions of the contract Documents relating to liquidated damages of the project if not completed on time.**

Complete the additional requirements of the Bid Proposal which are included on the following pages.

**C_5 Culebra - Castorville to Laredo & C_28 Zarzamora
Creek - San Gabriel to NW 23RD ST Phase 1B**

Item No.	Sewer and Water Bid Items	Unit	Qty.	Unit Price	Total Price
1	103.1 Remove Concrete Curb	LF	1,800	\$	\$
2	103.3 REMOVE CONCRETE SIDEWALKS AND DRIVEWAYS	SF	13,500	\$	\$
3	103.4 REMOVE MISC. CONCRETE	SF	1,235	\$	\$
4	202.1 PRIME COAT	GAL	4,205	\$	\$
5	203.1 TACK COAT	GAL	2,103	\$	\$
6	205.5 HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE D (3" COMPACTED DEPTH)	SY	4,659	\$	\$
7	205.4 HOT MIX ASPHALTIC CONCRETE PAVEMENT, TYPE D (2" COMPACTED DEPTH)	SY	16,366	\$	\$
8	208.1 SALVAGE, HAUL, STOCKPILE ASPHALT PAVEMENT (3" DEPTH)	SY	4,659	\$	\$
9	208.1 SALVAGE, HAUL, STOCKPILE ASPHALT PAVEMENT (2" DEPTH)	SY	16,366	\$	\$
10	413.1 FLOWABLE FILL (LOW STRENGTH)	CY	5,529	\$	\$
11	500.1 CONCRETE CURB	LF	1,800	\$	\$
12	502.1 CONCRETE SIDEWALKS	SY	1,400	\$	\$
13	503.1 CONCRETE DRIVEWAY	SY	18	\$	\$
14	503.3 GRAVEL ROAD	SY	932	\$	\$
15	505.2 CONCRETE RIPRAP (6" THICK)	SY	1,328	\$	\$
16	507.2 CHAIN LINK WIRE FENCE (6 FT. HIGH)	LF	179	\$	\$
17	509 METAL BEAM GUARD FENCE	LF	140	\$	\$
18	511.3 REPLACING WITH HOT MIX ASPHALTIC CONCRETE PAVEMENT (12" TYPE B)	SY	4,848	\$	\$
19	511.3 REPLACING WITH HOT MIX ASPHALTIC CONCRETE PAVEMENT (15" TYPE B)	SY	1,442	\$	\$
20	01150 REMOVE AND REPLACE LIGHT POLE	EA	6	\$	\$
21	515 TOPSOIL (6")	CY	4,200	\$	\$
22	520 HYDROMULCHING	SY	26,000	\$	\$
23	530.1 BARRICADES, SIGNS AND TRAFFIC HANDLING	LS	1	\$	\$
24	540 STORMWATER POLLUTION PREVENTION PLAN	LS	1	\$	\$
25	550 TRENCH EXCAVATION SAFETY PROTECTION	LF	12,916	\$	\$
26	812 6" PVC WATER LINE	LF	78	\$	\$
27	812 8" PVC WATER LINE	LF	1,239	\$	\$
28	812 12" PVC WATER LINE	LF	710	\$	\$
29	824 NEW 3/4" UNMETERED SVC (LONG)	EA	1	\$	\$
30	824 RELAY 3/4" METERED SVC LINE (SHORT)	EA	14	\$	\$
31	824 RELAY 3/4" METERED SVC LINE (LONG)	EA	23	\$	\$
32	824 RELOCATE 3/4" METERED SVC LINE (LONG)	EA	1	\$	\$
33	828 8" GATE VALVE	EA	8	\$	\$
34	828 12" GATE VALVE	EA	3	\$	\$
35	829 16" GATE VALVE	EA	1	\$	\$
36	831 8" X 8" CUT-IN TEE	EA	1	\$	\$
37	832 16" X 8" CUT-IN TEE	EA	1	\$	\$
38	834.1 FIRE HYDRANTS	EA	2	\$	\$
39	836 DUCTILE IRON FITTINGS	TON	2.4	\$	\$
40	840 8" TIE-INS	EA	6	\$	\$
41	840 12" TIE-INS	EA	2	\$	\$
42	841 HYDROSTATIC TESTING OPERATIONS	EA	4	\$	\$
43	844 2" TEMPORARY BLOW-OFF	EA	11	\$	\$
44	848 8" SANITARY SEWER LINE (6'-10')	LF	449	\$	\$
45	848 8" SANITARY SEWER LINE (10'-14')	LF	804	\$	\$
46	848 8" SANITARY SEWER LINE (14'-18')	LF	280	\$	\$
47	848 12" SANITARY SEWER LINE (6'-10')	LF	30	\$	\$
48	848 12" SANITARY SEWER LINE (10'-14')	LF	58	\$	\$
49	848 15" SANITARY SEWER LINE (10'-14')	LF	19	\$	\$
50	848 21" SANITARY SEWER LINE (6'-10')	LF	186	\$	\$
51	848 21" SANITARY SEWER LINE (10'-14')	LF	1,116	\$	\$
52	848 24" SANITARY SEWER LINE (10'-14')	LF	10	\$	\$
53	848 33" FRP (HOBAS) SANITARY SEWER LINE (14'-18')	LF	211	\$	\$
54	848 33" FRP (HOBAS) SANITARY SEWER LINE (18'-22')	LF	7	\$	\$
55	848 36" FRP (HOBAS) SANITARY SEWER LINE (14'-18')	LF	682	\$	\$
56	848 36" FRP (HOBAS) SANITARY SEWER LINE (18'-22')	LF	3,194	\$	\$
57	848 36" FRP (HOBAS) SANITARY SEWER LINE (22'-26')	LF	3,121	\$	\$
58	848 36" FRP (HOBAS) SANITARY SEWER LINE (26'-30')	LF	494	\$	\$

59	848	15" HDPE SANITARY SEWER LINE (10'-14') DR 17	LF	228	\$		\$
60	848	18" HDPE SANITARY SEWER LINE (10'-14') DR 17	LF	228	\$		\$
61	848	21" HDPE SANITARY SEWER LINE (10'-14') DR 17	LF	228	\$		\$
62	848	24" HDPE AIR JUMPER (10'-14') DR 17	LF	248	\$		\$
63	853	T-BASE FIBER REINFORCED MANHOLE (0 - 6')	EA	25	\$		\$
64	853	T-BASE FIBER REINFORCED DROP MANHOLE (0 - 6')	EA	25	\$		\$
65	853	T-BASE FIBER REINFORCED EXTRA DEPTH MANHOLE (> 6')	VF	778	\$		\$
66	852.1	STANDARD 4' MANHOLE (0'-6')	EA	27	\$		\$
67	852	STANDARD DROP MANHOLE (0'-6')	EA	12	\$		\$
68	852.2	STANDARD EXTRA DEPTH MANHOLES (>6')	VF	147	\$		\$
69	854	SANITARY SEWER LATERALS	LF	1,511	\$		\$
70	854.1	TWO-WAY SANITARY SEWER CLEAN-OUT	EA	77	\$		\$
71	856	JACKING, BORING OR TUNNELING 48"	LF	778	\$		\$
72	856	JACKING, BORING OR TUNNELING 54"	LF	879	\$		\$
73	856	33" CARRIER PIPE FOR JACKING, BORING OR TUNNELING	LF	778	\$		\$
74	856	36" CARRIER PIPE FOR JACKING, BORING OR TUNNELING	LF	879	\$		\$
75	856	48" CASING	LF	778	\$		\$
76	856	54" CASING	LF	879	\$		\$
77	860	VERTICAL STACKS	VF	580	\$		\$
78	862	ABANDONMENT OF SANITARY SEWER MAIN (>15" DIA.)	LF	5,064	\$		\$
79	1150	ABANDONMENT OF SIPHON	LS	2	\$		\$
80	866	SEWER MAIN PRE-TELEVISION INSPECTION (8" THROUGH 15" DIA.)	LF	4,076	\$		\$
81	866	SEWER MAIN PRE-TELEVISION INSPECTION (18" THROUGH 24" DIA.)	LF	3,604	\$		\$
82	866	SEWER MAIN PRE-TELEVISION INSPECTION (27" THROUGH 36" DIA.)	LF	1,910	\$		\$
83	866	SEWER MAIN TELEVISION INSPECTION (8" THROUGH 15" DIA.)	LF	1,849	\$		\$
84	866	SEWER MAIN TELEVISION INSPECTION (18" THROUGH 24" DIA.)	LF	2,016	\$		\$
85	866	SEWER MAIN TELEVISION INSPECTION (27" THROUGH 36" DIA.)	LF	9,511	\$		\$
86	3000	REMOVAL, TRANSPORTATION, AND DISPOSAL OF A.C. PIPE	LF	1,118	\$		\$
87	01150	SIPHON INLET BOX	LS	1	\$		\$
88	01150	SIPHON OUTLET BOX	LS	1	\$		\$
89	01150	BRACE / RELOCATE POWER POLES	ALLOWANCE	1	\$	\$ 30,000.00	\$
90	01150	GAS RELOCATION	ALLOWANCE	1	\$	\$ 60,000.00	\$
91	537.8	PREFORMED PAVEMENT MARKINGS (TYPE 11-A-A)	EA	26	\$		\$
92	535.1	HOT APPLIED THERMOPLASTIC PAVEMENT MARKINGS (4" YELLOW LINE)	LF	1,070	\$		\$
93	535.4	HOT APPLIED THERMOPLASTIC PAVEMENT MARKINGS (4" SOLID WHITE LINE)	LF	1,536	\$		\$
94	535.4	HOT APPLIED THERMOPLASTIC PAVEMENT MARKINGS (4" BROKEN WHITE LINE)	LF	950	\$		\$
95	01150	SPEED HUMP	EA	1	\$		\$

SUBTOTAL SEWER AND WATER BID ITEMS

\$

Apache Creek Trail North Bid Items

96		Tree Protection-Level 1	EA	22	\$		\$
97		Tree Protection-Level IIA	EA	12	\$		\$
98		Tree Protection-Level IIB	EA	33	\$		\$
99		Tree Removal & Disposal (14" avg. size)	EA	26	\$		\$
100		Clear and Grub and Haul Off	SY	5,234	\$		\$
101		Remove Existing Concrete/Asphalt	SY	4,656	\$		\$
102		New Asphalt Parking Spaces Type "D"	SY	73	\$		\$
103		Parking Lot Striping/ADA Symbol	LS	1	\$		\$
104		Repair Existing Concrete Walks	SF	300	\$		\$
105		Excavation and Haul Off	CY	534	\$		\$
106		Grading	SY	1,400	\$		\$
107		Concrete Trail & Misc. Conc.	SF	61,520	\$		\$
108		ADA Ramp	SF	147	\$		\$
109		Trails - 24" toe down	LF	2,220	\$		\$
110		Removable Bollards	EA	14	\$		\$
111		Wayfinding Large	EA	7	\$		\$
112		Park Rules Sign	EA	2	\$		\$
113		Map Pedestal	EA	8	\$		\$
114		ADA Sign	EA	1	\$		\$
115		Passing Sign	EA	10	\$		\$
116		Overpass Sign	EA	8	\$		\$
117		Interpretive Signs	EA	1	\$		\$
118		1/4 Mile Markers/Warning Signs	EA	4	\$		\$
119		Trailhead Sign	EA	1	\$		\$
120		Trash Container Pair	EA	4	\$		\$
121		Drinking Fountain	EA	1	\$		\$
122		Mutt-Mitt	EA	2	\$		\$
123		Shade Structure	EA	1	\$		\$
124		Bike Rack	EA	1	\$		\$
125		ADA Picnic Table	EA	1	\$		\$
126		Bench	EA	4	\$		\$
127		Concrete Curb	LF	381	\$		\$
128		Drainage Outfall, Type A	EA	1	\$		\$
129		Drainage Outfall, Type B	EA	7	\$		\$
130		Drainage Outfall, Type C	EA	2	\$		\$
131		Drainage Outfall, Type D	EA	2	\$		\$
132		Wall, Type 1 Combination Wall	CY	87	\$		\$
133		Wall, Type 2 Combination Wall	CY	165	\$		\$
134		Wall, Concrete Retaining Wall Under Bridge	CY	67	\$		\$
135		Rip-Rap	CY	968	\$		\$
136		Seed	ACRES	4	\$		\$
137		Sod	PALLET	35	\$		\$
138		UNDER BRIDGE LIGHTS	EA	12	\$		\$
139		#4 AWG CU	LF	180	\$		\$
140		#6 AWG CU	LF	300	\$		\$
141		#8 AWG CU	LF	2,400	\$		\$
142		3/4" IMC CONDUIT	EA	550	\$		\$

143	1-1/4" IMC CONDUIT	EA	400	\$ _____	\$ _____
144	WEATHERPROOF J-BOX	EA	24	\$ _____	\$ _____
145	REINFORCED CONCRETE POLE BASE	EA	6	\$ _____	\$ _____
146	NEW TRAIL LIGHT ON NEW POLE	EA	6	\$ _____	\$ _____
147	SPLICE AND EXTEND TRAIL LTG ELEC	EA	6	\$ _____	\$ _____
148	STORMWATER POLLUTION PREVENTION PLAN	LS	1	\$ _____	\$ _____
	SUBTOTAL APACHE CREEK TRAIL NORTH BID ITEMS			\$ _____	
149	100 Mobilization (Maximum of 10% of Line 1 - 148 Sub-Total Base Bid Amount)	LS	1	\$ _____	\$ _____
150	101 Preparation of Right-of-Way (Maximum of 5% of Line 1 - 148 Sub-Total Base Bid Amount)	LS	1	\$ _____	\$ _____

PROPOSAL CERTIFICATION

Accompanying this proposal is a Bid Bond or Certified or Cashier's Check payable to the Order of the San Antonio Water System for _____ dollars (\$_____), which amount represents five percent (5%) of the total bid price. Said bond or check is to be returned to the bidder unless the proposal is accepted and the bidder fails to execute and file a contract within 10 calendar days after the award of the Contract, in which case the check shall become the property of said San Antonio Water System, and shall be considered as payment for damages due to delay and other inconveniences suffered by said San Antonio Water System due to the failure of the bidder to execute the contract. The San Antonio Water System reserves the right to reject any and all bids.

It is anticipated that the Owner will act on this proposal within 60 calendar days after the bid opening. Upon acceptance and award of the contract to the undersigned by the Owner, the undersigned shall execute standard San Antonio Water System Contract Documents and make Performance and Payment Bonds for the full amount of the contract within 10 calendar days after the award of the Contract to secure proper compliance with the terms and provisions of the contract, to insure and guarantee the work until final completion and acceptance, and the guarantee period stipulated, and to guarantee payment of all lawful claims for labor performed and materials furnished in the fulfillment of the contract.

It is anticipated that the Owner will provide written Authorization to Proceed immediately after the bid opening.

The work called for in this Contract shall commence on the date indicated in the SAWS written Authorization to Proceed. Under no circumstances shall the work commence prior to the date provided for in the SAWS issued, written Authorization to Proceed. Work shall be completed in full within 548 consecutive calendar days.

The undersigned certifies that the bid prices contained in the proposal have been carefully checked and are submitted as correct and final.

The undersigned further acknowledges compliance with "Wage and Labor Standard Provisions" of this contract and the use of the Blue Book rental rates for establishment of equipment rental rates whether owned or leased during the course of this Contract.

In completing the work contained in this proposal the undersigned certifies that bidder's practices and policies do not discriminate on the grounds of race, color, religion, sex or national origin and that the bidder will affirmatively cooperate in the implementation of these policies and practices.

Signed: _____
Company Representative

Company Name

Address

Please return bidder's check to: _____
Company Name

Address

SECTION B. – SMWB COMMITMENTS

The SMWB goal on this project is 17%

1. The undersigned proposer has satisfied the requirements of the BID specification in the following manner (please check the appropriate space):

 The proposer is committed to a minimum of 17% SMWB utilization on this contract.

 The proposer, (if unable to meet the SMWB goal of 17%), is committed to a minimum of % SMWB utilization on this contract. *(If contractor is unable to meet the goal, please fill out Section C and submit documentation demonstrating good faith efforts).*

2. Name and phone number of person appointed to coordinate and administer the SMWB requirements on this project.

Name: _____

Title: _____

Phone Number: _____

IF THE SMWB GOAL WAS MET, PROCEED TO AFFIRMATION AND SIGN THE GFEP. IF GOAL WAS NOT MET, PROCEED TO SECTION C.

SECTION C – GOOD FAITH EFFORTS (Fill out only if the SMWB goal was not achieved).

1. List all firms you contacted with subcontracting/supply opportunities for this project that will not be utilized for the contract by choice of the proposer, subcontractor, or supplier. Written notices to firms contacted by the proposer for specific scopes of work identified for subcontracting/supply opportunities must be provided to subcontractor/supplier **not less than five (5) business days prior to bid/proposal due date**. The following information is required for all firms that were contacted of subcontracting/supply opportunities.

	Name & Address of Company	Scope of Work/Supplies to be Performed/Provided by Firm	Is Firm SMWB Certified?	Date Written Notice was Sent & Method (Fax, Letter, E-Mail, etc.)	Reason Agreement was not reached?
1.					
2.					
3.					
4.					
5.					
6.					
7.					

(Use additional sheets as needed)

In order to verify a proposer's good faith efforts, please provide to SAWS copies of the written notices to all firms contacted by the proposer for specific scopes of work identified in relation to the subcontracting/supply opportunities in the above named project. Copies of said notices must be provided to the SMWB Program Manager at the time the response is due. Such notices shall include information on the plans, specifications, and scope of work.

2. Did you attend the pre-bid conference scheduled for this project? ____ Yes ____ No

3. List all SMWB listings or directories, contractor associations, and/or any other associations utilized to solicit SMWB Subcontractors/suppliers.

4. Discuss efforts made to define additional elements of the work proposed to be performed by SMWBs in order to increase the likelihood of achieving the goal:

5. Indicate advertisement mediums used for soliciting bids from SMWBs. (Please attach a copy of the advertisement(s):

AFFIRMATION

I hereby affirm that the above information is true and complete to the best of my knowledge. I further understand and agree that, this document shall be attached thereto and become a binding part of the contract.

Name and Title of Authorized Official:

Name: _____

Title: _____

Signature: _____ Date: _____

NOTE:

This Good Faith Effort Plan is reviewed by SAWS Contracting Department. For questions and/or clarifications, please contact Marisol V. Robles, SMWB Manager, at 210-233-3420.

DEFINITIONS:

Prime Consultant/Contractor: Any person, firm partnership, corporation, association or joint venture which has been awarded a San Antonio Water System contract.

Subconsultants/contractor: Any named person, firm partnership, corporation, association or joint venture identified as providing work, labor, services, supplies, equipment, materials or any combination of the foregoing under contract with a prime consultant/contractor on a San Antonio Water System contract.

Small, Minority and Woman Business (SMWB): All business structures Certified by the Small Business Administration, Texas State Comptroller's Office, or the South Central Texas Regional Certification Agency that are 51% owned, operated, and controlled by a Small Business Enterprise, a Minority Business Enterprise, or a Woman-owned Business Enterprise.

Small Business Enterprise (SBE): A business structure that is Certified by the Small Business Administration, Texas State Comptroller's Office or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by someone who is legally residing in or a citizen of the United States, and the business structure meets the U.S. Small Business Administration's (SBA) size standard for a small business within the appropriate industry category

Minority Business Enterprise (MBE): A business structure that is Certified by the Small Business Administration, Texas State Comptroller's Office or the South Central Texas Regional Certification Agency as being 51% owned, operated, and controlled by an ethnic minority group member(s) who is legally residing in or a citizen of the United States. For purposes of the SMWB program, the following are recognized as minority groups:

- a. **African American** – Persons having origins in any of the black racial groups of Africa as well as those identified as Jamaican, Trinidadian or West Indian.
- b. **Hispanic American** – Persons of Mexican, Puerto Rican, Cuban, Spanish or Central or South American origin.
- c. **Asian-Pacific American** – Persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent or the Pacific Islands.
- d. **Asian-Indian American** – Persons whose origins are from India, Pakistan, Bangladesh or Sri Lanka.
- e. **American Indian/Native American** – Persons having no less than 1/16 percentage origin in any of the American Indian Tribes, as recognized by the U.S. Department of the Interior's Bureau of Indian Affairs and as demonstrated by possession of personal tribal role documents.

Women Business Enterprise (WBE): A business structure that is Certified by the Small Business Administration, Texas State Comptroller's Office or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by a woman or women who are legally residing in or citizens of the United States.

African American Business Enterprise (AABE): A business structure that is Certified by the Small Business Administration, Texas State Comptroller's Office or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by African American minority group member(s) who are legally residing in or are citizens of the United States.

Joint Venture: A limited association of two or more persons to carry out a single business enterprise for profit, for which purpose they combine their property, money, efforts, skills and knowledge.

Web Submittal of Subcontractor Payment Reports:

The Contractor will be required to electronically report the actual payments to all subcontractors, utilizing the Subcontractor Payment and Utilization Reporting (S.P.U.R.) System, beginning with the first SAWS payment for services under the contract, and with every payment thereafter (for the duration of the contract).

Electronic submittal of monthly subcontractor payment information will be accessed through a link on SAWS' "Business Center" web page. This information will be utilized for subcontractor participation tracking purposes. Any unjustified failure to comply with the committed SMWB levels may be considered breach of contract.

The Contractor and all subcontractors will be provided a unique log-in credential and password to access the SAWS subcontractor payment reporting system. The link may also be accessed through the following internet address: <https://saws.smwbe.com/>

CONFLICT OF INTEREST QUESTIONNAIRE INFORMATION

Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that persons, or their agents, who seek to contract for the sale or purchase of property, goods, or services with SAWS shall file a completed conflict of interest questionnaire with the SAWS Manager of Contract Administration no later than the 7th business day after the date that the person: (1) begins contract discussions or negotiations with SAWS; or (2) submits to SAWS an application, response to a request for proposals or bids, correspondence, or another writing related to a potential agreement with SAWS.

The Conflict of Business questionnaire is attached on the following page and is available from the Texas Ethics Commission at www.ethics.state.tx.us. Please consult your own legal advisor if you have questions regarding the statute or form.

Completed Conflict of Interest questionnaires should be included with your bid or proposal. If mailing a completed Conflict of Interest questionnaire, mail to: David Gonzales, Manager, Contract Administration, 2800 U.S. Hwy 281 North, San Antonio, TX 78212. If delivering a completed Conflict of Interest questionnaire, deliver to Contract Administration, Tower 2, 1st Floor, Room 171, 2800 U.S. Hwy 281 North, San Antonio, TX 78212.

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

FORM CIQ

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 Name of vendor who has a business relationship with local governmental entity.

2 Check this box if you are filing an update to a previously filed questionnaire. (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 Name of local government officer about whom the information is being disclosed.

Name of Officer

4 Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

Yes No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

Yes No

5 Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.

6 Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

Signature of vendor doing business with the governmental entity

Date

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

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

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

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

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

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

(2) the vendor:

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

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

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

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

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

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

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

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

(1) the date that the vendor:

- (A) begins discussions or negotiations to enter into a contract with the local governmental entity; or
- (B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

- (A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);
- (B) that the vendor has given one or more gifts described by Subsection (a); or
- (C) of a family relationship with a local government officer.

General Decision Number: TX160016 01/08/2016 TX16

Superseded General Decision Number: TX20150016

State: Texas

Construction Types: Heavy and Highway

Counties: Atascosa, Bandera, Bastrop, Bell, Bexar, Brazos, Burleson, Caldwell, Comal, Coryell, Guadalupe, Hays, Kendall, Lampasas, McLennan, Medina, Robertson, Travis, Williamson and Wilson Counties in Texas.

HEAVY (excluding tunnels and dams, not to be used for work on Sewage or Water Treatment Plants or Lift / Pump Stations in Bell, Coryell, McClennon and Williamson Counties) and HIGHWAY Construction Projects

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.15 for calendar year 2016 applies to all contracts subject to the Davis-Bacon Act for which the solicitation was issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.15 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2016. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number 0 Publication Date 01/08/2016

* SUTX2011-006 08/03/2011

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER (Paving and Structures).....	\$ 12.56	
ELECTRICIAN.....	\$ 26.35	
FORM BUILDER/FORM SETTER		
Paving & Curb.....	\$ 12.94	
Structures.....	\$ 12.87	
LABORER		
Asphalt Raker.....	\$ 12.12	
Flagger.....	\$ 9.45	
Laborer, Common.....	\$ 10.50	
Laborer, Utility.....	\$ 12.27	
Pipelayer.....	\$ 12.79	
Work Zone Barricade Servicer.....	\$ 11.85	
PAINTER (Structures).....	\$ 18.34	
POWER EQUIPMENT OPERATOR:		
Agricultural Tractor.....	\$ 12.69	
Asphalt Distributor.....	\$ 15.55	
Asphalt Paving Machine.....	\$ 14.36	
Boom Truck.....	\$ 18.36	
Broom or Sweeper.....	\$ 11.04	
Concrete Pavement Finishing Machine.....	\$ 15.48	
Crane, Hydraulic 80 tons or less.....	\$ 18.36	
Crane, Lattice Boom 80 tons or less.....	\$ 15.87	
Crane, Lattice Boom over 80 tons.....	\$ 19.38	
Crawler Tractor.....	\$ 15.67	
Directional Drilling Locator.....	\$ 11.67	
Directional Drilling Operator.....	\$ 17.24	

Excavator 50,000 lbs or	
Less.....	\$ 12.88
Excavator over 50,000 lbs...	\$ 17.71
Foundation Drill, Truck	
Mounted.....	\$ 16.93
Front End Loader, 3 CY or	
Less.....	\$ 13.04
Front End Loader, Over 3 CY.	\$ 13.21
Loader/Backhoe.....	\$ 14.12
Mechanic.....	\$ 17.10
Milling Machine.....	\$ 14.18
Motor Grader, Fine Grade....	\$ 18.51
Motor Grader, Rough.....	\$ 14.63
Pavement Marking Machine....	\$ 19.17
Reclaimer/Pulverizer.....	\$ 12.88
Roller, Asphalt.....	\$ 12.78
Roller, Other.....	\$ 10.50
Scraper.....	\$ 12.27
Spreader Box.....	\$ 14.04
Trenching Machine, Heavy....	\$ 18.48
Servicer.....	\$ 14.51
Steel Worker	
Reinforcing.....	\$ 14.00
Structural.....	\$ 19.29
TRAFFIC SIGNAL INSTALLER	
Traffic Signal/Light Pole	
Worker.....	\$ 16.00
TRUCK DRIVER	
Lowboy-Float.....	\$ 15.66
Off Road Hauler.....	\$ 11.88
Single Axle.....	\$ 11.79
Single or Tandem Axle Dump	
Truck.....	\$ 11.68
Tandem Axle Tractor w/Semi	
Trailer.....	\$ 12.81
WELDER.....	\$ 15.97

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1,

2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

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

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

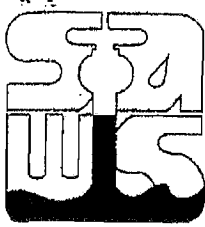
Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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

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END OF GENERAL DECISION

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San Antonio Water System

CONTRACT ADMINISTRATION

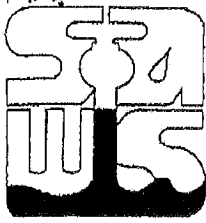
November 05, 2002

According to an agreement entered between the International Association of Heat and Frost Insulators and Asbestos Workers, Laborers are allowed to remove asbestos under certain circumstances. It was mutually agreed that the work listed below shall be performed accordingly:

1. The removal of all insulation materials, whether they contain asbestos or not, from mechanical systems (pipes, boilers, ducts, flues, breechings, etc.) is recognized as being the exclusive work of the **Asbestos Workers**.
2. On all mechanical systems (pipes, boilers, ducts, flues, breechings, etc.) that are going to be scraped, the removal of all insulating materials, whether they contain asbestos or not, shall be the exclusive work of the **Asbestos/Abatement Laborers**.
3. The removal of all Asbestos-containing materials from walls, ceilings, floors, columns and all other nonmechanical structures and surfaces, etc., is being recognized as being the exclusive work of the **Asbestos/Abatement Laborers**.
4. The term "removal" as used in this Agreement shall not include the sealing, labeling and dropping of scrap material into the appropriate containers. After drop, final disposal shall be the work of the **Asbestos/Abatement Laborers**.
5. The loading at the designated area of all materials that have been removed, bagged and tagged, as well as clean-up of all unloading, burying and other work required at the disposal site is recognized as being the exclusive work of the **Asbestos/Abatement Laborers**.
6. Asbestos/Lead Abatement Worker requires special training & licensing.

AAWR-1

100 E. MARKET ST. P.O. BOX 2449 SAN ANTONIO, TEXAS 78298-2449 210-704-7297



San Antonio Water System

CONTRACT ADMINISTRATION

November 05, 2002

SUBJECT: Wage Rates for Asbestos Worker (Includes removal of lead) & Asbestos Abatement Laborer

After a review and analysis on the work classifications (Asbestos Worker & Asbestos Abatement Laborer), the following wage rates will be utilized on the above project.

Asbestos Worker (includes removal of lead)

**\$18.93 per/hr plus \$5.72 per/hr
for fringe benefits
Total: \$24.65 per/hr**

Asbestos/Abatement Laborer

**\$12.18 per/hr plus \$.94 per/hr
for fringe benefits
Total: \$13.12 per/hr**

AAWR-2

100 E. MARKET ST. P.O. BOX 2449 SAN ANTONIO, TEXAS 78298-2449 210-704-7297

SAN ANTONIO WATER SYSTEM

**GENERAL CONDITIONS
(Revised June 2015)**

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- VII. Contract Payments**
- VIII. Contract Completion Time**
- IX. Project Completion and Acceptance**
- X. Disputes**
- XI. Supplemental and Special Conditions**
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- XIII. Venue**

SAN ANTONIO WATER SYSTEM

GENERAL CONDITIONS

ARTICLE I. CONTRACT DEFINITIONS:

Wherever in these General Conditions or in other parts of the Contract Documents, the following terms, or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

1. ACPA - American Concrete Pipe Association.
2. ANSI - American National Standards Institute.
3. ASTM - American Society for Testing Materials.
4. AUTHORIZATION TO PROCEED - (Work Project Authorization) A written notice given by Owner to Contractor establishing the date on which the Contract Time will commence to run and on which Contractor shall start to perform Contractor's obligations under the Contract Documents.
5. AWWA - American Water Works Association.
6. BIDDER - An individual, partnership, corporation, joint venture, etc., submitting a proposal.
7. BOARD – Board of Trustees of the San Antonio Water System.
8. CHANGE ORDER - A written order issued by the Owner to the Contractor authorizing additions, deletions, or revisions to the Work to be performed by the Contractor within the scope of construction services outlined in the Contract Documents. This includes changes in price and/or changes in time.
9. CITY- The City of San Antonio, Texas (COSA)
10. CITY COUNCIL - The duly elected members of the council of the City of San Antonio, Texas.
11. CLAIM – A written demand seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract.
12. COMPETENT PERSON – Employee of prime Contractor who has the industry knowledge of construction safety practices and is well versed with construction practices and procedures.
13. CONDITIONAL LETTER OF ACCEPTANCE - The date certified in writing by the Owner when the Construction of the entire Project or any completed portions thereof as defined by SAWS is completed in accordance with the Contract Documents.
14. CONSTRUCTION OBSERVER/INSPECTOR (COI) - The Owners assigned authorized representative who observes, inspects, and may accept any or all parts of the Project and the materials to be used therein.
15. CONSULTANT - A person registered as a professional engineer pursuant to Texas Occupations Code, Title 6, Chapter 1001, employed to provide professional engineering services and having overall responsibility for the design of a project or a significant portion thereof, together with administrative supervision of any subconsultants the Consultant may retain. The term "Consultant", unless the context clearly indicates otherwise, means an engineer in private practice retained for a specific project under a contractual agreement with the Owner.
16. CONTRACT - The signatory Agreement (Standard Form) between the SAWS and the Contractor governing the furnishing of material and performance of the Work. The Contract will include all Contract Documents.

17. CONTRACT DOCUMENTS - The Contract Documents consist of Bidding or Proposal Documents (Invitation to Bidder's or Invitation for Competitive Sealed Proposals, the Instructions to Bidders or the Instructions to Respondents, the Supplementary Instructions to Respondents, the Contractor's completed Bid Proposal or Price Proposal form, the Addenda), the Contract, the Conditions of the Contract (General, Supplemental and Special Conditions), the Standard Drawings, the Construction Specifications, the Change Orders, the Payment and Performance Bonds, and the Good Faith Effort Plan. The Contract Documents form the complete CONTRACT, which represents the entire and integrated agreement between the Owner and the Contractor and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind between:
 - (1) Design Consultant and Contractor;
 - (2) Owner and Subcontractor or Subcontractor; or
 - (3) Any person or entities other than Owner and Contractor.
18. CONTRACTOR - The individual, partnership, corporation, joint venture, or other entity contracting with the SAWS to complete the Work. The Contractor is directly responsible for the Subcontractors and Vendors that they select to complete the Work.
19. CONTRACT SUM - The total compensation payable to the Contractor for performing the Work as originally contracted or as subsequently adjusted by Change Orders.
20. CONTRACT TIME - The total time allowed the Contractor for completion of the Work. Contract Time will commence as per Article 8.1 and shall include the number of days set forth in the Contract plus any extended days granted under the provisions of Article 6.
21. ENGINEER - A Professional Engineer licensed by the State of Texas and duly authorized as a representative of the San Antonio Water System to provide professional engineering services on public works projects. Equivalent terms may include Engineer of Record, Program Engineer, Project Engineer, and/or Design Engineer.
22. FORCE ACCOUNT - a basis of payment for the direct performance of Work with payment based on the actual cost of the labor, equipment and materials furnished and consideration for overhead and profit as specifically provided for in Section 6.5.3 herein.
23. HAZARDOUS MATERIAL(s)/SUBSTANCE - Pursuant to Section 26.263 of the Water Code hazardous material means any substance or material designated as such by the administrator of the Environmental Protection Agency pursuant to the Comprehensive Environmental Response Compensation and Liability Act (42 U.S.C. Sec. 9601 et seq.), regulated pursuant to Section 311 of the Federal Clean Water Act (33 U.S.C. Sec. 1321 et seq.), or designated by the Commission and shall also include but not be limited to:
 - (1) any substance that, whether by its nature or its use, is subject to regulation or requires environmental investigation, monitoring, or remediation under any federal, state, or local environmental laws, rules, or regulations;
 - (2) any underground storage tanks, as defined in 42 U.S.C. Section 6991(1)(A)(I) (including those defined by Section 9001(1) of the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 et seq.;
 - (3) the Texas Water Code Annotated Section 26.344; and Title 30 of the Texas Administrative Code Sections 334.3 and 334.4), whether empty, filled or partially filled with any substance; and
 - (4) any other hazardous material, hazardous waste, hazardous substance, solid waste, and toxic substance as those or similar terms are defined under any federal, state, or local environmental laws, rules, or regulations.

24. INSTRUCTIONS TO BIDDERS - Owner Instructions of a general nature outlining the duties and responsibilities of a prospective bidder.
25. LABORATORY - The testing laboratories of the Owner or any other testing laboratory that may be designated or approved in writing by the Owner.
26. LABOR BURDEN – The cost paid by an employer for employing individuals above the salary actually paid and reflected in their payroll. These are limited to the following:
- Payroll Taxes – both Federal and State (FICA, FUTA, SUTA)
 - Paid Holidays, Vacation Leave and Sick Leave
 - Retirement/Pension Costs (401K, etc.)
 - Health Care
 - Life/AD&D Insurance
 - Workers Compensation Insurance
 - Long-Term Disability Insurance
 - Short-Term Disability Insurance
 - Bonuses, if paid to all employees regardless of company’s financial performance
 - Safety Training and Personal Protective Equipment (PPE) given to all employees
27. LUMP SUM– Price of an entire group of services, where no breakdown is given for individual items.
28. MAJOR BID ITEM - Any individual bid item submitted by Contractor whose total cost, as determined by multiplying the bid schedule line item quantity for that bid item by the Contract unit price also provided in that bid schedule line item, is equal to or greater than 5 percent of the original contract total amount. The preceding criteria notwithstanding, the Owner and Consultant **reserve the right** to identify or exclude specific bid items as being "Major" in the Special Conditions for each Project.
29. MINORITY BUSINESS ENTERPRISE - A business structure that is certified by the Small Business Administration, Texas State Comptroller’s Office or the South Central Texas Regional Certification Agency as being 51% owned, operated, and controlled by an ethnic minority group member(s) who is legally residing in or a citizen of the United States. The ethnic minority group members recognized by SAWS are African Americans, Hispanic Americans, Asian Americans, and Native Americans.
30. MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) - A conveyance or system of conveyances (including roads with drainage systems, municipal streets catch basins, curbs, gutters, ditches, man-made channels or storm drains:
- .1 Owned or operated by a State, City, town, borough, county, district association or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial waters, storm water or other wastes including special districts under State law such as a sewer district, flood control district or drainage district or similar entity or a designated and approved management agency under Section 208 of the Clean Water Act that discharges to water of the United States;
 - .2 Designated or used for collection or conveying storm water.
 - .3 That is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.
31. NEMA - National Electrical Manufacturers Association.
32. NFPA - National Fire Protection Association.
33. NON-HAZARDOUS MATERIAL(s)/SUBSTANCES - Any material(s)/substance(s) which is not designated as hazardous pursuant to Article I. 23 herein and the continued presence of such on the site is determined by the Owner's representative not to be detrimental to the completion of the Project.
34. NOTICE OF NON COMPLIANCE – Neglect of compliance; failure to comply.

35. OWNER - The San Antonio Water System (SAWS).
36. OWNER'S REPRESENTATIVE - The Owner's duly authorized representative of the System.
37. PAYMENT BOND – In accordance with Chapter 2253 of the Texas Government Code as amended, the security furnished by the Contractor through the Surety in the full amount of the Contract Sum for the protection of all persons supplying labor and material in the prosecution of the Work who properly follow statutory requirements for perfecting claims against such security. If the Contract amount does not exceed \$25,000, a Payment Bond may not be required.
38. PERFORMANCE BOND - In accordance with Chapter 2253 of the Texas Government Code as amended, the security furnished by the Contractor through the Surety in the full amount of the Contract Sum as a guaranty that the Work will be faithfully performed and completed and that the Owner will be saved harmless from all costs and damages which the Owner may suffer by reason of the Contractor's default or failure to perform the Work. If the Contract amount does not exceed \$25,000, a Performance Bond may not be required.
39. PIPELINE PROJECT - Work site and Work elements related to a sanitary sewer, water, or recycle water pipeline with all appurtenances and construction to be performed thereon under the Contract.
40. PLANS - The Plans, drawings, details and supplemental drawings, or reproductions thereof, produced and sealed by the Consultant and/or Engineer and approved by the Owner, showing the location, character, dimensions and details of the Work and which are a part of the Contract. Plans include standard details issued and sealed by the Consultant and/or Engineer or his representative.
41. PROJECT – The total design and construction of Work performed under the Contract Documents and may be the whole or a part of the Project and which may include construction by Owner or by separate Contractors. All references in these General Conditions to or concerning the Work or the Site of the Work will use and or related to the term “Project,”(including Pipeline Projects) notwithstanding that the Work only may be a part of the Project.
42. PROPOSAL - The offer of the bidder, made out on the prescribed forms, giving prices for performing the work described in the Plans and Specifications.
43. PUNCH LIST – List of Work remaining to be completed before final acceptance of the Project.
44. REQUEST FOR INFORMATION (RFI) – Document submitted by Contractor requesting clarification on a particular bid item, scope of work or intent of the Contract.
45. REQUEST FOR PROPOSAL (RFP) - Document submitted by Contractor to SAWS or document submitted by SAWS to Contractor requesting changes to the Contract Document.
46. SAMPLES - Physical examples furnished by the Contractor to Owner to illustrate intended or anticipated materials, equipment or workmanship, and to assist Owner and Consultant in the establishment of workmanship and quality standards by which the Work will be judged.
47. SAN ANTONIO WATER SYSTEM - San Antonio Water System (SAWS) shall mean the San Antonio Water System Board of Trustees as established pursuant to Article 1115, Texas Revised Civil Statutes Annotated, and City of San Antonio Ordinance No. 75686. Whenever used in this Contract the term SAWS or Owner shall be, unless indicated otherwise, understood to mean the San Antonio Water System Board of Trustees, or its successors or any person or persons acting lawfully in an official capacity on behalf of the SAWS at such time and within the power and authority specifically delegated to him or them by this Contract.
48. SEQUENCE OF CONSTRUCTION - The logical and proper order in which the Contractor shall accomplish the Work as provided by Article 5.14 as directed by the Owner in stages and phases, as shown in the Contract Documents, unless Owner orders otherwise by a properly executed Change Order as provided herein.

49. SHOP DRAWINGS - Drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are furnished by the Contractor and prepared by Contractor, first-tier or sub-tier subcontractors, manufacturer, supplier or distributor, and which illustrates and details some portion of the Work. Shop Drawings shall be furnished to the Owner as submittals.
50. SMALL BUSINESS ENTERPRISE – A business structure that is Certified by the Small Business Administration, Texas State Comptroller’s Office or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by someone who is legally residing in or a citizen of the United States, and the business structure meets the U.S. Small Business Administration’s (SBA) size standard for a small business within the appropriate industry category.
51. SMALL, MINORITY, AND WOMAN-OWNED BUSINESS - Hereinafter referred to as “SMWB”, includes all business structures Certified by the Small Business Administration, Texas State Comptroller’s Office, or the South Central Texas Regional Certification Agency that are 51% owned, operated, and controlled by a SMALL BUSINESS ENTERPRISE, a MINORITY BUSINESS ENTERPRISE, or WOMAN-OWNED BUSINESS ENTERPRISE
52. SPECIAL CONDITIONS – The part of the Contract Documents which add special requirements that apply to a specific project as defined in Article XI herein.
53. SPECIFICATIONS - The specific instructions to the Contractor that are provided in the Contract Document as to the requirements for materials, equipment, certain construction procedures, standards and quality of workmanship for the Work and performance of related services and other technical requirements and forming a part of the Contract.
54. SUBCONTRACTOR - The individual, firm, equipment vendor, or corporation, having a first tier subcontract with the prime or general Contractor, subject to the review of qualifications by the Consultant and the Owner's Representative, for the performance of a part of the Work. Sub-tier subcontractors must be identified by the subcontractors and be similarly subject to the review of qualifications by the Consultant and the Owner's Representative for the performance of a part of the Work.
55. SUBSTANTIAL COMPLETION - When construction of the project or a specified part thereof is sufficiently completed in accordance with the Contract Documents so that the Project, or specified part thereof could be utilized for the Owner's purposes for which it is intended.
56. SUPERINTENDENT - The Contractor’s onsite project representative whom the Contractor has authorized to communicate with the SAWS COI, pursuant to the terms of the Contract and as provided for in Section 5.4 herein.
57. SUPPLEMENTARY CONDITIONS - Shall be as defined in Article XI herein.
58. SURETY - The corporate body licensed to conduct business in the State of Texas that provides assurance that the Contractor, or his substitute will faithfully perform the Work covered by the Contract and make payment of any due, unpaid, eligible labor and supply claims arising there under and is in compliance with the provisions contained in Articles 3.4 and 3.5 herein.
59. UNDERGROUND FACILITIES - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments and appurtenances thereto, and any encasement containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, sewage and drainage removal, traffic or other control systems.
60. UNIT PRICE WORK - Work to be paid for by Owner on the basis of Contractor quoted unit prices in the Bid Proposal based upon Owner estimated quantities.
61. WOMAN BUSINESS ENTERPRISE – A business structure that is Certified by the Small Business

Administration, Texas State Comptroller's Office or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by a woman or women who are legally residing in or citizens of the United States

62. WORK - The entire completed construction or the various separately identifiable parts thereof required necessary, proper or incidental and required or reasonably inferable, to produce, construct and fully complete the construction project in strict accordance with the requirements of the Contract Documents. Work is the result of Contractor performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.
63. WORK CHANGE DIRECTIVE – Shall be as defined in Article VI herein. Document utilized to memorialize minor changes in work as described in 6.2.2.
64. WRITTEN NOTICE – Any notice, payment, statement or demand required or permitted to be given under this Contract by either party to the other may be effected by personal delivery in writing or by facsimile transmission, email or by mail, postage prepaid, or by overnight delivery to an officer, management level employee or other designated representative of either party. Mailed or email notices shall be addressed to the parties at an address designated by each party, but each party may change its address by written notice in accordance with this section. Mailed notices shall be deemed received as of three (3) calendar days after mailing.

ARTICLE II. LEGAL RELATIONSHIPS AND RESPONSIBILITIES:

- 2.1 LEGAL RESPONSIBILITIES - The Contractor in the performance of the Work shall comply with all pertinent Ordinances of the City of San Antonio (COSA), Regulations of the San Antonio Water System (SAWS), Laws of the State of Texas, and of the United States, including but not limited to Rules and Regulations of the United States Department of Labor, pertaining to Occupational Safety and Health Administration standards as presently existing or as may hereinafter be modified or amended.
 - .1 Where construction projects cross or run along state highways, the Contractor shall at a minimum comply with governing Texas Department of Transportation Regulations as outlined in State Permits for each crossing. In cases where State Regulations do not apply, City Regulations shall be binding.
 - .2 Where construction projects cross or run along county roads, the Contractor shall at a minimum comply with governing Bexar County Public Works Regulations as outlined in the County Permit for each crossing.
- 2.2 GENERAL UNDERSTANDING - Contractor at his own cost and expense shall furnish all supervision, tools, implements, machinery, labor, materials and accessories, such as are necessary and proper for the purpose, and secure all required permits and licenses, and shall at his own cost and expense construct, build and complete, in a good, first class, substantial and workmanlike manner, the structures, work and improvements herein described and/or referred to in the Contract Documents.
- 2.3 INDEMNIFICATION - Contractor shall protect the public, SAWS, and COSA fully by taking reasonable precaution to safeguard persons from death or bodily injury and to safeguard property of any nature whatsoever from damage. Where any dangerous condition or nuisance exists in and around construction sites, equipment and supply storage areas and other areas in any way connected with the performance of this contract, the Contractor shall provide and maintain reasonable warning of such danger or nuisance. The Contractor shall not create an excavation, obstruction, or any dangerous condition or nuisance of any nature whatsoever in connection with the performance of this Contract unless necessary to its performance, and in that event the Contractor shall provide and maintain at all times any and all reasonable means of warning of any danger or nuisance created. The duties of the Contractor in this section shall be nondelegable, and the Contractor's compliance with the specific recommendations and requirements of the San Antonio Water System or the City of San Antonio as to the means of warning shall not excuse the Contractor from the faithful performance of these duties should such recommendations and requirements not be adequate or reasonable under the

circumstances.

In order to protect SAWS and COSA the Contractor's failure to perform any of the foregoing duties or any of the terms of this Contract, the Contractor shall indemnify and save harmless SAWS, COSA and their agents and employees from all losses, damages, judgments, decrees, and expenses, liens, claims, demands, causes of action, or costs of any nature whatsoever, and/or any other liability, damage, fine or penalty (except where reimbursement for fines or penalties is prohibited by law), including all costs of defense, attorneys fees, and settlement arising out of or in any way connected with any claims or actions at law or in equity, brought against SAWS, COSA and their agents and employees for the death or injury to persons or for damage to property caused, or allegedly caused, by any willful acts, negligence, nuisance, or breach of any term or condition of this Contract in connection with work to be performed pursuant to said Contract, by the Contractor, his agents, subcontractors, or employees. The Contractor shall furthermore indemnify and save harmless SAWS and COSA and their agents and employees from all demands of subcontractors, workmen, material men, or suppliers of machinery and parts thereof, equipment, power tools, and supplies incurred in connection with work to be performed under this Contract. Property of any description, including but not limited to property of SAWS and COSA, which shall be damaged in the performance of this Contract by the Contractor, his agents, employees, subcontractors or their employees and subcontractors shall be restored to its condition prior to damage by the Contractor at the Contractor's expense.

SUCH INDEMNITY SHALL APPLY WHERE THE CLAIMS, LOSSES, DAMAGES, CAUSES OF ACTION, SUITS, JUDGEMENTS, DECREES, OR LIABILITY ARISE IN PART FROM THE NEGLIGENCE OF SAWS OR COSA. IT IS THE EXPRESSED INTENTION OF THE CONTRACTOR, SAWS AND COSA THAT THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH IS INDEMNITY BY CONTRACTOR, TO INDEMNIFY AND PROTECT SAWS AND COSA FROM THE CONSEQUENCES OF THEIR OWN NEGLIGENCE, WHERE THE NEGLIGENCE IS A CONCURRING CAUSE OF THE INJURY, DEATH, OR DAMAGE. FURTHERMORE, THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH SHALL HAVE NO APPLICATION TO ANY CLAIM, LOSS, DEATH OR DAMAGE RESULTS FROM THE SOLE NEGLIGENCE OF SAWS AND COSA UNMIXED WITH THE FAULT OF ANY PERSON OR ENTITY. The obligations of Contractor hereunder shall survive termination of this Contract for any reason. The foregoing notwithstanding, it is agreed that with respect to any statutory restrictions affecting the validity or enforceability of the indemnification obligation herein, it shall be subject to such restrictions, and the indemnification obligation herein shall be deemed to be amended to the minimum extent necessary to conform therewith, and shall otherwise continue in full force and effect.

In any claims against SAWS or COSA or their agents or employees by Contractor, any employee of Contractor, any subcontractor, anyone directly or indirectly employed by Contractor, or any subcontractor or anyone for whose acts any of them may be liable, the indemnification obligation under this Article shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or any subcontractor under workers' compensation acts, disability benefit acts of other employer's benefit acts.

- 2.4 **ROYALTIES AND PATENTS** - The Contractor shall pay all royalties and license fees, and defend all suits or claim for infringement of any patent rights and shall indemnify and as provided under Article 2.3 save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for all such royalties and license fees and loss when a particular design or process, or the product of a particular manufacturer or manufacturers is specified by Owners Contract Document; provided, however, if the Contractor has reason to believe the design, process or product specified constitutes an infringement of a patent, he shall be responsible for such royalties, license fees and loss unless he promptly gives such information to the Owner.
- 2.5 **NO WAIVER OF SAWS RIGHTS** - Unless specifically and unambiguously set out in the Contract Documents at the time of bid or proposal opening, no observation/inspection or approval by said Owner or any COI, officer or employee of the Owner, or any order, measurement or certificate by said Owner, or any estimate or payment by the Owner for any part of said Work, or material or method or equipment, or any extension of time, or any possession of the Work, at any time shall operate as a waiver of any provision or obligation of this Contract or any right or power herein given or reserved to said Owner, or of any right to claim any indemnity or damages for patent or latent defects in the work or otherwise as herein provided for; nor shall any Owner waiver of any Contractor breach of this

Contract be deemed as a waiver of any other or subsequent Contractor breach; and every Owner right or remedy under the Contract Documents shall be cumulative, and in addition to all other Owner rights and remedies.

- 2.6 INTEREST IN SAWS CONTRACT PROHIBITED - No officer or employee of the Owner shall have a financial interest, direct or indirect, in any Contract with the SAWS, or shall be financially interested, directly, in the sale to the SAWS of any land, materials, supplies or service, except on behalf of the SAWS as an officer or employee. This prohibition extends to the City Public Service Board, City of San Antonio, and City boards and commissions other than those, which are purely advisory.
- 2.7 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS/NONDISCRIMINATION CLAUSE The San Antonio Water System highly encourages Contractors to implement Affirmative Action practices in their employment programs. This means Contractor should not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, sexual orientation, political belief or affiliation, age, disability or genetic information.
- 2.8 SMALL, MINORITY, AND WOMEN BUSINESS PROGRAM (SMWBP) REQUIREMENTS -The San Antonio Water System highly encourages contractors to form joint ventures and/or provide subcontracting opportunities to small, minority and woman-owned business (SMWB) firms. The San Antonio Water System's Good Faith Effort Plan (GFEP) is **required and must be submitted** as part of the bid package to report all small, minority, and woman-owned firm participation for this project. The GFEP must reflect all information requested as part of the total construction Contract Documents.
- 2.9 STATE SALES TAX - The Owner qualifies for exemption from state and local sales tax and will upon request by the Contractor, furnish the Contractor with a tax exemption certificate. It is the Contractor's responsibility to claim exemption from payment of applicable state and local sales taxes by complying with such procedures as may be prescribed by the State Comptroller of Public Accounts. The Contract separates the cost of materials and tangible equipment from skill, labor and other associated costs of construction. This is in accordance with the Texas Tax Code to allow tax exemption on the Contract price for materials. Certain construction equipment that is owned or rented by the CONTRACTOR may be subject to State and Local Sales Tax. The Contractor will not include in the Contract Sum or any modification thereto any amount for sales, use or similar taxes for which Owner is exempt.
- 2.10 PREVAILING WAGE RATE AND LABOR STANDARD PROVISIONS. The Provisions of Chapter 2258 of the Texas Government Code, and the "Wage and Labor Standard Provisions" amended in City of San Antonio Ordinance 2008-11-20-1045, expressly are made a part of this Contract and are incorporated herein by reference (the "PWRLSP"). In accordance therewith, a schedule of the general prevailing rate of per diem wages in this locality for each craft or type of worker needed to perform this Contract is included as part of the Bidding Document that are part of the Contract Documents. In accordance with the PWRLSP, the Contractor shall forfeit, as a penalty to Owner, sixty dollars (**\$60.00**) for each laborer, workman or mechanic employed for each calendar day, or portion thereof, in which such laborer, workman or mechanic is paid less than the stipulated prevailing wage rates for any work done under this Contract by the Contractor or any Subcontractor employed on the project. The establishment of prevailing wage rates, pursuant to Chapter 2258 of the Texas Government Code, shall not be construed to relieve Contractor from its obligation under any federal or state law, regarding the wages to be paid to or hours worked by laborers, workmen or mechanics, insofar as applicable to the work to be performed hereunder. Contractor, in the execution of this Project, agrees it shall not discriminate in its employment practices against any person because of race, color, religion, sex, pregnancy, sexual orientation, political belief or affiliation, age, disability or genetic information. Contractor agrees it will not engage in employment practices which have the effect of discriminating against employees or prospective employees because race, color, religion, sex, pregnancy, sexual orientation, political belief or affiliation, age, disability or genetic information. This Contract provision shall be included in its entirety in all Subcontractor agreement(s) entered into by the Contractor or any Subcontractor employed on the project.
- .1 LCP Tracker - Each contractor and every lower-tier subcontractor will be required to submit certified payrolls and labor compliance documentation electronically utilizing the LCP Tracker web-based application as of the first Certified Payroll Report (CPR) and with every CPR thereafter. Electronic submittal of CPRs will be accessed through a link on SAWS' "Business

Center” web page. Each contractor and subcontractor will be provided a Logon identification and password to access the SAWS LCP Tracker reporting system. Electronic submittals will require data entry of weekly payroll information including: employee identification, labor classification, total hours worked and hours worked on this project, and wage and benefit rates paid. This electronic submission requirement also applies to every lower-tier subcontractor required to provide labor compliance documentation.

Additional information on the LCP Tracker System can be found on: www.lcptracker.com.

- 2.11 ETHICS. To report suspected ethics violations impacting The San Antonio Water System, please call 1-800-687-1918.

ARTICLE III. CONTRACT DOCUMENTS & BONDS:

3.1 PLANS AND SPECIFICATIONS - The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated and intended results. In cases of discrepancy between any drawing and the dimension figures written thereon, the dimension figures shall govern over scaled dimensions; Detailed Drawings and accompanying notations shall govern over general Drawings; Specifications shall govern over Drawings and Special Conditions shall govern over Supplemental Conditions, Specifications, Drawings and these General Conditions.

- .1 For the purposes of clarification, the most recently issued Document takes precedence over previous issues of the same document. The order of precedence for the Contract Document is as follows with the highest authority listed as "1."

1. Contract Modifications signed by Contractor and Owner.
2. Addenda, with those of later date having precedence over those of earlier date.
3. Special Conditions
4. Supplementary Conditions.
5. General Conditions
6. Specifications
7. Drawings

3.2 INTENT OF THE CONTRACT DOCUMENTS is to describe a functionally complete Project (or integral component part thereof) to be constructed in accordance with the Contract Documents. Any work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied by Contractor whether or not specifically called for by SAWS or its Consultant. When words which have a well-known technical or trade meaning are used to describe work, materials or equipment such words shall be interpreted in accordance with that meaning. Where phrases such as "directed by", "ordered by" or "to the satisfaction of", "the Consultant", "the SAWS COI" or "the Owner's Representative" occur, it is to be understood that the directions, orders, or instructions to which they relate are within the scope of, and authorized by the Contract Documents. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or Laws or Regulations in effect at the time of opening of Bids except as may be otherwise specifically stated in writing.

DISCREPANCY IN CONTRACT DOCUMENTS - If, during the performance of the Work, Contractor finds a conflict, error or discrepancy in the Contract Documents, Contractor shall so report to Consultant or Owner in writing immediately and before proceeding with the Work affected thereby and shall obtain a prompt written interpretation or clarification from SAWS or Consultant; however, Contractor shall not be liable to SAWS or Consultant for failure to report any conflict, error or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof or should reasonably have known thereof.

3.3 PLANS AND SPECIFICATIONS AT THE WORK SITE - The Contractor shall maintain at the Work site at least one copy of the most recent and complete set of Contract Documents to include, but not limited to, Plans, Specifications, Addenda, approved Shop Drawings and Change Orders, in good order and marked to record all changes to the Plans and/or existing physical conditions made during construction.

.1 RECORD DRAWINGS - Each month as the Work progresses the Consultant shall formally submit to SAWS, along with the monthly payment application, a set of red line drawings noting work completed during that period. Red Line drawings should also reflect any and all variations to the Plans and reflect all actual dimensions necessary for the development of as built drawings. As a condition precedent to any progress payment of final payment the Contractor shall have a duty to submit, and coordinate with Consultant, Contractor's properly marked drawings. Prior to final payment to the Contractor, the Contractor who has control of the Work and is in a position to know how the Project was constructed, shall formally submit to SAWS Consultant, at the final walk through the set of clearly marked red line drawings and related documents noting work completed and any variations from the original plan and specifications for Consultant's use in preparing Owner's final "Record Drawings" for the SAWS permanent file.

3.4 PERFORMANCE BOND - CONTRACTOR shall furnish a Performance Bond in favor of SAWS in an amount equal to 100% of the total construction cost under this Contract. Total construction cost are defined as the entire cost of materials and their installation, and include, but are not limited to, the cost of labor, equipment, supplies, materials and additional construction costs. The Performance Bond shall: (1) guarantee the completion of the entire construction herein identified in conformity with the Plans and Specification approved by SAWS, and (2) guarantee the Work against defects in workmanship and materials for a period of twenty four (24) months after acceptance of the work by the San Antonio Water System. The bond shall be in accordance with Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code and shall have corporate Sureties that are licensed to conduct business in Texas. The Contractor agrees that the following shall apply to bonds provided by a Surety:

If any bond is in an amount in excess of ten (10%) percent of the Surety company's capital and surplus, the San Antonio Water System shall require, as a condition to accepting the bond, written certification that the surety company has reinsured the portion of the risk that exceeds ten (10%) percent of the surety company's capital and surplus with one or more reinsurers who are duly authorized, accredited, or trustee to do business in this state. The amount reinsured by any reinsurer may not exceed ten (10%) percent of the reinsurer's capital and surplus.

If the amount of the bond exceeds \$100,000, the surety must also:

- (1) hold a certificate of authority from the United States secretary of the treasury to qualify as a surety on obligations permitted or required under federal law; or
- (2) have obtained reinsurance for any liability in excess of \$100,000 from a reinsurer that is authorized and admitted as a reinsurer in this state and is the holder of a certificate of authority from the United States secretary of the treasury to qualify as a surety or reinsurer on obligations permitted or required under federal law.

If the Surety on any bond furnished by the Contractor to the Board is declared bankrupt or becomes insolvent, or has its right to do business revoked in the State of Texas, then the CONTRACTOR will have ten (10) days to substitute another bond and surety there for which shall be acceptable to SAWS and which shall be at the expense of the Contractor.

3.5 PAYMENT BOND - Contractor shall furnish Payment Bond in favor of SAWS in an amount equal to 100% of the total construction cost under this Contract. Total construction costs are defined as the entire cost of materials and their installation, and include, but are not limited to, the cost of labor, equipment, supplies, materials and additional construction costs. The Payment Bond shall be security for the payment of all persons supplying labor and material in the prosecution of the Work provided for in the Contract Documents. The Contractor agrees that the following shall apply to Bonds provided by a Surety:

If any Bond is in an amount in excess of ten (10%) percent of the Surety company's capital and surplus, the San Antonio Water System shall require, as a condition to accepting the Bond, written certification that the surety company has reinsured the portion of the risk that exceeds ten (10%) percent of the surety company's capital and surplus with one or more reinsurers who are duly authorized, accredited, or trusted to do business in this state. The amount reinsured by any reinsurer may not exceed ten (10%) percent of the reinsurer's capital and surplus.

If the amount of the bond exceeds \$100,000, the Surety must also:

- (1) hold a certificate of authority from the United States secretary of the treasury to qualify as a surety on obligations permitted or required under federal law; or
- (2) have obtained reinsurance for any liability in excess of \$100,000 from a reinsurer that is authorized and admitted as a reinsurer in this state and is the holder of a certificate of authority from the United States secretary of the treasury to qualify as a surety or reinsurer on obligations permitted or required under federal law.

The bonds shall have corporate Sureties that are licensed to conduct business in Texas. If the Surety on any Bond furnished by the Contractor to the Board is declared bankrupt or becomes insolvent, or has its right to do business revoked in the State of Texas, then the CONTRACTOR will have ten (10) days to substitute another Bond and Surety therefore which shall be acceptable to SAWS and which shall be at the expense of the Contractor.

- 3.6 CONTRACTOR AND SURETIES STILL BOUND - No assignment, transfer or subletting, without the written consent of SAWS, and no order of SAWS for or approval of any alterations or modifications in said Specifications, Plans, or Work, and no change in the requirements or order for extra work made by the SAWS as provided in this Contract, shall ever in any manner release or diminish the responsibility of Contractor or any Surety on any bond of Contractor, but on the contrary, such responsibility shall extend to and comprehend all such changes and other matters. If any Surety upon any bond furnished in connection with the Contract becomes insolvent, or otherwise not authorized to do business in this State, the Contractor shall within ten (10) days furnish equivalent substitute forms of security while seeking substitute bonding, to protect the interests of the SAWS and of persons supplying labor or materials in the prosecution of the Work contemplated by the Contract, or may be liable for breach of Contract and default termination.
- 3.7 CONTRACTS LESS THAN \$25,000 - If the Contract Sum is less than or equal to \$25,000, Owner and Contractor may agree (at Owner's discretion) to Contractor not providing Performance and Payment Bonds; provided that in such event, no money will be paid by Owner to Contractor until Final Completion and acceptance of all Work by the Owner. If Contractor elects to provide Performance and Payment Bonds, the Contract Sum shall be payable to Contractor through progress payments in accordance with these General Conditions.

ARTICLE IV. CONTRACT ADMINISTRATION:

4.1 GENERAL ADMINISTRATION

- .1 PLANS AND SPECIFICATIONS BY CONSULTANT -The Consultant will provide general administration of the Contract during construction in accordance with the Consultant's scope of work as defined in the Consultant's Contract with the SAWS.
 - .1 The Consultant has the authority to act on behalf of the Owner to the extent provided in the Construction Contract Documents. The Consultant will advise and consult with the Owner. The Owner's instruction to the Contractor may be issued through the Consultant but the Owner reserves the right to issue instructions directly to the Contractor through other designated SAWS representatives. Contractor understands that SAWS may modify the authority of such Consultant as provided in the terms of its contract relationship with the Consultant, and the Owner shall, in such event, be vested with powers formerly exercised by such Consultant, provided written notice of such modification shall be immediately served on the Contractor. Nothing herein shall authorize independent agreements between Contractor and such Consultant, nor shall the Consultant be deemed

to have a legal relationship with the Contractor.

- .2 Any and all oral instructions shall be confirmed expeditiously in writing with copies furnished to the Consultant, the Owner's designated representatives, and the Contractor by the party issuing the oral instruction.
- .3 Upon the Consultant's written recommendation, the Owner's Representative shall have the final authority to reject Work performed by the Contractor which does not meet the requirements of the Contract, and to order such Work repaired, removed, or replaced in accordance with Article 5.10. Rejected Work will be documented and all payments related to the rejected Work will be suspended until the Work is accepted by the Owner.

.2 PLANS AND SPECIFICATIONS BY SAWS ENGINEER

- .1 The Engineer shall confirm all oral instructions to the Contractor expeditiously in writing.
- .2 Any other provision contained herein notwithstanding, the Engineer shall have the authority to reject Work performed by the Contractor which does not meet the requirements of the Contract, and to order such Work repaired, removed, or replaced in accordance with Article 5.10. Rejected Work will be documented and all payments related to the rejected Work will be suspended until the Work is accepted by the Owner.

4.2 ACCESS TO AND OBSERVATION/INSPECTION OF THE WORK

- .1 PLANS AND SPECIFICATIONS BY CONSULTANT - The Contractor shall provide sufficient, safe, and proper facilities at all reasonable times for the observation and/or inspection of the Work by any duly authorized representative of the Owner. The Consultant and the Owner will make visits to the site at intervals appropriate to the various stages of construction to observe the progress of the executed Work and to determine if the Work is proceeding in accordance with the Contract Documents.

- .1 On the basis of such visits and on-site observations as an experienced and qualified design professional, Consultant will keep Owner informed of the progress of the Work and will guard Owner against defects and deficiencies in the Work which are the responsibility of the Contractor to prevent and/or cure.
- .2 No approval of any phase of the construction Project by any of the Owner's representatives or observer/inspectors shall relieve the Contractor from full compliance with the Contract Documents regarding the ultimate Work product. Any additional cost, damages, or delays occasioned by patent or latent defects in the Work, and/or failure to meet the requirements of the Contract Documents, at any Project phase, shall be borne by the Contractor.

- .2 PLANS AND SPECIFICATIONS BY SAWS ENGINEER - The Contractor shall provide sufficient, safe and proper facilities at all reasonable times for the observation/inspection of the Work by the duly authorized representative of the Owner. The Engineer will make visits to the site at intervals appropriate to the various stages of construction to observe the progress of the executed Work and to determine if the Work is proceeding in accordance with the Contract Documents.

- .1 No approval of any phase of the construction Project by any of the Owner's observer and/or inspectors shall relieve the Contractor from full compliance with the Contract Documents regarding the ultimate Work product. Any additional cost, damages, or delays occasioned by patent or latent defects in the Work, and/or failure to meet the requirements of the Contract Documents, at any Project phase, shall be borne by the Contractor.

- 4.3 ASSIGNMENTS AND SUBLETTING - Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract, or any portion thereof, or any right, title or interest in, to or under

the same, without the previous written consent of the Owner. Contractor shall not assign by power of attorney or otherwise any of the monies or other considerations to become due and payable by the Owner under this Contract, without the previous written consent of the Owner. The Contractor shall notify the Owner, by written notification by certified mail to the Owner, that such assignment, transfer, conveyance or subletting, or other disposition of this Contract or any portion thereof, or any right, title or interest, in, to or under the same, is contemplated. If the Contractor does not receive written approval of such contemplated action from the Owner within thirty days of receipt of such initial request by the Contractor, such contemplated assignment, transfer, conveyance or subletting, or other disposition of this contract or any portion thereof, or any right, title or interest in, to, or under the same, shall be deemed disapproved. In no event shall the Owner be liable in excess of the consideration of this Contract in the case of any such assignment, transfer, conveyance or subletting of the Work or performance which is subject hereof.

.1 The Owner reserves the right to withhold any monthly payment hereafter provided for in the event of an assignment or subletting of a portion of the work without the previous consent and knowledge of the Owner and by reserving such right, the Owner shall not be deemed to have waived its right to declare a full breach of this Contract for Contractor's failure to comply with provisions hereof, such remedy being alternative only and exercisable at the option of the Owner.

4.4 SUBCONTRACTORS - The Contractor shall upon executing the Contract, notify the Owner in writing of the names of all proposed first tier Subcontractors for the Work. This should include the SMWBs identified in the Good Faith Effort Plan.

.1 SUBCONTRACTUAL RELATIONS - By an appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner. Said agreement shall preserve and protect the rights of the Owner under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with his Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the Subcontract, copies of the Contract Documents to which the Subcontractor will be bound by this paragraph and identify to the Subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each Subcontractor shall similarly make copies of such Documents available to his Sub-subcontractor.

4.5 SEPARATE CONTRACTS

.1 The Owner reserves the right to let other Contracts in connection with this Work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his Work with their work.

.2 When separate Contracts are awarded for different portions of the Project, "the Contractor" in the Contract Documents in each case shall be the Contractor who executes each separate Contract. This Contractor shall properly connect and coordinate his Work with the work of other Contractors. If any part of this Contractor's Work depends for proper execution or proper results on the work of any other separate Contractor, this Contractor shall inspect and promptly report in writing to the Consultant and SAWS COI any discrepancies or defects he may find in the work of any separate Contractor that render it unsuitable to achieve proper connection, execution and results. Failure of this Contractor to so inspect and report obvious discrepancies or defects shall constitute an acceptance of the other Contractor's work as fit and proper to receive this Contractor's Work, except as to defects which may develop in the other separate contractor's work after the execution of this Contractor's work.

- .3 Any other provision contained herein notwithstanding, should this Contractor negligently cause damage to the work or property of any separate Contractor on the Project, this Contractor shall, upon due notice, endeavor to settle with such other Contractor by agreement. A reciprocal clause shall be placed in the Contract Documents between the SAWS and the separate Contractor if involving other SAWS work. If such separate Contractor sues the SAWS and/or its agents on account of any damage alleged to have been so sustained, the SAWS and/or its agents shall notify this Contractor who shall defend the SAWS and/or its agents' interests and Contractor's own interests in such proceedings and pay all attorney fees, and costs in connection therewith, and if any judgment against the SAWS results there from, this Contractor shall pay or satisfy that judgment.

4.6 CONTRACT TERMINATION

- .1 **TERMINATION BY CONTRACTOR** - If the Work is stopped by SAWS for a period of ninety (90) consecutive days under an order of any court or other public authority having jurisdiction, or as a result of an act of a higher governmental authority, such as a declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing any of the Work under a Contract with the Contractor, then the Contractor may upon ten (10) additional days written notice after first providing a complete and detailed written explanation of the event that constitutes an allowable termination under this provision to SAWS and the Consultant, at which time SAWS will promptly provide a written determination whether in its sole discretion the event detailed by the Contractor constitutes an acceptable Contract termination event, pursuant to this provision; then the Contractor may terminate the Contract and recover from the Owner payment for all Work performed as of the date that Contractor gives written notice of termination pursuant to this paragraph. Owner shall not be liable for the payment of any lost or anticipated profit on Work not performed or for any consequential damages on termination of this Contract. If the Work is recommenced during the ten (10) day notice period, the Contractor may not terminate the Contract.
- .2 **TERMINATION BY OWNER** - If the Contractor is adjudged as bankrupt, or if he makes a general assignment for the benefit of his creditors, without the consent of the SAWS or if a receiver is appointed on account of his insolvency, or if he persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction pertaining to the Work, or otherwise is guilty of a substantial violation of a provision of the Contract Documents warranting Owner default of Contractor, then the Owner may, without prejudice to any right or remedy and after giving the Contractor and Contractor's Surety, if any, ten (10) days written notice, terminate the employment of the Contractor and/or take possession of the site and of all materials, and may upon order of a court of competent jurisdiction take possession of equipment, tools, construction equipment and machinery thereon owned by the Contractor. Should the Surety fail to pursue completion of the Work with reasonable speed, the Owner may arrange for completion of the Work and deduct the cost thereof from the unpaid Contract sum remaining, including the cost of additional Owner administration and Consultant services made necessary by such default or neglect, in which event no further payment shall then be made by the Owner until all Cost of completing the Work shall have been paid. If the unpaid balance of the Contract sum exceeds all the costs of finishing the Work, including direct and indirect consequential costs, attorney's fees and compensation for the Consultant's additional services made necessary thereby, such excess sum shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor or his surety shall pay the difference to the Owner. This obligation for payment shall survive the termination of the Contract
- .1 **TERMINATION FOR CONVENIENCE** - The right to terminate this Contract for the convenience of Owner (including, but not limited to, non-appropriation of funding) expressly is retained by Owner. In the event of a termination for convenience by Owner, Owner shall, at least ten (10) calendar days in advance, deliver written notice of the termination for convenience to Contractor. Upon Contractor's receipt of such written notice, Contractor immediately shall cease the performance of the Work and shall take

reasonable and appropriate action to secure and protect the Work then in place. Contractor shall then be paid by Owner, in accordance with the terms and provisions of the Contract Documents, an amount not to exceed the actual labor costs incurred, the actual cost of all materials installed and the actual cost of all materials stored at the Project site or away from the Project site, as approved in writing by Owner but not yet paid for and which cannot be returned, and actual, reasonable and documented demobilization costs, if any, paid by Contractor and approved by Owner in connection with the Work in place which is completed as of the date of termination by Owner and that is in conformance with the Contract Documents, less all amounts previously paid for the Work. No amount ever shall be owed or paid to Contractor for lost or anticipated profits on any part of the Work not performed or for consequential damages of any kind.

- .2 In the event that Owner shall be prevented from completing performance of its obligations under this Contract by an act of God or other occurrence whatsoever which is beyond the control of Owner, then Owner shall be excused from any further performance of its obligation and undertakings.
- .3 Contractor may not recover from Owner any lost or anticipated profit on Work not performed or consequential damages of any kind on or for termination of this Contract by Owner or Contractor or for any breach of this Contract by Owner.

4.7 CONTRACTOR BID SUSPENSION POLICY

- .1 INTRODUCTION - SAWS through its Board of Trustees routinely contracts with private businesses to build, maintain and repair SAWS structures, vehicles, equipment, property and other assets. SAWS desires to receive quality service and performance at a fair price for each construction services, material, supply, and equipment Contract awarded under Section V of SAWS Purchasing and Contracting Policy.

On occasion, SAWS finds that the quality of service or performance required by the Contract Documents is not provided. Therefore SAWS requires a policy and a process to address nonperformance by contractors and, if necessary, to suspend certain contractors from further contract awards for a period of time.

The purpose of this policy is to establish a procedural framework to suspend a contractor from consideration for award of future Contracts with SAWS, based on a determination that the Contractor has not met the performance standards as outlined in Article 4.7.4, Reasons for Contractor Suspension.

Staff will implement procedures consistent with this Article 4.7 to address service quality and performance issues. These procedures will include adequate safeguards, reviews and appeals to insure that Contractors being considered for suspension are provided ample opportunity for discussion, communication, and corrective actions prior to being suspended.

The term "Contractor" as used in this Article herein means a construction Contractor, subcontractor, vendor, supplier, materialman and any other person or entity supplying labor and/or material to SAWS on a contract basis.

"SAWS Management Officials" means SAWS personnel who are at the Manager level or above and who are involved in the supervision, review or acceptance of services, work or materials provided by Contractors under Contract with SAWS.

Any provision contained herein notwithstanding, SAWS reserves the right to not award a Contract to any Contractor who SAWS determines has failed to perform work to the quality of satisfaction required by SAWS and is therefore not a responsible bidder. In cases where SAWS determines that a Contractor is not a responsible bidder on a Contract due to Contractor's failure to provide quality and satisfactory work, SAWS will first give notice to the Contractor, prior to making the ultimate determination as to Contractor being a non-responsive bidder, of the

reasons for SAWS determination. The Contractor will then have an opportunity to respond to SAWS determination. At that time SAWS shall in its sole discretion make a final determination, as to whether Contractor is a responsible bidder on a given Contract.

- .2 CREATION OF CONTRACTING COMMITTEE - There shall be a standing Contracting Committee comprised of SAWS staff appointed by the President/Chief Executive Officer of SAWS. At least one Committee member will be a Vice President of SAWS and all other Committee members will be Managers or higher. The members of the Committee hearing the complaint will be SAWS Management Officials not directly involved with the Contractor being considered for bid suspension. If a standing Contracting Committee member has been involved in the day-to-day administration or supervision of a Contract with a Contractor being reviewed by the Committee, such Committee member will not serve on the Committee with regard to a complaint or appeal affecting that Contractor. The President/CEO may either appoint a substitute or the Committee may proceed with fewer members, but in no event will there be less than three members available at any Committee meeting to hear information presented.
- .3 ADMINISTRATIVE PROCEDURES - Subject to applicable laws, regulations and this policy, SAWS legal department will develop the Administrative and Operational Procedures for Contractor Bid Suspension Hearings and Appeals as outlined in "**Exhibit B**" of these General Conditions. The Contracting Committee may recommend changes to the Administrative and Operational Procedures. Changes to the Administrative and Operational Procedures must be approved by the President/CEO.

.4 REASONS FOR CONTRACTOR SUSPENSION:

The Contracting Committee may suspend a Contractor for any of the following reasons:

- .1 Contractor's failure to satisfy Contract obligations;
 - .2 Contractor's unsatisfactory safety performance;
 - .3 Contractor's failure to meet schedules or deadlines established in a Contract with SAWS;
 - .4 Contractor's failure to meet specifications or plan requirements;
 - .5 Contractor's failure to staff a project as specified in Contract Documents;
 - .6 Contractor's provision of inaccurate information in bid documents;
 - .7 Contractor's failure to provide change order documentation specified in Contract Documents;
 - .8 Contractor's failure to comply with warranty obligations;
 - .9 Contractor's failure to satisfy all Contract obligations to subcontractors, material men and laborers on SAWS projects as specified in Contract Documents;
 - .10 Contractor's failure to correct valid customer or public complaints as provided for in the Contract specifications, city ordinance, or applicable law;
 - .11 Conviction of a principal, owner, manager or corporate officer of the Contractor of a criminal offense;
 - .12 Relevant documented information from other parties with whom a contractor has contracted which are negative in nature and reflective of any of the foregoing reasons.
- .5 COMPLAINT AND HEARING PROCEDURES - A SAWS Management Official may submit a complaint to the Chief Operating Officer recommending that a particular Contractor be suspended from consideration for award of Contracts with SAWS. The Chief Operating Officer

will determine whether the complaint is in accordance with the Administrative and Operating Procedures. Upon such a determination, the Chief Operating Officer will convene the Contracting Committee in a Hearing on Contractor Bid Suspension. The standing Contracting Committee will consider all relevant information and decide whether the Contractor will be suspended from bidding on SAWS Contracts.

.6 NOTICE OF SUSPENSION BY CONTRACTING COMMITTEE - If the Contracting Committee decides to suspend the Contractor, the Chief Operating Officer will send written notice as described in Article 4.7 Contractor Bid Suspension Policy. This notice will be sent by certified mail, return receipt requested.

.7 SUSPENSION PERIOD - If the Contractor has not been previously suspended pursuant to this policy, the term of the suspension will be for one (1) year from the date of issuance of the notice of suspension.

If the Contractor has been previously suspended pursuant to this policy, the term of the suspension will be for two (2) years from the date of issuance of the notice of suspension.

.8 APPEALS PROCESS - The Contractor may request review of the decision by the President/Chief Executive Officer of SAWS by filing a written request for review with the President/CEO within ten (10) days of the date of the notice of the result of the appeal hearing. The suspension will stay in effect throughout the appeal process.

.9 SEVERABILITY - Should any section, part, paragraph, sentence, phrase, clause or word of this policy, for any reason, be held illegal, inoperative or invalid, or if any exception to or limitation upon any general provision herein contained be held to be unconstitutional or invalid or ineffective, the remainder shall, nevertheless, stand effective and valid as if it had been enacted without the portion held to be unconstitutional or invalid or ineffective.

.10 ADMINISTRATIVE LIABILITY - No officer, attorney, agent or employee of SAWS renders himself or herself personally liable for any damage that may accrue to persons or property as a result of any act required or permitted and performed in good faith in the discharge of his or her duties under this policy so long as such officer, attorney, agent or employee is acting within the scope of his or her official capacity. Any suit brought against an officer, attorney, agent or employee of SAWS acting within his or her official capacity and scope, as a result of any act required or permitted and performed in good faith in the discharge of duties under this policy, will be defended by SAWS legal counsel until the final determination of the proceeding therein.

4.8 SUSPENSION OF WORK BY OWNER

.1 The Owner may suspend said Work either partially or totally by his written order whenever in his opinion the interests of SAWS require the suspension of such Work. In the event that the Owner suspends Project Work, the Contractor hereby acknowledges and agrees that so long as the total suspension(s) is (are) for a period not to exceed ten (10) cumulative days accruing throughout the entire Contract Time, that the Contractor is not entitled to request a negotiated adjustment of the Contract Sum nor an extension of the Contract Time. Such right to suspend Project Work for periods not to exceed ten (10) cumulative days accruing throughout the entire Contract Time without compensation to the Contractor, is expressly reserved by SAWS.

.2 Any total suspension of Project Work by the Owner that extends beyond ten (10) cumulative days accrued throughout the entire Contract Time, may entitle the Contractor to request either a negotiated adjustment of Contract Sum or an extension of Contract Time, or both, as directly attributable to such extended total suspension of Project Work, Provided:

.1 Any equitable extension of the Contract Time shall not exceed the actual delay caused by the temporary suspension, as determined by Owner, and Engineer and or Consultant;

.2 Any equitable adjustment to the Contract Sum shall be for the actual, necessary and reasonable costs of properly protecting any Work finished or partially finished during the period of the temporary suspension; provided, however, that no payment of profit and/or overhead shall be allowed on top of these costs; and

assurance evidencing to the Owner's satisfaction that adequate funds are available to pay the costs of removing, treating and disposing of such Waste or proper treatment of the environmental condition as required by Law.

- 4.9 **PROTECTION OF PRIVATE PROPERTY** - The SAWS has secured right-of-way and easements, as shown on the plans, to be occupied by the finished construction, with only such additional temporary construction easements as shown for use by the Contractor in carrying out his Work. The Contractor shall take proper measures to protect all property within all construction easements, and adjacent or adjoining property which might be injured by any process of construction; and, in case of any injury or damage, he shall restore at his own expense the damaged property to a condition equal to or better than that existing before such injury or damage was done, or he shall make good such injury or damage in a manner acceptable to the owner and/or private or public owner.
- .1 The Contractor shall immediately correct customer complaints for such items as, but not limited to, driveway access, mailboxes, privacy fences, public safety hazards, public nuisances, water and sewer services as directed by the SAWS COI.
 - .2 The Contractor shall not, except upon procuring written consent from proper private parties, enter or occupy with men, tools, materials, or equipment, any privately owned land except for those on easements provided herein by SAWS. Contractor must submit a copy of the easement agreement to SAWS.
 - .3 No permit shall be removed outside the permanent easement, except where expressly authorized in writing by the Owner and City of San Antonio. Any tree not authorized for removal shall be adequately protected against damage from construction operations. Contractor shall be responsible for any damage, destruction or other harm including but not limited to all costs, fees, or other expenses attributable thereto, caused to trees not authorized for removal that is due to or arise out of Contractor's Work at the Project.

ARTICLE V. CONTRACT RESPONSIBILITIES:

- 5.1 **OWNER-CONTRACTOR OBLIGATIONS** - The Owner and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. The Contractor shall not assign the Contract or sublet it as a whole without the prior written consent of the Owner, nor shall the Contractor assign any monies due or to become due to him hereunder, without the prior written consent of the Owner and in the manner established in Article 4.3 herein.
- 5.2 **OWNER'S RESPONSIBILITY** - Projects Contracted through other outside entities and containing utility work by SAWS shall be managed by the other entity with support by SAWS personnel. Contractor shall report directly to the other entity. Utility projects contracted through SAWS, which contain secondary street work, shall be managed by SAWS with support by other entity personnel. Contractor shall report directly to SAWS.
- .1 The design of this Project was performed by a professionally licensed Engineer who is an authorized representative of the Owner, who will exercise the authority and functions of the Owner as the project Consultant in the following respects:
 - .1 Provide Contractor with benchmarks.
 - .2 Checking of shop drawings furnished by the Contractor in compliance with Article 5.12 herein.
 - .3 Consultation and advice during construction and rendering those decisions requiring interpretation of the Plans and Specifications.
 - .4 Make visits to the Site at intervals appropriate to the various stages of construction operations to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, and to endeavor to guard the

- Owner against defects and the Work.
- .5 Assist in the Substantial Completion inspection.
 - .6 Assist in the final inspection.
 - .7 Assist in the preparation of the monthly and final quantity and pay estimates.
 - .8 Any terms and conditions of the consultant's Contract with the Owner shall be cumulative of the above.
- .2 Unless otherwise provided or ordered, all resident observation and inspection on all SAWS contracted projects will be performed by the SAWS COI, who will exercise the authority and functions of the Owner in the following respects:
- .1 Review laboratory, mill and shop tests of materials and equipment for general compliance with the Plans and Specifications.
 - .2 Observation and inspection of the authorized Work, and administration for the Owner, and review of all Work performed for general compliance with the Plans and Specifications.
 - .3 Stop the Work or any portion of the Work if Contractor fails to carry out the Work in accordance with the Contract, or fails to correct Work which is not in accordance with requirements of the Contract. However, the right of the SAWS to stop the Work as provided for in Article 4.8, will not give rise to a Claim for delay or to a duty on the part of the SAWS to exercise this right for the benefit of Contractor or any other person or entity. SAWS will provide the Contractor with a written explanation and detail for the stoppage of work.
 - .4 Review monthly and final quantity and pay estimates.
 - .5 Conduct substantial completion observation and inspection.
 - .6 Conduct final observation and inspection.
 - .7 Determine acceptability of the finally completed Work.
- .3 Quality Assurance Random sampling and testing of materials, inspection of laboratory testing processes and procedures for Quality Assurance purposes beyond those required to be performed at the expense of the Contractor under their Quality Control program in full compliance with 5.3 herein, may be performed by SAWS, at the expense of SAWS, in a certified commercial testing laboratory approved and designated by SAWS. The Contractor at their expense shall furnish assistance in obtaining and providing samples for SAWS Quality Assurance purposes.

5.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Quality Control - The Contractor agrees and understands that the Contractor is responsible for performing Quality Control inspection and testing services to assure Project compliance with Contract Documents. Sampling and testing of materials, laboratory inspection of materials and processes for quality control purposes shall be performed at the expense of the Contractor or Supplier by an independent commercial laboratory approved by the SAWS COI. All test reports and shop drawings shall be signed and sealed by a Texas Registered Professional Engineer and submitted to the SAWS COI. All structural members shall be marked or stamped individually with an identifying number for the purpose of cross-referencing all reports. All test reports and vendors' certifications for materials incorporated into the project shall be submitted in accordance to the latest revision of the International Building Code, as required by City Building Permit, with sufficient time in advance as to allow the Owner, Owner's representative, Consultant, Owner's Third Party Inspection Agency and City Building Officials to review and

approve materials, installation and placement prior to next stage of the project. Approval does not constitute or relieve the Contractor's obligation under this contract to fully comply with the specifications and building permit requirements.

- .2 The Contractor shall supervise and direct the Work using the best skill and attention. Any provision contained herein notwithstanding, the Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for the implementation of safety precautions and for coordinating all portions of the Work under this Contract.
- .3 The Contractor shall give the SAWS COI reasonable advanced notice of the readiness of any Work for observation/inspection, and when practicable, twenty-four (24) hours notice. If any underground Work is performed without the proper prior notification to the COI, it shall be uncovered for observation/inspection and properly restored at the Contractor's expense.
- .4 If the Contractor, in the course of the Work, finds any discrepancies between the Plans and the physical conditions of the locality, or any errors or omissions in the Plans or the layout as given by survey points and instructions, he shall immediately inform the SAWS COI and Consultant, with a RFI, and the Consultant and/or Engineer shall promptly investigate the same. Any Work impacted by the discrepancy performed by Contractor after such discovery, until authorized, will be done at the Contractor's risk and/or expense.
- .5 Contractor's Risk and Inventory - Contractor shall be responsible for the complete, timely, performance of the Work under this Contract and compliance with the Contract Documents. Contractor shall be responsible for the safe storage and inventory control of all materials paid by SAWS as "materials on site", on the project site and/or within off site bonded/insured storage facilities either owned or leased by the Contractor. Contractor shall allow full access, seven days a week, 24 hours, to storage facilities, whether on site or off site, as requested by SAWS COI. Contractor shall protect materials and Work from all theft, loss, vandalism, or damage from any cause whatsoever until final Project completion by Contractor and acceptance by Owner; and shall deliver said Work and improvements to the SAWS in a completed and acceptable condition in accordance with the Contract Documents.
- .6 It is the intention of the SAWS to be sensitive to the needs and concerns of the citizenry. It is the Contractor's responsibility to adhere to this policy to the best of his ability. The Contractor, subcontractor and his employees should, whenever possible, address citizen inquiries about the project, provide names and numbers of SAWS personnel, relay citizen complaints, and provide continuous access to the citizen's property.
- .7 Permits - Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, including review fees, inspections, and licenses. Owner shall reasonably assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay any and all charges, fees and costs necessary for obtaining permits for the prosecution of the Work. The contractor shall be responsible for all costs associated with registering with the City of San Antonio Right of Way Office (COSA ROW), applying and obtaining COSA ROW Street cut permit(s) as required for the project and shall keep the permit active during the course of the work. Contractor is also responsible for the initial permit, permit renewals, expedited permits and any and all costs inclusive of but not limited to COSA ROW inspection fees, penalties and/or any and all fees associated with the permit. To register the contractor should contact the COSA ROW office at 210-207-6949.
- .8 Project Sign – Each Project Specification will contain a detailed requirement for Project signage that identifies the site and Work to general citizenry.
- .9 Pre-Construction and Post-Construction Videos – The Contractor shall provide pre-construction videos prior to commencement of the project in accordance with standard specification for construction Item No. 1114, Pre-Construction Videos. The video shall identify the condition of all existing surface features within the project limits. The Contractor shall submit two copies of the completed video prior to request for mobilization. The Contractor shall also submit two copies of the completed post-construction video of all surface features within the project limits within ten (10) days following the date of substantial completion.

- .10 Large Water Main Shut Downs: Projects that include a Large Water Main (16-inches and larger), will require advance coordination from the Contractor with Owner, with a minimum of two weeks' notice to Owner prior to the desired shut down date. The Contractor is to have all material and equipment on site and have the necessary prep work done in order to minimize the shutdown period required for the tie in Work. Mains Larger than 16-inches that will be required to be shutdown throughout the year may (as solely determined by Owner) require a temporary water main, valves and other appurtenances to keep the water main in service. The size of the temporary water main will be determined by Owner and shown on the plans by the Consultant or as Directed by Owner.
 - .11 Water and Sewer Service to Customers – the Contractor shall maintain uninterrupted service to SAWS customers at all times.
 - .12 Contractor will abide by all applicable policies and regulations of Owner with respect to conduct, including smoking, parking of vehicles, security regulations and entry to adjacent facilities owned by the Owner.
 - .13 Independent Contractor - In performing the Work under this Contract, the relationship between Owner and Contractor is that of an independent Contractor. Contractor shall exercise independent judgment in performing the Work and solely is responsible for setting working hours, scheduling and/or prioritizing the Work flow and determining the means and methods of performing the Work, subject only to the requirements of the Contract Documents. No term or provision of this Contract shall be construed as making Contractor an agent, servant or employee of Owner or making Contractor or any of Contractor's employees, agents or servants eligible for the fringe benefits, such as retirement, insurance and worker's compensation which Owner provides to its employees.
- 5.4 SUPERINTENDENT - The Contractor shall keep on-site for the Project during its progress a competent Superintendent, able to communicate fluently in English, and any necessary assistants, all satisfactory to the Owner. A Superintendent shall be identified in writing to the Owner at the pre-construction meeting. The Superintendent shall represent the Contractor and all directions given to the Superintendent shall be binding on the Contractor. Oral directions from the SAWS representatives involving critical situations or Work elements shall be immediately (as may be reasonable under the circumstances and in accordance with the Contract Documents), confirmed in writing by Owner to the Contractor. The Contractor's Superintendent shall provide full-time on-site supervision to any Work ongoing at the site by its own forces or subcontractors, using the best industry skill and attention. The Contractor's Superintendent shall not be replaced without first providing written notice to the Owner. The written notice provided to the Owner shall contain the credentials for their proposed replacement Superintendent. The Owner will review the credentials supplied and if in the Owners discretion they are appropriate for the work, approve the proposed replacement Superintendent. The Superintendent may not be employed on any other project prior to Final Completion of the Work, without the approval of the Owner, which approval will not be unreasonably withheld.
- 5.5 INCIDENTAL WORK, CONNECTIONS AND PASSAGEWAYS - The Contractor shall perform all incidental Work necessary to complete this Contract, including, but not by way of limitation, the following: Contractor shall make and provide all suitable reconnections with existing improvements as are necessarily incidental to the proper completion of the Project; Contractor shall provide passageways or leave open such thoroughfares in the Work area as may be reasonably required by SAWS and shall protect and guard same at Contractor's own risk, and shall continuously maintain the Work area in a clean, safe and workmanlike manner.
- 5.6 CONDITIONS AT SITE
- .1 Contractor declares that prior to the submission of the Bid Proposal on this Contract, the Contractor has thoroughly examined the location(s) of the Work to be performed, has become familiar through their own investigation with any and all conditions, including but not limited to typical local geophysical conditions at or near this Project, and has read and has thoroughly understood the "Contract Documents" and any other document made available prior to the bid

opening, as they may relate to the physical conditions prevalent or likely to be encountered in the performance of the Work at such location(s). Any testing, boring, soil profiles and water elevations shown on Contract Documents, or otherwise provided, were obtained solely for the use of SAWS in the preparations of its plans and the Contractor is cautioned, and SAWS MAKES NO WARRANTY OR REPRESENTATION, AS REGARDING THE ACCURACY OF SUCH DATA AND THE CONTRACTOR SHOULD MAKE NO RELIANCE THEREON IN DETERMINING CONTRACTOR'S MEANS AND METHODS OF CONSTRUCTION. Contractor, by the performance of the above, hereby generally acknowledges that such "Contract Documents" are not obviously deficient and will enable the Contractor to accomplish the proper performance of the Work at the Project site.

- .2 The Contractor shall immediately, and before such discovered conditions and/or structures are disturbed, notify the Owner with a RFI of (1) subsurface or latent physical and/or structural conditions at the site differing materially from those indicated in the Plans, Specifications, and other Contract Documents or (2) newly discovered, unknown physical conditions at the site of an unusual nature differing materially from those geophysical conditions typically encountered in the type Work being performed and generally being recognized as not indigenous to the Texas environs and are not indicative of otherwise disclaimed in the plans, Specifications, and Contract Documents. The Owner, or designated representative, shall promptly investigate the reported physical and/or structural conditions, and shall determine whether or not the physical and/or structural conditions do materially so differ and whether they cause an increase or decrease in the Contractor's cost of, and/or the time required for performance of any part of the Work under this Contract. In the event that the Owner in its reasonable determination finds that the physical and/ or structural conditions do materially so differ from the provisions of the Contract Documents, a negotiated, equitable, adjustment may be made to either the Contract Time or Contract Sum, or both as in the Owner's determination is reasonable, and a Contract Change Order shall be issued in writing accordingly.
- .1 No claim of the Contractor under this Article shall be allowed unless the Contractor has given the written notice called for above, prior to disturbing the discovered conditions and/or structures.
- .2 Any other provision contained herein notwithstanding, no claim by the Contractor for an equitable adjustment to the Contract Time or Contract Sum, or both, shall be allowed if claimed by the Contractor after Final Payment as defined in Article 7.3 herein has been made by the SAWS to the Contractor under the terms of this Contract.

5.7 CONTRACTOR'S STANDARD COMMERCIAL INSURANCE SPECIFICATIONS AND CERTIFICATE OF LIABILITY INSURANCE REQUIREMENTS

- .1 Commercial Insurance Specifications ("Insurance Specifications"):
 - .1 Commencing on the date of this Contract, the Contractor shall, at his own expense, purchase, maintain and keep in force such lines of insurance coverage as will protect him and the San Antonio Water System ("SAWS") and the City of San Antonio ("the City") and their employees and agents from claims, which may arise out of or result from his operations under this Contract, whether such operations are by himself, by any sub-contractor, supplier or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable, including, without limitation, the following lines of insurance coverage:
 - .1 Workers' Compensation (WC) insurance that will protect the Contractor, SAWS and the City from claims under statutory Workers' Compensation laws, disability laws or such other employee benefit laws and that will fulfill the requirements of the jurisdiction in which the work is to be performed.

This line of insurance coverage shall be endorsed to provide a Waiver of Subrogation in favor of SAWS and the City of San Antonio with respect to both this insurance coverage and the Employers' Liability (EL) insurance (as specified immediately

below in Article 1.1.2).

- .2 Employers' Liability (EL) insurance (Part 2 under the standard Workers' Compensation insurance policy) that will protect the Contractor, SAWS and the City for damages because of bodily injury, sickness, disease of vendor's employees apart from that imposed by Workers' Compensation laws.

The EL line of insurance coverage shall have minimum policy limits of liability of not less than:

\$1,000,000.00 Bodily Injury by Accident
\$1,000,000.00 Bodily Injury by Disease - Each Employee
\$1,000,000.00 Bodily Injury by Disease - Policy Limit

- .3 Commercial General Liability (CGL) insurance that will protect the Contractor, SAWS and the City from claims for damages because of bodily injury, personal injury, sickness, disease or death and insurance that will protect the Contractor, SAWS and the City from claims for damages to or destruction of tangible property of others, including loss of use thereof.

This line of insurance coverage shall:

- Cover independent Contractors;
- Not include any exclusions relating to blasting, explosion, collapse of buildings or damage to underground property;
- The GENERAL AGGREGATE limit shall apply per Project;
- Afford coverage for Products Liability and/or Completed Operations and, Contractual Liability.

The minimum policy limits of liability for this line of insurance coverage shall be:

\$1,000,000.00 Occurrence Limit
\$2,000,000.00 General Aggregate
\$2,000,000.00 Products/Completed Operations Aggregate
\$1,000,000.00 Personal and Advertising Injury
\$1,000,000.00 Contractual Liability

This line of insurance coverage shall be endorsed:

- Additional Insured - The Commercial General Liability policy shall be endorsed naming the SAWS and the City of San Antonio as an Additional Insured for both ongoing and completed operations, and
- Waiver of Subrogation - The Commercial General Liability policy shall be endorsed with the Waiver of Subrogation in favor of SAWS and the City of San Antonio.

OR

- .4 Owner and Contractor Protective Liability (OCP) Insurance policy which insures SAWS and the CITY and their agents and employees with the same coverage specified in Article 5.7.1.1.3 above unless the CGL policy specified in Article 5.7.1.1.3 above includes the Endorsement CG2503 - per project general aggregate limit applies.

- .5 Commercial/Business Automobile Liability (AL) insurance that will protect the Contractor, SAWS and the City from claims for damages arising out of the maintenance, operation, or use of any owned, non-owned or hired vehicles.

Minimum policy limits of liability for this line of insurance coverage for bodily injury and property damage combined shall be not less than \$1,000,000.00 per each occurrence.

This line of insurance coverage shall be endorsed:

- Additional Insured - The Commercial/Business Automobile Liability policy shall be endorsed naming the SAWS and the City of San Antonio as an Additional Insured; and
- Waiver of Subrogation - The Commercial/Business Automobile Liability policy shall be endorsed with the Waiver of Subrogation in favor of SAWS and the City of San Antonio.

- .6 Excess/Umbrella Liability (UL) insurance shall have minimum policy limits of \$2,000,000 per occurrence and \$2,000,000 in the aggregate. This policy shall be of an "Occurrence" type and the limit of liability shall be concurrent with (following form) and in excess of the EL, CGL, and AL lines of insurance coverage as described in Articles 5.7.1.1.2, 5.7.1.1.3, and 5.7.1.1.5 listed above.

NOTE - For the Excess/Umbrella Liability policy, describe in the Description of Operations section of the Certificate of Liability Insurance ("Certificate"), the coverage form under which this line of coverage is written – either:

- Umbrella liability form; or
- Excess Liability form.

This line of insurance coverage shall be endorsed:

- Additional Insured - The Commercial General Liability policy shall be endorsed naming the SAWS and the City of San Antonio as an Additional Insured for both ongoing and completed operations.
- Waiver of Subrogation - The Commercial General Liability policy shall be endorsed with the Waiver of Subrogation in favor of SAWS and the City of San Antonio.

- .7 Contractor's Pollution Liability Insurance with limits of \$2,000,000 per claim/occurrence/\$2,000,000 in the aggregate.

The policy shall provide either a "claims made" or an "occurrence based" coverage for all claims, liabilities, damages, costs, fees, and expenses of any kind or character arising out of any Pollution Condition(s) (as defined below) that is in any way related to Contractor's operations, actions or inactions, and completed operations associated with any work performed by Contractor, its subcontractors, or any of their respective employees, agents, representatives, or officers under this Contract.

If the Policy is "claims made" based, coverage must be maintained for a minimum of twenty-four (24) months after the date that a Conditional Letter of Acceptance is issued, or if the Contract is terminated for any reason, for a minimum of twenty-four (24) months following the date of termination.

The “claims made” policy retroactive date will be no later than the Contract effective date or the project commencement date, whichever is earliest.

If the Policy is “occurrence based”, no policy retroactive date is required and, the twenty-four (24) months extension of coverage after the date that a Certificate of Completion is issued, or if the Contract is terminated for any reason, is not required.

Any exceptions to the above cited coverage forms must be reviewed and approved by SAWS Risk Manager.

Pollution Condition(s) means the discharge, dispersal, release or escape of any solid, liquid, gaseous or thermal irritant or contaminant, including, but not limited to, smoke, sewage, vapors, soot, fumes, acids, alkalis, toxic chemicals, medical waste and waste materials into or upon land, the atmosphere or any watercourse or body of water, including groundwater, provided such conditions are not naturally present in the environment in the amounts or concentrations discovered.

The Contractor’s Pollution Liability Insurance will pay on behalf of the Contractor, SAWS and the City all claims, demands, damages, liabilities, costs, fees, and expenses of any kind or character for bodily injury or death, property damage, environmental or natural resource damage, and any fines, fees, assessments or penalties of any kind assessed by any governmental department, agency or commission that result from or are related to a Pollution Condition(s). Coverage will include all subcontractors hired by Contractor to perform any work on the Project or under this Contract.

The policy shall also include the following coverage provisions:

- .1 Provide for bodily injury to include physical injury, sickness, disease, mental anguish and emotional distress sustained by any person, including death;
- .2 All costs that are related to or that arise out of or from the investigation or adjustment of any claim or in connection with any court, arbitration, mediation, state administrative hearing, or other proceeding of any kind, including attorneys fees, expert witness fees, costs, charges and expenses of any kind or character, that arise out of or that are related to a Pollution Condition(s);
- .3 Coverage shall be Primary and in addition to any other valid and collectible insurance carried by SAWS and the CITY as respects to this Contract;
- .4 Coverage for Natural Resource Damages and any fines, fees penalties or assessments by any governmental agency, commission or department related to any Pollution Condition(s);
- .5 Insured versus Insured exclusion, if found in the policy, shall not apply to a claim by an Insured who qualifies as a Client of the Named Insured under the policy;
- .6 If Non-Owned Disposal sites are used for disposal of wastes, these sites shall be specifically included under the Contractors Pollution Liability Insurance policy; and
- .7 Coverage for punitive, exemplary, and multiple damages.

Commercial/Business Automobile Liability policy of the CONTRACTOR hauling excavated spoil shall either be endorsed to provide coverage under

the CA-9948 endorsement or the Contractor's Pollution Liability Insurance policy shall be endorsed to provide transportation coverage beyond the boundaries of the job site.

NOTE - For the Contractor's Pollution Liability, declare on the Certificate of Liability Insurance ("Certificate") the coverage form under which this line of insurance is written – either:

- Claims-made form - if the coverage form declared on the Certificate is the Claims-made form, also include on the Certificate the "Retroactive-date" when this line of coverage was first written or started, or the Contract date or the project commencement date, whichever is earliest; or
- Occurrence based form – no additional wording required.

- .8 All Risk Builders' Risk (*if applicable*) - In the event, the project contracted for herein requires the building of structures or facilities used for storage, housing equipment or the occupancy of personnel, the Contractor shall provide Physical Damage Insurance on Builder's Risk Form which insures SAWS and the City for damages to all Property Purchased for, or Assigned to, the Project commencing on the start date through completion. Policy limits shall be in an amount equal to the total construction cost contracted herewith. The policy form shall be an All Risk Builders' Risk form and shall include the flood and earthquake endorsements.
- .2 Contractor shall require all Sub-contractors to carry lines of insurance coverage appropriate to their Scope of Work performed.
- .3 Contractor agrees that with respect to the above required lines of insurance, all insurance policies are to contain or be endorsed to the extent, not inconsistent with the requirements of the issuing insurance carrier, to provide for an endorsement that the "other insurance" clause shall not apply where SAWS and the City are an Additional Insured shown on the policy if such endorsement is permitted by law and regulations.
- .4 Contractor shall, upon request of SAWS, provide copies of all insurance policies and endorsements required under Contract.
- .5 Contractor is responsible for the deductibles under all lines of insurance coverage required by these Insurance Specifications.
- .6 The stated policy limits of each line of insurance coverage required by these Specifications are MINIMUM ONLY and it shall be the Contractor's responsibility to determine what policy limits are adequate and the length of time each line of insurance coverage shall be maintained; insurance policy limits are not a limit of the Contractor's liability.
- .7 These minimum limits required of each line of insurance coverage may be either basic policy limits of the WC, EL, CGL and AL or any combination of basic limits or umbrella (Umbrella liability form) or excess (Excess Liability form) limits. SAWS acceptance of Certificate(s) that in any respect, do not comply with these Insurance Specifications, does not release the Contractor from compliance herewith.
- .8 Each line of insurance coverage that is required under these Insurance Specifications shall be so written so as to provide SAWS and the City thirty (30) calendar days advance written notice directly of any suspension, cancellation or non-renewal or material change in coverage, and not less than ten (10) calendar days advance written notice for nonpayment of premium.
- .9 Within five (5) calendar days of a suspension, cancellation or non-renewal of any required

line of insurance coverage, the Contractor shall provide SAWS a replacement Certificate with all applicable endorsements included. SAWS shall have the option to suspend the Contractor's performance should there be a lapse in coverage at any time during this Contract.

- .10 Failure to provide and to maintain the required lines of insurance coverage shall constitute a material breach of this Contract.
- .11 In addition to any other remedies, SAWS may have, upon the Contractor's failure to provide and maintain any insurance or policy endorsements to the extent and within the time herein required, SAWS shall have the right to order the Contractor to stop performing services hereunder and/or withhold any payment(s) which become due to the Contractor hereunder until the Contractor demonstrates compliance with the Insurance Specifications hereof.
- .12 Nothing herein contained shall be construed as limiting, in any way, the extent to which the Contractor may be held responsible for payments for damages to persons or property resulting from the Contractor 's or its sub-contractors' performance of the services covered under this Contract.
- .13 It is agreed that the Contractor's insurance shall be deemed primary and non-contributory with respect to any insurance or self insurance carried by SAWS, the City and their employees and agents for liability arising out of operations under this Contract.
- .14 Contractor agrees that all lines of insurance coverage required by these Insurance Specifications shall be with insurance companies, firms or entities that have an A.M. Best rating of "A- ("A"- minus)" and a Financial Size Category of a "VII" or better. All lines of insurance coverage shall be of an "Occurrence" type except for the Contractor's Pollution Liability line of insurance coverage.

SAWS will accept worker's compensation insurance coverage written by the Texas Workers Compensation Insurance Fund.

- .15 SAWS reserves the right to review the above stated Insurance Specifications during the effective period of this Contract and any extension or renewal hereof and to request modification of lines of insurance coverage and their respective liability limits when deemed necessary and prudent by SAWS' Risk Manager and Legal Department based upon changes in statutory law, court decisions, or circumstances surrounding this Contract.

In no instance will SAWS and the City allow modification whereupon SAWS and the City may incur increased risk exposure.

.2 Certificate(s) of Liability Insurance ("Certificate") Requirements

Prior to the commencement of any Services under this Contract and once notified by SAWS Contracting Official that your Company has been selected as the apparent successful Contractor pursuant to a competitive bid selection process, pending Board final approval, and, a request is made for you to submit your Company's Certificate of Liability Insurance, that Certificate must meet all of the following requirements:

- .1 The Contractor shall have completed by its insurance agent(s), and submitted to SAWS Contracting Department within 5 business days, a Certificate(s) of Liability Insurance ("Certificate(s)") providing evidence of the lines of insurance coverage pursuant to Articles 5.7.1.1 through 5.7.1.5 above.
- .2 The original Certificate(s) or form must include the agent's original signature, including the signer's company affiliation, mailing address, Office and FAX phone numbers, email address, and contact person's name; and, be mailed, with copies of all applicable endorsements, directly from the insurer's authorized representative in strictly compliance with Articles 5.7.2.1.6 (Certificate Holder) and Articles 5.7.2.1.7

(Distribution of Completed Certificates) below.

- .3 SAWS will not accept Memorandum of Insurance or Binders as proof of insurance.
- .4 SAWS shall have no duty to pay or perform under this construction Contract until such certificate(s) and applicable endorsements have been received, reviewed and deemed 100% compliant with the CONTRACTOR'S STANDARD COMMERCIAL INSURANCE SPECIFICATIONS AND CERTIFICATE OF LIABILITY INSURANCE REQUIREMENTS as contained in the Bid Document by SAWS' Risk Management/Contract Services Department. No one other than SAWS Risk Manager shall have authority to waive any part of these requirements.
- .5 The SAWS Project/Contract number(s) along with its Project Name must be included in the Description of Operations section located in the bottom half of the standard ACORD Certificate forms.
- .6 Certificate Holder - SAWS shall be shown as the Certificate Holder in the Certificate Holder section located in the bottom half of the standard ACORD Certificate forms and formatted as follows:

San Antonio Water System
c/o Ebix BPO
PO Box 12010-ZD
Ref. # (SAWS Contract/Project #)*
Hemet, CA 92543

**SAWS Contracting Official will include in the above address, the correct, complete Ref# in the written confirmation of your selection as a CONTRACTOR pending final Board approval.*

DO NOT BEGIN THE DISTRIBUTION OF ANY CERTIFICATE(S) BEFORE RECEIVING AND INSERTING THE COMPLETE REFERENCE NUMBER INTO THE CERTIFICATE HOLDER ADDRESS SHOWN ABOVE.

- .7 Distribution of Completed Certificates - Completed Certificates shall be distributed by the Contractor as follows:

- .1 Send Original:

- .1 By Mail:

San Antonio Water System
C/O Ebix BPO
PO Box 12010-ZD
Ref. #(Same as the Certificate Holder name/address shown above.)
Hemet, CA 92543

- .2 By Fax: 1-770-325-6502

- .3 By E-Mail: saws@Ebix.com

- .4 To Upload Online: <http://www.ebixcerts.com> (preferred method)

- .2 Send Copy to:

San Antonio Water System
Attention: Contract Administration
P.O. Box 2449
San Antonio, TX 78298-2449

- .8 Contractor shall be responsible for obtaining Certificates of Insurance from the first tier Sub-contractor, and upon request furnish copies to SAWS.

.3 SURVIVAL

Any and all representations, conditions and warranties made by Contractor under this Contract including, without limitation, the provisions of Articles 5.7.1.1.2, 5.7.1.1.3 and 5.7.1.1.4 of these COMMERCIAL INSURANCE SPECIFICATIONS AND CERTIFICATES OF LIABILITY INSURANCE REQUIREMENTS are of the essence of this Contract and shall survive the execution and delivery of it, and all statements contained in any document required by SAWS whether delivered at the time of the execution, or at a later date, shall constitute representations and warranties hereunder.

5.8 MATERIALS & WORKMANSHIP

- .1 MATERIALS - Unless otherwise specified, all materials incorporated in the permanent Work shall be new, and both workmanship and materials shall be of good quality in accordance with Specifications. The Contractor shall, if required, furnish satisfactory evidence as to the supply or manufacture, and quality of materials supplied. All materials that come in direct or indirect contact with potable water must conform to ANSI/NSF Standard 60 for direct additives and ANSI/NSF 61 for indirect additives and must be in full compliance with all current regulations of the TCEQ and any other applicable regulatory requirements.
 - .2 USE OF MATERIALS WITHIN THE RIGHT-OF-WAY - The Contractor, with the approval of the SAWS COI, may use in the Work any suitable stone, gravel, or sand found in the excavation that otherwise meets or exceeds Contract Specifications. The Contractor shall not over excavate any material from within the right-of-way, which is not within the excavation limits as required under the plans and specifications. Any over excavation will be at the contractor expense. No recycled concrete shall be used.
 - .3 SALVAGEABLE MATERIAL - Salvageable material, as stated by the Contract documents, shall remain the property of the Owner and shall be relocated and stored at the job site by the Contractor unless the Contract Document provide for storage elsewhere.
 - .4 DISPOSAL OF NON-HAZARDOUS WASTE MATERIAL/SUBSTANCES - The Contractor shall be responsible for disposing of all Non-Hazardous Material as the term is defined in Article I herein including old concrete or any other non-hazardous material which is required to be removed from the project. Such material shall not be deposited in any sanitary sewer, creek, river, watercourse or MS4, (unless a written exception is approved by Owner) as the term is defined herein.
 - .5 DISPOSAL OF HAZARDOUS MATERIAL/SUBSTANCES - The Contractor shall be responsible for disposing of all hazardous materials/substances, as that term is defined in Article I herein in accordance with all applicable Federal, State and local laws, rules, regulations or ordinances, and in accordance with any specific instructions set out in the Plans and Specification herein.
 - .6 RECLAMATION OF LOW AREAS - The Contractor may undertake the reclamation of low areas with the prior approval of the Owner.
 - .7 BLOCKAGE OF THE MS4 - The Contractor shall comply with the provisions of the appropriate City Ordinances. In no event shall the Contractor block any portion of the MS4 with fill. Should any blockage occur the Contractor shall remove such fill, at contractor's expense, as directed by the SAWS COI.
- 5.9 TESTING - The Owner or the Consultant may require special inspection, testing or approval of material or Work for determining compliance with the requirements of the Contract Documents. Upon Owner-authorized direction of the Consultant, the Contractor shall promptly arrange for such special testing, inspection or approval procedure. Should the material or Work fail to comply with the requirements of the Contract Documents, the Contractor shall bear all costs of the special testing, inspection or approval as well as the cost of replacement of any unsatisfactory material or Work as

provided by Article 5.10, otherwise, should the Work prove not defective, the Owner shall bear such costs and an appropriate Change Order shall be issued.

5.10 REMOVAL OF DEFECTIVE WORK - If any materials furnished under this Contract fails to perform in the manner such material is expected to perform in accordance with intended usage, the Contractor shall proceed to remove from the Project at his sole expense all such materials, whether worked or unworked, and to remove all portions of the condemned Work.

5.11 EQUAL MATERIALS - It is not the intent of the Specifications to unreasonably limit materials to the product of any particular manufacturer or supplier. Where definite materials, equipment and/or fixtures have been specified by name, manufacturer or catalog number, it has been done so as to set a definite standard and/or a reference for comparison as to quality, application, physical conformity, and other characteristics. It is not the intention to discriminate against or prevent any dealer, jobber or manufacturer from furnishing materials, equipment, and/or fixtures that meet or exceed the characteristics of the specified items. Unless otherwise provided for in the Specifications, Contractor's substitution of materials, equipment and/or fixtures shall not be made without prior written approval from the Consultant, and the Owner Request for substitutions will not be accepted from anyone except the Contractor, and such requests will not be accepted (if appropriate) until after the Contract has been awarded.

5.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Shop Drawings, Product Data, Samples and similar submittals are not part of the Contract. The purpose of their submittal is to demonstrate, for those portions of the Work for which submittals are required by the Contract Documents, the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.

.2 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Engineer/Consultant Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor will be returned by the Engineer/Consultant without action. Contractor shall submit to Engineer/Consultant for review and approval or for other appropriate action, five (5) hard copies and/or electronic copies, if requested by COI, of all Shop Drawings, Product Data, Samples or similar submittals bearing a stamp or specific written indication that Contractor has satisfied the Contractor's responsibilities under the Contract Documents with respect to his review of his submission. All Shop Drawings, Product Data, Samples and similar submittals in regards to Pipeline Projects shall be provided to the Engineer/Consultant during pre-construction meeting.

.1 By approving and submitting Shop Drawings, Product Data, Samples and similar Submittals, the Contractor represents that the Contractor has determined and verified materials, quantities, specified performance criteria, installation requirements, catalog numbers, field measurements and filed construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

.2 Contractor shall give Engineer/Consultant specific written notice of each variation that the Shop Drawings, Product Data, Samples and similar submittals may have from the requirements of the Contract Documents, and, in addition, shall cause a specific Contractor notation to be made on each Shop Drawing, Product Data, Sample and similar submittals submitted to Consultant for review, approval, or other appropriate action highlighting each such variation.

.3 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Engineer/Consultant. The Engineer/Consultant will review and return such submittals within twenty (20) calendar days or within a reasonable period so as to not delay the project.

- .4 Engineer/Consultant's review, approval, or other appropriate action regarding Contractor's submissions will be only to check conformity with the design concept of the Project and for compliance with the information contained in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate component item will not indicate approval of the assembly into which the item is functionally integrated. Contractor shall make corrections required by Engineer/Consultant, and shall return the required number of corrected copies of Shop Drawings, Product Data, Samples or similar submittals to the Contractor. Contractor may be required to resubmit as required revised Shop Drawings, Product Data, Samples or similar submittals for further review and approval. Contractor shall direct specific attention in writing to any new revisions not specified by Contractor on previous Contractor submissions.
- .3 The Work shall be in accordance with approved submittals, except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer/Consultant's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer/Consultant in writing of such deviation at the time of submittal and (1) the Engineer/Consultant has given written approval regarding the specific deviation as a minor change in the Work, or (2) a Change Order or Field Work Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Engineer/Consultant's approval thereof.
- .4 Where Engineer/Consultant requires by written request an approved Contractor Shop Drawing, Product Data, Sample, or similar submittals any related Work performed by Contractor prior to Consultant's review and approval of the affected submission will be at the sole risk of Contractor.
- .5 The Contractor shall not be required to provide professional services which constitute the practice of architecture or Engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Engineer/Consultant will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Engineer/Consultant. The Owner and the Engineer/Consultant shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided the Owner and Engineer/Consultant have specified to the Contractor all performance and design criteria that such services must satisfy. The Engineer/Consultant will review, approve or take other appropriate action on submittals only for the limited purpose of checking of conformance with information given and the design concept expressed in the Contract Documents.

5.13 CONTRACTOR'S WORK PROGRESS SCHEDULE

- .1 The "Work Progress Schedule" and successive updates or revisions thereof are for the Contractor's use in managing the Work. The Work Progress Schedule is for the information of the Owner and to demonstrate that the Contractor has complied with requirements for planning

the Work. The Owner's acceptance of a schedule and schedule updates or revisions constitutes the Owner's agreement to coordinate its own activities with the Contractor's activities as shown on the schedule. The Contractor shall provide a Work Progress Schedule to the Owner within ten (10) calendar days after receipt of the Authorization to Proceed.

- .1 Acceptance of the Work Progress Schedule, or update and/or revision thereto, does not indicate any approval of the Contractor's proposed sequences and duration.
 - .2 Acceptance of a Work Progress Schedule update or revision indicating early or late completion does not constitute the Owner's consent to any changes, alter the terms of the Contract, waive either the Contractor's responsibility for timely completion, or waive the Owner's right to damages for the Contractor's failure to do so.
- .2 The Contractor's scheduled dates for completion of any activity or of the entire Work do not constitute a change in terms of the Contract. Change Orders are the only method of modifying the completion date(s) and Contract Times.
 - .3 Submittal of a schedule, schedule revision or schedule update constitutes the Contractor's representation to the Owner, as of the date of the submittal; of the accurate depiction of all progress to date and that the Contractor will follow the schedule as submitted in performing the Work.
 - .4 The Contractor shall provide a Work Progress Schedule to the Owner within ten (10) calendar days after receipt of the Authorization to Proceed. The schedule shall show the order in which the Contractor proposes to carry out the Work and the anticipated start and completion dates of each phase of the Work.
 - .5 The Work Progress Schedule must indicate the times (number of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents or "Hold Points" designated by the Owner during the review process, identify the "Critical Path" for completing the Work, identify when all Subcontractors will be utilized, and take into consideration any limitations on Working Hours. This Work Progress Schedule, a copy of which shall be made available at the job site(s), must contain sufficient detail to indicate that the Contractor has properly identified required Work elements and tasks, has provided for a sufficient and proper workforce and integration of Subcontractors, has provided sufficient resources and has considered the proper sequencing of the Work required to result in a successful Project that can be completed within the Contract time. Contractor's submitted Work schedule shall be in a detailed, precedence-style critical path management Microsoft Project or Primavera format, satisfactory to the Owner and the Engineer/Consultant.
 - .6 Schedule Updates - The Work Progress Schedule and the Submittal Schedule shall be updated monthly, as a minimum, to reflect progress to date and current plans for completing the Work. A paper and an electronic copy of the update shall be submitted to the Engineer/Consultant as directed. The Owner has no duty to make progress payments unless accompanied by the updated Work Progress Schedule. The anticipated date of Substantial Completion shall show all extensions of time granted through Change Order(s) as of the date of the update. The Contractor, after coordination and consultation with the Owner, may revise the Work Progress Schedule logic only with the Owner's concurrence, which will not be unreasonably withheld, when, in the Contractor's judgment, it becomes necessary for the management of the Work. The Contractor shall identify all proposed changes to schedule logic to Owner and to the Engineer/Consultant via an Executive Summary accompanying the updated schedule for review prior to implementation of any revisions. If the Contractor's operations are materially affected by changes in the Plans or in the amount of Work, or if he has failed to comply with the anticipated progress, the Contractor shall submit a revised schedule reflecting the change in progress, within five (5) calendar days of the occurrence of such event. The schedule may also be revised by the Contractor in response to the reasonable request of the Owner.
 - .1 Each schedule shall segregate the Work into a sufficient number of activities to facilitate the efficient use of critical path method scheduling by the Contractor, Owner, and

Engineer/Consultant. Each schedule activity shall be assigned a cost value consistent with the Schedule of Values so as to allow the Owner and Contractor to project cash flow for the Project.

- .2 Each schedule shall include activities representing manufacturing, fabrication, or ordering lead time for materials, equipment, or other items for which the Engineer/Consultant is required to review submittals, shop drawings, product data, or samples.
- .3 Each schedule, other than the initial schedule, shall indicate the activities, or portions thereof, which have been completed; shall reflect the actual time for completion of such activities; and shall reflect any changes to the sequence or planned duration of all activities.
- .4 If any updated schedule exceeds the time limits set forth in the Contract Documents for Substantial Completion of the Work, the Contractor shall include with the updated schedule a statement of the reasons for the anticipated delay in Substantial Completion of the Work and the Contractor's planned course of action for completing the Work within the time limits set forth in the Contract Documents. If the Contractor asserts that the failure of the Owner or the Engineer/Consultant to provide information to the Contractor is the reason for anticipated delay in completion, the Contractor shall also specify what information is required from the Owner or Engineer/Consultant.
- .5 Neither the Owner nor the Contractor shall have exclusive ownership of float time in the schedule, and all float time (if any) shall inure to the benefit of the project. The Contractor agrees to use its best efforts not to sequence the Work or assign activity duration so as to produce a schedule in which more than one-fourth of the remaining activities have no float time.
- .7 Submission of any schedule under this Contract constitutes a representation by the Contractor that as of the date of the submittal: (1) the schedule represents the sequence in which the Contractor intends to prosecute the remaining Work; (2) the schedule represents the actual sequence and duration used to prosecute the completed Work; (3) that to the best of its knowledge and belief the Contractor is able to complete the remaining Work in the sequence and time indicated; and, (4) that the Contractor intends to complete the remaining work in the sequence and time indicated.
- .8 The Contractor shall submit in conjunction with his monthly request for payment, a copy of the current adjusted Work Progress Schedule showing the progress of the Work to date. If it is determined by Owner that the Contractor is not maintaining his anticipated progress, then the Owner may withhold approval of the monthly progress payment as provided in Article 7.2.

5.14 SEQUENCE OF CONSTRUCTION

- .1 PHASES OF CONSTRUCTION - The Contractor shall perform the Work as provided in the "Special Conditions" or as shown on the Contract Documents. The Contractor may submit to Owner a revised Contractor Phasing Plan prior to start of construction for review and approval by the Owner. If the Owner determines that the revised Contractor's Phasing Plan is not acceptable as being in the best interest of the Owner, then the Contractor shall proceed with the Work in accordance with the Owner's Phasing Plan at no additional cost to the Owner.
- .2 DETOUR ROUTES - A detour route for through traffic (the means and methods of which as to be determined by the Contractor) must be provided by the contractor where the proposed construction is located within the limits of a street designated as "Collector", "Secondary" or Primary". The detour route must be approved by the ROW owner, such approval to be obtained by Contractor prior to construction. The Contractor shall not begin construction of the Project or close any streets until adequate barricades, detour signs and electronic message boards (if needed) have been provided, erected and maintained in accordance with the detour route and details shown on the Plans or as shown on the approved traffic control plan. The Contractor

shall notify the SAWS COI forty-eight (48) hours in advance of closing any street to through traffic. Local traffic shall be permitted the use of streets under construction where feasible.

5.15 CONSTRUCTION STAKES - The Contractor shall hire a licensed surveyor, at his expense, for field staking and any other surveying requirements pertinent to the project.

5.16 PUBLIC UTILITIES

.1 Owner's Responsibility:

1. The Owner shall cause to be sent a set of Plans to utilities listed on the plans. The Owner shall request that the utilities review such Plans and Specifications to determine and/or verify the location of any utilities within the project site. The utility shall further be requested to communicate in writing the results of such review to the Contractor.

.2 Contractor's Responsibility:

.1 The Contractor is hereby required to become familiar with all the existing utility structures, lines and mains that are known to exist and may be encountered within and/or adjacent to the limits of the work covered by the Contract. While the existence and location of underground utilities indicated on the Plans are taken from the most current utility records available to the Consultant and/or Engineer, the Contractor understands and acknowledges that the notation of such underground utilities on the Plans does not constitute a warranty, representation or guarantee by the Owner or Consultant regarding those Underground Facilities. In addition, Contractor further understands and acknowledges that Owner and Consultant are under no obligation to indicate the location of any private service lines on the Plans.

.2 The Contractor shall go to the Project site, locate, and verify depth of any utilities indicated on the Plans prior to the Commencement of Work. The Contractor shall further investigate the possible location of any private service lines prior to the Commencement of Work as defined under Article 8. To facilitate this obligation on the part of Contractor, the Contractor shall communicate with the utilities listed on the plans, call for locations and subsequently visit the project site with a qualified utility representative of each utility listed on the plans, prior to the Commencement of Work. The information resulting from such on-site investigations shall govern over the information notated on the Plans, when and if a conflict between such information arises. In the event such investigations on the part of Contractor result in a utility location adjustment, Contractor shall not commence work until the completion of such adjustment has been completed.

.3 The Contractor acknowledges and agrees that maintaining continuity of utility service to utility customers is critical, including but not limited to the need for temporary water services.

.4 The Contractor shall be responsible for protecting the integrity of all utilities (public or private) either shown on the Plans or discovered during the Contractor investigations required in Article 5.16.2.2 herein. Such method of protection shall first be reviewed and approved by the affected utility.

.5 The Contractor shall be responsible for any damages to any utilities (public or private) either shown on the Plans or discovered during Contractor investigations acquired in Article 5.16.2.2 herein. Any existing utilities shown on the plans or discovered during Contractor investigations set out herein which cannot be relocated shall be protected by the Contractor as part of the original Bid Proposal Price submitted by Contractor. The Contractor shall pay for temporary relocation of utilities for the Contractor's convenience.

.6 Contractor shall be responsible for damage to utilities not shown on the Plans and not discovered during Contractor's investigations required in Article 5.16.2.2 herein when the existence of such a utility or the suspected existence of such a utility should have been anticipated and investigated by the Contractor, based upon certain physical manifestations observed during the course of construction or other tangible evidence

which constitutes common knowledge in the construction industry of the probable existence of a utility. A Contractor shall not be responsible for damages to utilities not shown on the Plans and not discovered during Contractor's investigation required herein when in accordance with the common knowledge in the construction industry; the existence of such utility could not reasonably be anticipated.

- .3 Temporary clearance of high voltage (600 volts and above) and overhead electrical lines is required prior to the operation of equipment within 10 feet of such lines (Texas Health and Safety Code, sections 752.003 and 752.006). The Contractor shall bear the expense to obtain the necessary temporary clearance from the high voltage line operator or utility company. Temporary clearance shall be a temporary barrier separating and preventing contact of material, equipment, persons, communications with high voltage electrical lines, or temporary de-energization and grounding or temporary relocation, or raising of the lines; as approved by the utility company.
 - .4 In the case of sewer, water, gas, electric, telephone, cablevision cable, or any other utility shown on the Plans and/or discovered during the Contractor's investigations required in Article 5.16.2.2 herein, the Contractor will use care in excavating over, under and around such lines and will provide all necessary temporary bridging during construction so as to maintain continuous service of the utility line. The Contractor shall backfill around the main and complete his construction operations in such a manner as to leave the utility line firmly and securely bedded in its original position without damage to any protective coatings.
 - .5 In instances where gas or water mains are exposed during construction, the utility company owning or operating the service shall be given at least a twenty-four (24) hour notice by the Contractor prior to backfilling in order that the protective coating on the mains may be inspected and/or repaired by utility company.
 - .6 **BRACING AND SUPPORTING** - In areas where utilities are known to be near the Project site, and could be damaged by soil movement, slips or cave-ins, the Contractor shall take all precautions necessary to protect such utilities from damage and shall pay for the repair of any such damages caused by Contractor's failure to properly protect the utility.
- 5.17 **SUBSURFACE CONDITIONS** - Reports of explorations and tests of subsurface conditions at the construction site, where applicable, may be available for review. These reports if available were procured by SAWS in order to generally forecast soil conditions at various depths to assist the Consultant in designing the Project. The logs and descriptive data are **NOT PART OF THE CONTRACT DOCUMENTS** but are made available for the general information of bidders and SAWS **SPECIFICALLY DISCLAIMS ANY AND ALL WARRANTY (INCLUDING WITHOUT LIMITATION AND IMPLIED WARRANTIES OF MERCHANTABILITY) OR GUARANTEE AS TO SUITABILITY OF FITNESS OF THE REPORTS, DATA OR INFORMATION FOR ANY PARTICULAR PURPOSE** and neither the SAWS nor the Consultant assumes any obligation or responsibility, either specific or implied, for the accuracy or completeness of any information contained therein. Sub-surface conditions along and across the Project site may vary significantly from those shown on the test reports. All excavations shall be unclassified (as provided in the specifications) and shall include all materials encountered regardless of their nature or the manner in which they are removed.
- 5.18 **WORKING HOURS** - No Work, with the exception of such items as curing of concrete, maintenance of barricades, etc., will be allowed by the Owner between the hours of 5:00 p.m. and 8:00 a.m. of the following day, unless directed by Owner or requested in writing by Contractor and approved by Owner and the ROW Owner. In addition to no work being permitted on Sundays or holidays, no work shall occur on Saturdays without specific, written permission of the Owner's representative forty-eight (48) hours in advance of intent to perform Work.
- 5.19 **USE OF STREETS RIGHT OF WAY** - The Contractor shall confine the movements of all steel tracked equipment to the limits of the Project and any such equipment will not be allowed to use City, Public or Private streets unless being transported on pneumatic tired vehicles. Any damage to existing City streets caused by the Contractor's equipment shall be repaired by Contractor at his own expense

upon direction, and in the manner prescribed by City's or other appropriate entities specifications and the SAWS COI.

- 5.20 DAMAGES TO STREETS caused by the Contractor, within the limits of the Project but not within the current phase being constructed, shall be repaired by the Contractor at his own expense upon direction by the SAWS COI.
- 5.21 DUST CONTROL - The Contractor will apply appropriate amounts of water (or other appropriate substance), to the area under construction and on detours as required to maintain sufficient moisture content in the surface layer for dust control.
- 5.22 SANITARY PROVISIONS - The Contractor shall provide and maintain in a neat, sanitary condition, rest room facilities for the use of his employees and authorized on-site visitors as may be necessary to comply with the requirements and regulations of the City Health Department and of the State Department of Health.
- 5.23 USE OF EXPLOSIVES - the use of explosives of any kind for this project is strictly prohibited.
- 5.24 WATER - the responsibility shall be upon the Contractor to provide and maintain an adequate supply of water for construction and on-site domestic consumption. Any connections and piping that the Contractor deems necessary for providing and maintaining an adequate water supply to the jobsite shall be installed at his expense and at locations approved by the SAWS COI. A fire hydrant meter is required. Before final Project acceptance, all temporary connections and piping installed by the Contractor in accordance with this paragraph shall be removed in a manner satisfactory to the SAWS COI.
- 5.25 ELECTRICITY - All electric current required by the Contractor at the jobsite shall be procured by Contractor. All necessary meters, switches, connections and wiring shall be installed at locations approved by the SAWS COI. Before final acceptance, all meters, switches, connections and wiring installed by the Contractor pursuant to this paragraph shall be removed in a manner satisfactory to the SAWS COI.
- 5.26 CLEANING
- .1 The Contractor shall at all times keep the Project premises safe and free from accumulation of waste materials or rubbish caused by the Work under this Contract. This includes the maintenance of grass, shrubbery, and trees within the ROW.
 - .2 Upon completion of the Work, and prior to the Owner's final inspection, the Contractor shall present the premises in a neat and clean condition, prepared for acceptance by Owner.
 - .3 Prior to final acceptance of the Work, Contractor shall reasonably restore the Project site to its pre-project condition (accounting for such restoration concerns as cosmetic appearance, landscaping, drainage gradients, accessibility, etc.) to the extent permitted by the Project improvements. All of this incidental Work to be performed by Contractor to the satisfaction of the SAWS COI.
- 5.27 ACCESS REQUIREMENTS - The Contractor shall provide access to residents and businesses affected by the construction of this Project to the greatest extent possible.
- 5.28 SAFETY PRECAUTIONS AND PROGRAMS
- .1 In the performance of this Contract the Contractor shall protect the public, SAWS and the City of San Antonio by taking reasonable precaution to safeguard persons from death or bodily injury and to safeguard property of any nature whatsoever from damage. Where any dangerous condition or nuisance exists in and around construction sites, equipment and supply storage that are in any manner connected with or arise from the performance of this Contract, the Contractor shall provide and maintain reasonable warning of such danger or nuisance. The Contractor shall not create any dangerous condition or nuisance of any nature whatsoever in connection with the performance of this Contract including, but not limited to, excavations and obstructions, unless necessary to its performance, and in that event the Contractor shall provide and maintain at all times a reasonable means of warning of any danger or nuisance so created. The duties of the

Contractor in this paragraph shall be nondelegable and the Contractor's compliance with the specific recommendation and requirements of SAWS as to the means of warning shall not excuse the Contractor from the faithful performance of these duties should such recommendations and requirements not be adequate or reasonable under the circumstances. The Contractor shall take reasonable precautions for the safety of and shall provide protection to prevent damage, injury, or loss to:

- .1 All employees on the Work, and all other persons who may reasonably be foreseen to be affected by the Work.
 - .2 All the Work and all materials to be incorporated at street crossings, along proposed detour routes, and at material stockpiles. Where directed by the Owner or his duly authorized representative, the Contractor shall provide and maintain suitable warning signs, barricades and lights, in accordance with the details included in the Contract Documents, to direct traffic around the Work in progress and to assure the safety of the public. The Contractor shall provide adequate warning signs, barricades, and lights and, where necessary, flagmen for the Project or portions of the Project within which operations are being prosecuted in any one day or which will be closed overnight.
 - .3 Other property at the site or adjacent thereto including but not limited to, trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- 2 The Contractor shall comply with the U.S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (Public Law 91-596 and all subsequent amendments) and under Section 107 of the Contract Work Hours and Safety Standards Act (Public Law 91-54 and all subsequent amendments). This project is subject to all of the Safety and Health Regulations (CFR 29, Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974 and CFR 29, Part 1910 and all subsequent amendments, General Industry Safety and Health Regulations Identified as Applicable to Construction. Contractors shall be knowledgeable with the requirements of these regulations and any amendments thereto.
 - 3 On trench excavation that exceeds a depth of five (5) feet, trench excavation protection shall be accomplished as required by the most current provisions of part 1926 subpart P - Excavations, of the Occupational Safety and Health's Standards and interpretations and as further defined in the note(s) on the Plans and other Contract Documents.
 - 4 In any emergency affecting the safety of persons or property, the Contractor shall act to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor resulting from emergency Work shall be considered by Owner in accordance with Articles VI and VIII for Completion Time.
 - 5 The Contractor shall provide, at the site, such equipment and medical facilities as are necessary to supply first aid service to anyone who may be injured in connection with the Work. Such equipment shall comply with the most current regulations of the Occupational Safety and Health Administration of the United States Department of Labor.
 - 6 The Contractor must promptly report in writing to the Owner all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on or adjacent to the site which caused death, personal injury, or property damage, giving full details and any statements of witnesses. In addition, if death, serious injury, or serious damage is caused, the accident then shall be reported immediately by telephone or messenger to the Owner.
 - 7 SAWS requires all Contractor job sites shall be immediately accessible to appropriate local, State and Federal agency safety officials.

ARTICLE VI. CONTRACT CHANGES:

- 6.1 CHANGE ORDERS - The Contract Sum and/or the Contract Time may be increased or decreased only

by written Change Order. A Change Order signed by the Contractor indicates his acceptance and approval thereof including the adjustment in the Contract Sum and/or the Contract Time. Any compensation paid in conjunction with the terms of a Change Order shall comprise the total compensation due the Contractor for the work or the change defined in the Change Order. By signing the Change Order, the Contractor acknowledges that the stipulated compensation includes payment for the Work of Change plus all payment for the interruption of schedules, stop work orders, extended overhead, delay, or any other impact, claim or ripple effect, and by such signing specifically waives any reservation or claim for additional compensation in respect to the subject of the Change Order. Except as modified by Change Order, all Work performed under a Change Order shall be completed in accordance with these Contract Documents. Each Change Order shall be specific and final as to prices and extensions of time with no reservations or other provisions allowing for future additional money or time as a result of the particular changes identified and fully compensated in the change order.

6.2 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract and applicable law consisting of additions, deletions or other revisions and the Contract Sum and/or the Contract Time will be adjusted accordingly. All such changes in the Work shall be authorized by written Change Order and shall be performed by Contractor under the applicable provisions of the Contract Documents as provided herein.

.1 MAJOR CHANGES IN THE WORK - any significant change in a Major Bid Item constitutes a major change in the Work and shall be implemented by a Change Order that shall be binding on the Owner and Contractor. A significant change that constitutes a Major Change in the Work shall be defined as follows:

- .1 An increase or decrease of five percent (5%) or more in the number of units (not price) for a Major Bid Item as included in the Consultant's estimated quantities included in the Bid Documents; or
- .2 An increase or decrease of five percent (5%) or more in the dollar value of a lump sum, Major Bid Item.
- .3 Any change in the Contract Sum resulting from a Major Change in the Work, which reflects among other things, quantity changes, market price changes, and any quantity or volume discounts that might apply, shall be determined as specified in Article 6.5.

.2 MINOR CHANGES IN THE WORK - The SAWS COI will have authority to order such minor changes in the Work not involving an adjustment in the Contract Sum or Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be implemented by a written directive (a "Work Change Directive") and shall be binding on the Owner and Contractor. The Contractor shall carry out any written directive promptly.

.1 If the Contractor does not agree with the SAWS COI that a Minor Change in the work is minor and will result in no adjustment in Contract Sum or Contract Time, he must so notify the Owner in writing, within seven (7) calendar days of issuance of the written directive and prior to beginning any disputed work. If the Contractor fails to file such written notification as provided for above, he shall waive and forever forfeit his rights to file a claim for additional compensation or Time for the Work under this section.

.3 In the event there is a Major Change In The Work as provided for in Article 6.2.1, that causes an increase in the number of units for a Major Bid item, Owner may consider a price increase for the Major Bid item for those additional units. In any event the Contractor shall not be entitled to an adjustment of price due to a decrease in a Major Bid Item.

6.3 Contractor proposals, along with the supporting data including impact to the critical path, for the proposals as specified in item 6.5.4 shall be submitted no later than seven (7) calendar days after the owner's issuance of an RFP request by Owner's Representative, unless Owner's Representative grants an extension. Failure of contractor to provide the complete and proper proposal including all support will not be cause for delay or additional time.

- 6.4 The entire cost of extra Work resulting from Change Orders including the incremental cost of extra Work resulting from any prior Change Orders, modifications, or additions so ordered, shall not cumulatively exceed twenty-five percent (25%) of the original Contract Sum, in accordance with Texas Local Government Code, Chapter 252 and provided further that the price is agreed upon in writing by Owner and Contractor before materials are furnished or the Work is done. Contractor shall be responsible for keeping records that track the Contractor's cumulative total for Change Orders and Contractor, by entering this Contract, approves, understands and agrees that no Work is approved, no payment will be made, and no Change Order is authorized, that exceed the statutory limit provided herein and any Work undertaken or performed by the Contractor in excess of this amount is at the Contractors sole risk and expense
- 6.5 Changes or Credits for the Work covered by an approved Change Order shall be determined by one or a combination of the following methods:
- .1 UNIT PRICE - Submitted by the Contractor in the original Contractor Bid Proposal as part of the base bid or as a designated additive or deductive alternate, and if agreed to by the Contractor and the Owner, appropriately adjusted either upward or downward to reflect any increases or decreases in the amount of labor, material or equipment as they relate to Major Bid Items.
 - .2 AGREED CONTRACT CHANGES - Lump Sum Agreement between Owner and Contractor as to the price, quantity and time for changes in the Work. The Contractor shall submit an itemized, estimated cost breakdown together with supporting data. This itemized breakdown shall be in accordance with the requirements established in Article 6.5.4 and 6.5.5.
 - .3 FORCE ACCOUNT - If no Agreed Contract Change or unit price can be reached after good faith negotiations between the SAWS and Contractor, the Owner may direct the Work be performed by the Contractor on a Force Account basis, and payment by the SAWS shall be upon the basis of Actual Cost of the Work as specified in Article 6.5.4 plus the participation allowances as specified in Article 6.5.5.
 - .4 ACTUAL COST OF THE WORK – The “Actual Cost” incurred by the Contractor to perform the additional Work. Contractor shall provide a complete breakdown of the Actual Costs to the Owner on a daily basis as follows:
 - .1 Labor including Foremen
 - .2 Labor burden shall be allowed at a maximum of 35%. Any burden in excess of the percentage shown shall be submitted for review and approval by the Owner and will be subjected to audit.
 - .3 Materials comprising the Work
 - .4 The Contractor's actual incremental ownership or rental cost of equipment during the time of use on the extra Work. (Rental cost shall be based on current Southwest Regional AGC, Association of Equipment Distributors regional computations or equivalent).

For Contractor-owned machinery, trucks, power tools or other equipment, necessary for use on Change Order work, the Rental Rate Blue Book for Construction Equipment (hereafter referred to as “Blue Book”) rate, as modified by the following, will be used to establish Contractor's allowable hourly rental rates. Equipment used shall be at the rates in effect for each section of the Blue Book at the time of use. The following formula shall be used to compute the hourly rates:

$$H = \frac{M \times R1 \times R2}{176} + OP$$

176

Where H = Hourly Rate

M = Monthly Rate

- GC 40 -

R1 = Rate Adjustment Factor

R2 = Regional Adjustment Factor

OP = Operating Costs

If Contractor-owned machinery and/or equipment is not available and equipment is rented from an outside source, the hourly rate shall be established by dividing the actual invoice cost by the actual number of hours the equipment is involved in the Work. Owner reserves the right to limit the hourly rate to comparable Blue Book rates. When the invoice specifies that the rental rate does not include fuel, lubricants, repairs and servicing, the Blue Book hourly operating cost shall be allowed to be added for each hour the equipment operates. The allowable equipment hourly rates shall be paid for each hour that the equipment is involved in the Work and an additional maximum of fifteen percent (15%) may be added as compensation.

- .5 Power and consumable supplies for the operation of power equipment.
- .6 Insurance and any extra bond premiums shall be allowed at a maximum of two (2%) percent of the total change order cost. Any insurance and extra bond premiums in excess of the percentage shown shall be submitted for review and approval by the Owner and will be subjected to audit.

.5 PARTICIPATION ALLOWANCE

- .1 For Contractor’s proposals covering both increases and decreases in the amount of the Contract, the application of overhead and profit percentages (as provided in the following tables) shall be on the net increase in the Actual Cost for the Contractor or Subcontractor performing the Work. However, where the Contractor or first tier Subcontractor receives proposals for additive and deductive amounts from separate sub tier subcontractors, the commission shall be allowed on the added amounts prior to subtraction of the credit amounts. The cost of such extra Work shall be added to the Contract Sum by a Written Change Order as specified in Article 6.1. The following tables provide further explanation of the application of the provisions in this Article:

ALLOWABLE MARK UPS	Work performed by PC		Work performed by Sub A		Work performed by Sub B	
	O & P	Comm.	O & P	Comm.	O & P	Comm.
Prime Contractor (PC)	20%	---	---	5%	---	5%
Subcontractor A (Sub A)	---	---	20%	---	---	5%
Subcontractor B (Sub B)	---	---	---	---	20%	---
Subcontractor C (Sub C)	SAWS Does Not Allow Mark Up On Sub C					

DEFINITIONS	
Prime Contractor	Owns the contract with SAWS
Subcontractor A	Works directly for Prime Contractor
Subcontractor B	Works directly for Subcontractor A
Subcontractor C	Works directly for Subcontractor B
O & P	Overhead & Profit
Comm.	Commission

EXAMPLE	Sub B change order for \$1,000		
	Work performed by Sub B		
	O & P	Comm.	
Prime Contractor	---	\$63.00	
Subcontractor A	---	\$60.00	
Subcontractor B	\$200.00	---	
Subcontractor C	---	---	
Summary	CO	Mark Up	CO Total
	\$ 1,000.00	\$323.00	\$1,323.00

- 6.6 **DELETION OF WORK** - The Owner may, pursuant to Texas Local Government Code, Chapter 252, or as otherwise may be provide by law, order the Contractor to omit up to twenty five percent (25%) of the original Contract Sum and associated Work, as specified in Article 6.4, without the consent of the

Contractor.

6.7 CLAIMS FOR ADDITIONAL COSTS

- .1 If the Contractor pursues a claim for an increase in the Contract Sum and or time prior to final acceptance, he shall give the Owner written notice thereof with a simultaneous information copy to the Consultant, within thirty (30) days after the Contractor knows, or should have known, of the events giving rise to such Contractor claim. This notice shall be presented in writing to the Owner and Consultant by the Contractor and contractor shall not proceed with work until directed by Owner, except in an emergency endangering life or property in which case the Contractor shall proceed in accordance with Article 5.28.4. No such Contractor claim shall be valid unless the Contractor follows the notice procedure outlined herein, and failure to follow the notice procedure provided above shall cause the Contractor to waive and forever forfeit the right to seek additional amounts on the Contract in regards to the claim. If the Owner and the Contractor cannot agree on the amount of the adjustment in the Contract Sum, if any, it shall be determined by administrative procedures as provided to Article X. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.
- .2 If the Contractor claims that additional cost will be incurred because of: (1) any written Owner or Consultant interpretation of the Contract Documents, (2) any order by the Owner to stop the Work pursuant to Article 4.8 where the Contractor was not at fault, or (3) any written order involving a perceived minor change in the Work issued pursuant to Article 6.2.2, the Contractor shall make such claim as provided in Article 6.7.1.

6.8 NO DAMAGES FOR DELAY CLAUSE - Notwithstanding anything to the contrary in the Contract Documents, an extension in the Contract Time, to the extent permitted under Article 6., shall be the sole remedy of the Contractor for any (i) delay in commencement, prosecution, or completion of Work, (ii) hindrance, interference, suspension or obstruction in the performance of Work, (iii) loss of productivity, or (iv) other similar claims (items (i) through (iv) herein collectively referred to in this Article 6.8 as "Delays") whether or not such Delays are foreseeable, unless a Delay is caused by the acts of the Owner constituting intentional interference with Contractor's performance of the Work, and only to the extent such act continues after the Contractor furnishes Owner with written notice of such interference. In no event shall the Contractor be entitled to any compensation or recovery of any damages, in connection with any Delay, including, without limitation, consequential damages, lost opportunity costs, impact damages, or other similar remunerations. For purposes of interpreting this provision, the Owner's exercise of any of its rights or remedies under the Contract Documents (including without limitation, ordering changes in Work, or directing suspension, rescheduling, or correction of the Work), regardless of the intent or frequency of the Owner's exercise of such rights or remedies, shall not be construed as intentional interference with the Contractor's performance of the Work.

6.9 SUBCONTRACTOR PASS-THROUGH CLAIMS - In the event that any Subcontractor of Contractor asserts a claim to Contractor that Contractor seeks to pass through to Owner under the Contract Documents, any entitlement to submit and assert the claim as to Owner shall be subject to:

- .1 The requirements herein of these General Conditions; and
- .2 The following additional three (3) requirements listed below, all three (3) of said additional requirements shall be conditions precedent to the entitlement of Contractor to seek and assert such Claim against Owner:
 - (1) Contractor shall:
 - (a) have direct legal liability as a matter of Contract, common law, or statutory law to Subcontractor for the claim that Subcontractor is asserting; or
 - (b) have entered into a written liquidating agreement with Subcontractor, prior to the Claim's occurrence, under which Contractor has agreed to be legally responsible to the Subcontractor for pursuing the assertion of such Claim against Owner under

said Contract and for paying to Subcontractor any amount that may be recovered, less Contractor's included markup (subject to the limits in the Contract Documents for any markup). The relationship, liability or responsibilities shall be identified in writing by Contractor to Owner at the time such Claim is submitted to Owner and a copy of any liquidating agreement shall be included by Contractor in the Claim submittal materials.

- (2) Contractor shall have reviewed the Claim of the Subcontractor prior to its submittal to Owner and independently shall have evaluated such Claim in good faith to determine the extent to which the Claim is believed in good faith to be valid. Contractor shall inform Owner that Contractor has made a review, evaluation, and determination that the Claim is made in good faith and is believed to be valid.
- (3) Subcontractor making the Claim to Contractor shall certify to both Contractor and Owner that it has compiled, reviewed and evaluated the merits of such Claim and that the Claim is believed in good faith by Subcontractor to be valid. A copy of the certification by Subcontractor shall be included by Contractor in the Claim submittal materials.

.3 Any failure of Contractor to comply with any of the foregoing requirements and conditions precedent with regard to any such Claim shall constitute a waiver of any entitlement to submit or pursue such Claim.

6.10 **TIME REQUIRED TO PROCESS CHANGE ORDERS** - All Change Orders require written approval by either Owner or Owners Representative or, where authorized by the State. The approval process requires a minimum of forty-five (45) calendar days **after submission** to Owner in final form with all supporting data. Receipt of a submission by Owner does not constitute acceptance or approval of a proposal, nor does it constitute a warranty that the proposal will be authorized by Owner. **THE TIME REQUIRED FOR THE APPROVAL PROCESS SHALL NOT BE CONSIDERED A DELAY AND NO EXTENSIONS TO THE CONTRACT TIME OR INCREASE IN THE CONTRACT SUM WILL BE CONSIDERED OR GRANTED AS A RESULT OF THIS PROCESS.** Pending the approval of a Change Order as described above, Contractor will proceed with the work under a pending Change Order only if directed in writing to do so by Owner.

ARTICLE VII. CONTRACT PAYMENTS:

7.1 **INTERNET-BASED PROJECT MANAGEMENT SYSTEM.** SAWS shall administer its services through an Internet-Based Project Management System (hereafter referred to as "CPMS"). In such case, Contractor shall conduct communication through CPMS and perform all Project-related functions utilizing CPMS, with the exception of Sub-Contractor payment monitoring activities, which shall be through the S.P.U.R. system. This includes any and all correspondence, submittals, requests for information, vouchers, compensation requests and processing, amendment, change orders and other administrative activities as may be required in the Contract. SAWS shall administer the CPMS software, shall provide CPMS training to Project Team members and shall make the software accessible via the Internet to all necessary Project Team members. All invoices shall be submitted through the CPMS.

Monthly payments for work performed shall be reviewed by SAWS upon Contractor entering itemized invoices, with all required back-up, within CPMS. The invoice shall indicate the value of the work performed to date.

7.2 **ESTIMATED QUANTITIES AND MEASUREMENT** - The estimated quantities of the various elements of Work to be done and material to be furnished are approximate only and are provided by Consultant and Owner as a basis for Owner comparison of proposals and award of Contract. It is expressly understood and agreed by Owner and Contractor that the actual amounts of Work to be done and material to be furnished may differ somewhat from these estimated quantities. The quantities of Work actually performed by Contractor will be computed on the basis of measurements taken by the Owner's representatives, and these measurements shall be final and binding on Contractor.

PROGRESS PAYMENTS - During the latter part of each month as the Work progresses on all SAWS

Contracts regardless of Contract Sum, said Owner, or his designated representatives and Contractor shall determine either the cost of the labor and materials or quantities incorporated into the Work during that month and actual invoiced cost of Contractor acquired materials stored on the Project site, and/or within off-site local storage facilities either owned or leased by the Contractor. Upon receipt of a complete and mathematically accurate Construction Payment Estimate Form from the Contractor, the SAWS shall make payment to Contractor within thirty (30) calendar days of receipt. Contracts totaling four hundred thousand (\$400,000.00) dollars or less, based upon such cost determination and at the Contract unit prices in a sum equivalent to ninety percent (90%) of each such invoice. The remaining ten percent (10%) retainage shall be held by the SAWS until the final Contract Settlement. However, where the Contract amount exceeds four hundred thousand dollars (\$400,000.00), installments shall be paid to Contractor at the rate of ninety-five percent (95%) of each monthly invoice within thirty (30) calendar days of Owner receipt of an approved and mathematically accurate Construction Payment Estimate Form from the Contractor, and the retainage held until final Contract Settlement shall be five percent (5%). In either case, should the Construction Payment Estimate Form submitted by the contractor be incorrect, the Construction Payment Estimate Form will be rejected and returned to the contractor for correction. Upon receipt of the corrected Construction Payment Estimate form, the timeline stated above for payment will apply.

- .1 Contractor's Payment to Sub-Contractors: The contractor will be required to report the actual payments to all subcontractors, utilizing the Sub-contracting Payment and Utilization Reporting (S.P.U.R.) System, in the time intervals and format prescribed by SAWS. This information will be utilized for SMWB participation tracking purposes. Any unjustified failure to comply with the committed SWMB levels may be considered breach of Contract.
- .2 Web Submittal of Subcontractor Payment Reports: The Contractor is required to electronically submit monthly subcontractor payment information utilizing the Sub-contracting Payment and Utilization Reporting (S.P.U.R.) System, beginning with the first SAWS payment for services under the Contract, and with every payment thereafter (for the duration of the contract).

Electronic submittal of monthly subcontractor payment information will be accessed through a link on SAWS' "Business Center" web page. The Contractor and all subcontractors will be provided a unique log-in credential and password to access the SAWS subcontractor payment reporting system. The link may also be accessed through the following internet address: <https://saws.smwbe.com/>

Training on the use of the system will be provided by SAWS. After the prime receives payment from SAWS, electronic submittals will require data entry of the amount paid to each subcontractor listed on the Contractor's Good Faith Effort Plan.

Owner's payment of installments shall not in any way be deemed to be a final acceptance of any part of the Work by Owner, and will not prejudice Owner in the final settlement of Contract account nor relieve the Contractor from completion of the Work as herein provided.

7.3 WITHHOLDING OF PAYMENT - In the event that the Owner discovers evidence of Contractor and/or Work noncompliance with the Contract Documents subsequent to approval of the Construction Estimate Certification Forms, the Owner may revoke or otherwise amend that part of any Construction Estimate Certification Form to such extent as may be necessary to withhold monies to protect the Owner from loss on account of:

- .1 Defective Work not remedied by Contractor.
- .2 Persistent and uncured Contractor non-compliance with the administrative provisions of the Contract Documents including, but not limited to, failure to electronically submit monthly subcontractor payment information utilizing the Sub-contracting Payment and Utilization Reporting (S.P.U.R.) System.
- .3 Damage to Work of another Contractor.
- .4 Liquidated Damages assessed by Owner for Contractor failure to maintain scheduled progress in

accordance with the most recent applicable construction schedule, if any are specified in the Contract Documents, and/or Contractor failure to meet final completion date.

- .5 Receipt of written notice by the Owner of Contractor's unpaid bills, as stipulated in Chapter 53, Texas Property Code, if the Contractor has not provided a payment bond and only if the Contract Sum does not exceed \$25,000.00. Any funds so withheld by Owner shall be released to the Contractor if he furnishes either a special indemnity bond to Owner securing release of lien as provided in Chapter 53, Texas Property Code, or Contractor proof of payment of disputed bills.
- .6 "Indemnification" as provided for in Article 2.3.

When the above Contractor deficiencies are cured, Owner will make payment for amounts withheld because of the deficiencies within (30) thirty calendar days.

- 7.3 FINAL PAYMENT - Contractor shall not be entitled to receive payment of any sum in excess of the cumulative amounts paid upon such monthly invoices as outlined above until after the Owner transmittal of the Letter of Conditional Approval and in accordance to Article 9 project completion and acceptance and not before all the stipulations, requirements and provisions of this Contract are faithfully performed and complied with by Contractor, and unless and until said structures, Work and improvements shall be entirely completed, and delivered to, and accepted by the SAWS in accordance with the Contract Documents. Completion, delivery and acceptance of the Work is evidenced by the Final Certificate of Acceptance issued in accordance to Article 9.1 by the Owner and such Certificate of Acceptance is approved by the Owner. The Owner shall prepare the final invoice as the basis for final Contract settlement. Owner may deduct from the amount of such final invoice and retain any and all sums which are to be deducted by SAWS or paid or allowed by Contractor to SAWS, or which are to be retained by Owner for reasons stemming from any/all fines, fees, or penalties, in addition to those previously stated in Article 7.2.

- .1 NOTARIZED AFFIDAVIT - Before and as a condition precedent to Final Payment for the work by the Owner, the Contractor shall submit to the Owner a notarized affidavit in duplicate stating under oath that all subcontractors, vendors, and other persons or firms who have furnished or performed labor or furnished materials for the work have been fully paid or satisfactorily secured. Such affidavit shall bear or be accompanied by a statement, signed by the surety company who provided the Payment Bond for the work, to the effect that said surety company consents to Final Payment to the Contractor being made by the Owner.

- 7.4 OWNER TO FINALLY DETERMINE ALL AMOUNTS PAYABLE OR CHARGEABLE - It is expressly understood and agreed by Contractor that subject only to the prices, terms and provisions specifically set forth in the Contract Documents including Change Orders, the written estimates and Certificates of the Owner shall be final in fixing and determining amounts payable or chargeable hereunder to Contractor by SAWS as required by the other terms and conditions hereof. Also, in case of controversy, the monthly construction estimates and Certificates of Final Acceptance shall be final in fixing and determining all sums to be deducted and retained by SAWS for reasons as stated in Article 7.2, out of any funds otherwise estimated as payable to Contractor by SAWS.

7.5 CLAIMS BY THIRD PARTIES FOR LABOR OR MATERIALS

- .1 Contractor hereby agrees to promptly pay all persons supplying labor, services and materials in the prosecution of the Work provided for in this Contract and any and all duly authorized modifications or Change Orders of said Contract that may hereafter be made, and shall fully indemnify and hold harmless the SAWS and its agents against any and all claims, liens, suits or actions asserted by any person, persons, firm or corporation on account of labor, materials or services furnished such Contractor during the prosecution of the Work herein undertaken. Contractor shall execute a payment bond in accordance with other sections governing same herein for this purpose. Before the SAWS shall be obligated to pay any amount to Contractor on final Contract settlement, Contractor shall execute a sworn, written and notarized statement on an affidavit form to be supplied by the Owner along with a "consent of surety" letter endorsing Final Payment to Contractor, evidencing that all labor employed and all equipment

and materials incorporated into the Construction of the Work have been either fully paid for by Contractor and Subcontractors, or that any pending disputes over payment are being properly addressed by the surety as provided for in 7.3.1 herein.

- .2 Suppliers, any subcontractors, and persons claiming to have performed any labor, or to have supplied any equipment and materials toward the performance of this Contract, and who claim not to have received proper compensation from the Contractor or Subcontractors for same, shall be instructed by Owner and Contractor that written and documented claims must be sent directly to the Contractor and his Surety in accordance with Chapter 2253, Texas Government Code. The Owner will furnish to claimants, in accordance with such Chapter 2255, Texas Government Code, a copy of the Contractor's Payment Bond and Contract as provided therein upon claimant's written request. **The Owner shall further furnish a statement to claimants that claimants are cautioned that no legal or equitable lien exists on the SAWS funds yet unpaid to the Contractor, and that reliance on notices sent only to the Owner may result in loss of claimant's rights to timely perfect recovery against the Contractor and/or his Surety. The Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any unauthorized representation by any agent or employee of Owner to the contrary.**

ARTICLE VIII. CONTRACT COMPLETION TIME:

- 8.1 **COMMENCEMENT OF WORK** - The Work called for in this Contract shall commence on the date indicated in the SAWS written Authorization to Proceed. Under no circumstances shall the Work commence prior to the Contractor's receipt of SAWS issued, written Authorization to Proceed.
- 8.2 **COMPLETION OF WORK** - After commencement of Work as outlined in Article 8.1, the Contractor shall prosecute the Work continuously, diligently and uninterruptedly throughout the Contract Time period, during which period of time Contractor, all subcontractors and suppliers are bound and obligated at all times to employ sufficient Work force and supervisory diligence to complete said structures, Work and improvements, and to deliver same over to the SAWS in a timely acceptable, completed, undamaged and clean condition. THE TIME OF BEGINNING, RATE OF PROGRESS AND TIME OF COMPLETION OF SAID WORK ARE HEREBY DECLARED BY OWNER AND UNDERSTOOD BY CONTRACTOR TO BE "OF THE ESSENCE" TO THIS CONTRACT. By executing this Contract, Contractor confirms that the Contract Time is a reasonable period for performing the Work. Any other provision contained herein notwithstanding, the Owner may suspend said Work either partially or totally as provided for in Article 4.6 and 4.7.
- 8.3 **CALENDAR DAY CONTRACT** – Unless otherwise specifically provided in Supplemental or Special Conditions to the Contract, all Contracts shall be Calendar Day Contracts and “Day” as used in the Contract Documents shall mean a calendar day which are days of 24 hours each from midnight to the next consecutive midnight. Work on Sundays or SAWS Designated Holidays will not be permitted except in cases of extreme emergency, and then only with the written permission of the Owner. If Sunday or SAWS Designated Holiday Work is permitted, the COI's average salary costs at time and one half will be charged to the Contractor. This amount shall be deducted from Contractor's monthly payment application by Owner. Nothing in this Paragraph shall be construed as prohibiting the Contractor from working on Saturdays if so desired provided they give Owner at least the prerequisite forty-eight (48) hours written notice (and receive subsequent approval by the Owner) of intent to perform Work on Saturday so that Owner's representatives may be scheduled to observe/inspect said Work.
- 8.4 **FAILURE TO COMPLETE WORK ON TIME** - If the Contractor fails to complete the Contract in the time specified by Owner in the Contract Documents and agreed to by Contractor through execution of this Contract, Contract Time charges will continue to be made for each Calendar Day thereafter. THE TIME SET FORTH IN THE CONTRACT FOR THE COMPLETION OF THE WORK IS AN ESSENTIAL ELEMENT OF THE CONTRACT. For each Calendar Day that any Work shall not be complete, after the expiration of the Calendar Days specified in the Contract, (to include Calendar Days charged for correction of Contractor deficiencies found during the final inspection), plus, any extended days allowed by Owner, the amount of liquidated damages assessed per day as stipulated in the Contract will be deducted from the money owed or to become due to the Contractor, not as a penalty but as liquidated damages owed to SAWS for extended expenses, loss and public

inconvenience resulting from Contractor's failure to complete said Work within the Contract Time that the Contractor agreed to by execution of this Contract. Contractor and SAWS agree that such liquidated damages as are set prior to the Contract execution are for projected reasonable costs that are otherwise difficult for either Party to forecast and will be incurred by the SAWS due to Contractor completion beyond the number of Calendar Days calculated herein by the SAWS.

- .1 The Contract Time may only be changed by a Change Order duly executed by both Contractor and Owner.
- .2 Should progress of the Work fall behind the construction schedule except for reasons stated in 8.4.1, Contactor shall promptly submit at the request of Owner or Authorized Representative an updated Construction schedule to Owner or Authorized Representative for approval. Contractor shall take any and all action necessary to restore progress by working the hours, and lawful overtime operations as necessary to achieve Contract Time.

8.5 WEATHER DELAY CLAUSE - SAWS includes weather delay days when determining the total number of days allowed for each Contract. Any additional days beyond those specified in 8.5.3 must be formally requested in writing with the next monthly payment invoice and justified by the contractor with daily logs or NO ADDITIONAL DAYS WILL BE GRANTED.

- .1 Pursuant to the Contract, Contractor may be granted an extension of time because of unusual inclement weather, including but not limited to unusual rainfall events, which are beyond the Normal Rainfall recorded and expected for San Antonio, Texas. However, the Contractor will not be granted an extension of time for “Normal Rainfall”, as described in 8.5.3.
- .2 "Unusual Inclement Weather" is defined as a rain event or other weather related event which occurs at the site and is of sufficient magnitude, as determined by the COI, to prevent Contractor from performing work critical to maintaining the Progress Schedule. If rain is the basis for the Unusual Inclement Weather event it must at a minimum exceed the Normal Rainfall as defined herein.
- .3 Baseline Rain Day Determination. “Normal Rainfall”, based on the National Oceanic and Atmospheric Administration (NOAA) or similar data for San Antonio, Texas, is considered a part of the Calendar Day Contract, and is not a justification for an extension of time. Listed below are the number of days in each month for which no compensatory days for rainfall events (“Rain Days”) in such months may be claimed:

January.....	2 days
February.....	3 days
March.....	4 days
April.....	3 days
May.....	4 days
June.....	6 days
July.....	3 days
August.....	4 days
September.....	5 days
October.....	5 days
November.....	5 days
December.....	3 days

“Rain Days” in addition to the baseline “Rain Day” determination described above will be measured (with the Owner’s Representative’s approval) at the jobsite or at a location as agreed in writing by the parties.

- .4 Contractor may receive credit in any month for Unusual Inclement Weather, and specifically for any Rain Days in that month which exceed the number of Rain Days allocated to that month, if a Claim is made in accordance with paragraph 8.5.1 and the weather event meets the definition for "Unusual Inclement Weather", and as applicable, “Rain Day” and such claimed day is a day on which Work critical to maintaining the Progress Schedule is scheduled to be performed and

is otherwise capable of being performed.

- 8.6 Liquidated Damages for Failure to Complete on Time – The Contractor agrees that **Time Is Of Essence** of this Contract and that for each day of delay beyond the number of days herein agreed upon for the completion of work herein specified and contracted for, after due allowance for such extension of time as is provided for under the provisions herein, the Owner may withhold permanently for the Contractor's total compensation, not as a penalty but as liquidated damages, the sum per day in accordance to the Supplemental Conditions of the Contract.

ARTICLE IX. PROJECT COMPLETION AND ACCEPTANCE:

- 9.1 FINAL ACCEPTANCE of the Project will be considered only after all stipulations, requirements and provisions of this Contract are faithfully completed and the Project is delivered to the SAWS by Contractor in an acceptable condition for the intended use by Owner. In the event that all major Contract pay items are complete and only minor clean-up operations remain for Contract completion, the Owner has the discretionary authority to issue a Conditional Letter of Acceptance. Should the Owner's Conditional Letter of Acceptance contain conditions for the Final Acceptance of the Work, Contract Time will continue to be charged against the Contractor until such conditions have been corrected to the satisfaction of the Owner.

- .1 Final Release of Retainage - Contractor shall be entitled to receive payment of all retainage within forty-five (45) calendar days of completion, receipt and acceptance of all required "completion items" as stipulated below:
- .1 The "Semi-Final Pay Request" indicating that no additional monthly invoices will be submitted by the Contractor for payment.
 - .2 The "Conditional Letter of Acceptance" with all "Punch List Items" completed indicating that Owner is approving the Release of Retainage.
 - .3 When applicable, the "Recapitulation Change Order" reconciling all Pay Item Quantities. Recapitulation Change Orders exceeding \$100,000 positive or negative are subject to formal Board of Trustee approval.
 - .4 The "Contractor Certification" provided for herein indicating that all subcontractors and suppliers have been paid.
 - .5 The "Consent of Surety" provided for herein indicating the Bonding Agent's approval to remit all retainage directly to the Contractor.
 - .6 When applicable, the "TWDB Certificate of Approval & Release of Retainage" letter indicating Texas Water Development Board's approval to remit all retainage directly to the Contractor.

- 9.2 PARTIAL ACCEPTANCE by Owner for beneficial occupancy of any completed part of the Work, which has specifically been identified in the Contract Documents as being eligible for early Owner Acceptance, or which Owner, Engineer and/or Consultant and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner without significant interference with Contractor's performance of the remainder of the Work, may be accomplished prior to completion of the total Work identified in the Contract Documents, subject to the following:

- .1 Owner may at any time request Contractor in writing to permit Owner to beneficially occupy any such part of the Work which Owner believes to be ready for its intended use. If Contractor agrees, Contractor will certify to Owner and Consultant that said part of the Work is substantially complete and request the Owner to issue a Conditional Letter of Acceptance, for only that part of the Work. Within a reasonable time after such request, Owner, Contractor, Engineer and/or Consultant shall make an inspection of the said part of the Work to determine its status of completion. Warranties (as provided under Article 9.3) on that part of the Work beneficially occupied by Owner will commence upon issuance of the Conditional Letter of Acceptance. Any Work items remaining to be completed as defined in the Conditional Letter of Acceptance for the said part of the Work will have warranty commencement upon completion

and Final Acceptance by Owner.

- .2 Owner may at any time request Contractor in writing to permit Owner to take over operation of any such part of the Work although it is not Substantially Complete. A copy of such request will be sent to the Engineer and within a reasonable time thereafter, Owner, Contractor, and Engineer and/or Consultant, shall make an inspection of that part of the Work affected by the request to determine its status of completion and will jointly prepare a list of the items remaining to be completed or corrected issuance of a Conditional Letter of Acceptance. If Contractor does not agree that said part of the Work is ready for separate operation by Owner or that separate operation by Owner will not significantly interfere with Contractor's remaining operations, the Contractor must submit their objections and appropriate justifications in writing to the Owner and Engineer and/or Consultant within 5 days of the request by the Owner. Once any objections have been addressed or if there are no objections, the Owner will finalize a list of items to be completed or corrected and will deliver such list to Contractor together with a written recommendation as to the division of responsibilities pending issuance of the Conditional Letter of Acceptance with respect to security, operation, safety, maintenance, warranties, utilities, insurance, and retainage for that part of the Work taken over for operation by Owner. During such operation, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

- 9.3 Correction Period/Warranty - During a period of twenty four (24) months from and after the date of the Conditional Letter of Acceptance, the Contractor shall make all needed repairs arising out of defective workmanship or materials, or both, which in the judgment of the Owner shall become necessary during such period. The Owner shall notify and submit a "Performance Claim Form", which will be completed by the Owner and details the location and nature of needed repairs, to the Contractor. The Contractor shall submit a schedule for inspection and completion of said repairs within three (3) days after the notification of the warranty repairs to be approved by the Owner. If within three (3) days after the receipt of a notice in writing from the Owner, the Contractor shall neglect to make or to undertake with due diligence the aforesaid repairs, the Owner is hereby authorized to make demand of performance from the company issuing the Performance Bond. If the Contractor fails to complete the repairs within the approved schedule, the Owner is hereby authorized to make demand of performance from the company issuing the Performance Bond. In case of an emergency where, in the judgment of the Owner, delay would cause a serious loss or damage, repairs may be made without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.

ARTICLE X. DISPUTES:

- 10.1 GENERAL - Prior to any anticipated litigation between the Owner and the Contractor, both hereby agree that disputed matters shall first be submitted to Owner administrative appellate procedures as described below:

- .1 Except as otherwise provided in this Contract, any dispute concerning a question of fact arising under this Contract which is not disposed of by mutual agreement shall be initially decided by the Owner (as represented by the decision of the Owner) who shall reduce his decision to writing and promptly mail or otherwise furnish a copy thereof to the Contractor. The decision of the Owner shall be final and conclusive unless within thirty (30) calendar days from the date of issuance of such decision by Owner the Contractor mails or otherwise furnishes to the Owner a written notice of appeal addressed to the SAWS President/C.E.O., whose appellate decision on behalf of the SAWS shall be the final and conclusive SAWS decision. In connection with any appeal under this Article, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of the appeal to persons to be promptly appointed by the SAWS President/C.E.O. to review such disputed matters. The SAWS department sponsoring the Project or any other Owner's representative will also be allowed to present information supporting Owner's position.
- .2 Pending final President/C.E.O. decision after a dispute hearing, the Contractor shall proceed diligently with the performance of the Contract and in accordance with the President/C.E.O. decision. Neither the SAWS nor the Contractor is precluded from resorting to litigation or other remedy at law nor in equity to perfect a legal filing prior to the expiration of an applicable statute of limitations or after this Owner administrative review process is completed.

- 10.2 PREVAILING PARTY. In any dispute arising under this Agreement, the following shall apply in the determination of which party is the prevailing party. If a party claiming a right to payment of an amount in dispute is awarded all or substantially all of such disputed amount, then such claiming party shall be the prevailing party. If a party defending against such claim is found to be not liable to pay all or substantially all of the disputed amounts claimed by the claiming party, then the party so defending against such claim shall be the prevailing party. If both Parties prevail with respect to different claims by each of them, then the party who is prevailing with respect to the substantially greater monetary sum shall be deemed the prevailing party; otherwise, if both Parties prevail with respect to monetary sums on different claims, neither of which sums is substantially greater than the other, the tribunal having jurisdiction over the controversy, claims or actions shall in rendering the award determine in its discretion whether and to what extent either party should be entitled to recover any portion of its attorney fees. The Prevailing Party shall be entitled to recover reasonable attorney fees and costs.

ARTICLE XI. SUPPLEMENTAL AND SPECIAL CONDITIONS:

- 11.1 GENERAL - When the Work contemplated by the Owner is of such a character that the foregoing Standard General Conditions of the Contract cannot adequately cover necessary and additional contractual provisions, the Contract Documents may include Supplemental and Special Conditions as described below:
- .1 SUPPLEMENTAL CONDITIONS shall describe any additional procedures and requirements of Contract administration to be followed by the Contractor, Owner, and Owner representatives. Supplemental Conditions may expand upon matters covered by the Standard General Conditions, where necessary.
 - .2 SPECIAL CONDITIONS shall relate to terms, conditions and procedures related to a specific project and that are unique to that project.
- 11.2 ARCHAEOLOGICAL - "Unidentified Archaeological Sites": If the Contractor should encounter archaeological deposits during construction operations, the Contractor must stop excavation immediately and contact the Owner, who will then contact appropriate agencies for an archaeological investigation. The Contractor cannot begin excavation again in this area without written permission from the Owner.
- 11.3 FUNDED PROJECTS - On State or Federally funded projects, the Owner may waive, suspend, or modify any Article in these General Conditions which conflicts with any State or Federal statute, rule, regulation or procedure, where such waiver, suspension, or modification is essential to receipt by the Owner of such State or Federal funds for the Project. In the case of any project financed in whole or in part by State or Federal funds, any Contract standards or provisions required by the enabling State or Federal statute, or any State or Federal rules, regulations or procedures adopted pursuant thereto that conflict with, or preempt these local Standard General Conditions, shall be controlling.

ARTICLE XII. RIGHT TO AUDIT CLAUSE:

- 12.1 By execution of the Construction Contract, the Contractor grants the Owner the right to audit, at the Owner's election, all of the Contractor's records and billings relating to the performance of the Work under the Contract Documents. The Contractor agrees to retain its Project records for a minimum of three (3) years following completion of the Work. The Owner agrees that it will exercise the right to audit only at reasonable hours. Any payment, settlement, satisfaction, or release provided under this Contract shall be subject to the Owner's rights as may be disclosed by any audit.

ARTICLE XIII. VENUE:

This Contract is performed in Bexar County, Texas, and if legal action is necessary to enforce this Contract, exclusive venue shall lie in Bexar County, Texas.

- END -

CONTRACT

«Contract_No»

«Job_No»

STATE OF TEXAS §
COUNTY OF BEXAR §

KNOW ALL MEN BY THESE PRESENTS:

That this Agreement made and entered into this «Board Date» day of «Board Month», A.D.,«Board Year», by and between **THE SAN ANTONIO WATER SYSTEM BOARD OF TRUSTEES**, hereinafter called **THE SAN ANTONIO WATER SYSTEM, COUNTY OF BEXAR, STATE OF TEXAS**, Acting through its Contracting Officer, First Party, hereinafter termed the Owner, and «Company Name», of the City of «City», County of «County», State of «State », Second Party, hereinafter termed the Contractor.

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned to be made and performed by said First Party, (Owner), the said Second Party, (Contractor), hereby agrees with the First Party to commence and complete the construction of certain improvements in the amount of «Written Contract Amt» Dollars «Formatted Price», for the San Antonio Water System Job No(s). , dated «Bid Opening Date», the same being designated as San Antonio Water System Project «Project Name».

The Contractor shall perform all work shown on the Plans and described Specifications and shall meet all requirements of this Agreement, The General and Special Conditions of the Agreement; and such Orders and Agreements for Extra Work as may subsequently be entered by the above named parties to this Agreement.

The Contractor shall not offer, confer, or agree to confer any benefit or gift to any San Antonio Water System employee and Water System employees are prohibited from soliciting, accepting or agreeing to accept any gifts from outside sources; please see Section M. – Gifts or Benefits of the Water System’s Code of Ethical Standards. Section M of the Water System’s Code of Ethical Standards regarding Gifts or Benefits is available on the SAWS Business Center website.

The Contractor hereby agrees to commence work under this Contract on the date indicated in the SAWS written Authorization to Proceed. Under no circumstances shall the work commence prior to the Contractor's receipt of SAWS issued, written Authorization to Proceed. Computation of Contract Time will begin on the construction start date as indicated on the written Authorization to Proceed. All work specified in these Contract Documents shall be completed within «Calendar Days» calendar days from the construction start date indicated on the written Authorization to Proceed.

It is agreed and understood by the Owner and the Contractor that the provisions of Chapter 252, Texas Local Government Code, and/or Chapter 2269, Texas Government Code (as amended) apply to this contract. As applicable, the terms of the aforementioned state law are incorporated herein by reference. Contractor and Owner agree that pursuant to state law, Owner authorizes its duly designated administrative officer (Contracting Officer) to negotiate change orders up to and including the amount of \$100,000.00. It is also agreed and understood that any change orders which increase the cost of the work provided under the contract in excess of 25% of the original contract price are prohibited. The cost of the work provided under the contract may be decreased over 25% of the original contract price with the consent of the Contractor.

The Owner agrees to pay the Contractor in current funds, and to make payments on account, for the performance of the work in accordance with the Contract, at the prices set forth in the Contractor's Proposal, subject to additions and deductions, all as provided in the General Conditions of the Agreement.

STATUTORY PERFORMANCE BOND
Pursuant to Vernon's Texas Government Code
Title 10, Chapter 2253, as amended

Bond No. _____

(Penalty of this Bond must be 100% of Contract Award)

KNOW ALL MEN BY THESE PRESENTS:

That «Company Name» «Street Address» «City and State» «Zip Code» (hereinafter called "Principal"), as Principal, and «Surety Name», a Corporation organized and existing under the laws of the State of «Suretys State », with its principal office in the City of «City of Suretys Principal Office», and authorized under the laws of the State of Texas to act as surety on bonds for principals (hereinafter called "Surety"), are held and firmly bound unto THE SAN ANTONIO WATER SYSTEM BOARD OF TRUSTEES, San Antonio, Bexar County, Texas (hereinafter called "Owner/Obligee"), in the amount of «Written Contract Amt». Dollars «Formatted Price», for the payment whereof, Principal and Surety firmly bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

WHEREAS, Principal has entered into a certain written contract with the Owner/Obligee, dated the «Board Date» day of «Board Month», «Board Year», consisting of «Job No»; «Project Name» (hereinafter called "the Contract"), which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

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

NOW, THEREFORE, if Principal shall repair any and all defects in said work occasioned by and resulting from defect in materials furnished by, or workmanship of, Principal in performance of the work covered by the Contract, occurring during a period of within 24 months from the date of the Contract Completion Certification, therein this obligation shall be null and void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 10, Chapter 2253, as amended, of the Texas Government Code, and all liabilities on this bond shall be determined in accordance with the provisions of this Chapter, to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, or other waiver or amendment of the terms of the Contract or to the work to be performed thereunder, nor any change in the method nor any change in the method or amount of payments stipulated to be made by Owner/Obligee under the Contract, shall relieve Surety of its obligations hereunder, and Surety hereby waives notice of any such change, extension of time, waiver or amendment of the terms of the Contract or to the work to be performed thereunder. The bond shall be automatically extended in time, without formal and separate amendment, to cover full and faithful performance of the Contract in the event of modification of the Contract, regardless of the length of time involved.

IN WITNESS THEREOF, Principal and Surety have signed and sealed this instrument on _____ day of _____, 2016.

Principal

Surety

By _____
Title _____
Address _____

By _____
Title _____
Address _____

Name, Address and Telephone Number of Resident Agent of Surety:

STATUTORY PAYMENT BOND
Pursuant to Vernon's Texas Government Code
Title 10, Chapter 2253, as amended

Bond No. _____

(Penalty of this Bond must be 100% of Contract Award)

KNOW ALL MEN BY THESE PRESENTS:

That «Company Name»«Street Address»«City and State»«Zip Code» (hereinafter called "Principal"), as Principal, and «Surety Name», a corporation organized and existing under the laws of the State of «Suretys State », with its principal office in the City of «City of Suretys Principal Office», and authorized under the laws of the State of Texas to act as surety on bonds for principals (hereinafter called "Surety"), are held and firmly bound unto THE SAN ANTONIO WATER SYSTEM BOARD OF TRUSTEES, San Antonio, Bexar County, Texas (hereinafter called "Owner/Obligee"), in the amount «Written Contract Amt» Dollars «Formatted Price», for the payment whereof, Principal and Surety firmly bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

WHEREAS, Principal has entered into a certain written contract with the Owner/Obligee, dated the «Board Date» day of «Board Month», «Board Year» consisting of «Job No» ; «Project Name» (hereinafter called "the Contract"), which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

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

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 10, Chapter 2253, as amended, of the Texas Government Code, and all liabilities on this bond shall be determined in accordance with the provisions of this Chapter, to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, or other waiver or amendment of the terms of the Contract or to the work thereunder, nor any change in the method nor any change in the method or amount of payments stipulated to be made by Owner/Obligee under the Contract, shall relieve Surety of its obligations hereunder, and Surety hereby waives notice of any such change, extension of time, waiver or amendment of the terms of the Contract or to the work thereunder. The bond shall be automatically extended in time, without formal and separate amendment, to cover full and faithful performance of the Contract in the event of modification of the Contract, regardless of the length of time involved.

IN WITNESS THEREOF, Principal and Surety have signed and sealed this instrument on the _____ day of _____, 2016.

Principal

Surety

By _____
Title _____
Address _____

By _____

Title _____
Address _____

Name, Address and Telephone Number of Resident Agent of Surety:

EXHIBIT B

ADMINISTRATIVE AND OPERATIONAL PROCEDURES FOR CONTRACTOR BID SUSPENSION HEARINGS AND APPEALS

I. SCOPE

These Administrative and Operational Procedures for Contractor Bid Suspension Hearings and Appeals apply to all contractors awarded contracts with SAWS.

The term “contractor” as used in these Procedures means a construction contractor, subcontractor, vendor, supplier, materialman or any other person or entity supplying labor or material to SAWS on a contract basis.

"SAWS Management Officials" means SAWS personnel who are at the Manager level or above and who are involved in the supervision, review or acceptance of services, work or materials provided by contractors under contract with SAWS.

II. GENERAL PROCEDURES

A. If a SAWS Management Official determines that a particular contractor’s responsiveness, capabilities or performance under one or more SAWS contracts is unsatisfactory, the SAWS Management Official may file a complaint with the Chief Operating Officer recommending that the particular contractor be suspended from consideration for award of contracts with SAWS. A complaint may not be filed unless:

- 1) SAWS has sent the contractor at least three letters advising that the contractor is in non-compliance with a contract with SAWS, and the letters each include a warning that further defaults or breaches may lead to a suspension; or
- 2) the contractor has had a previous contract with SAWS terminated for contractor default; or
- 3) either the City of San Antonio or the State of Texas has suspended the contractor.

B. A SAWS Management Official filing a complaint will provide the Contracting Committee with any information he or she may have relating to the Reasons for Contractor Suspension as described in Section 4.9, Contractor Bid Suspension Policy of the General Conditions.

- C. SAWS will maintain the materials relating to any and all complaints filed against a particular contractor in a “complaint file” pertaining to the contractor.
- D. A contractor may be suspended if the contractor is determined by the Contracting Committee to be not sufficiently responsible to warrant consideration for award of contracts with SAWS.

III. RIGHTS AT HEARING

A hearing on a complaint will be held before a Contracting Committee which will review the evidence presented at the hearing and make a determination as to whether the contractor should be suspended. The Committee will select a chair to preside at the hearing. At the hearing, SAWS and the contractor will each have the following rights and opportunities:

- A. to be heard before an impartial committee;
- B. to be represented by an attorney or a representative of choice;
- C. to hear the witnesses and other evidence presented by the opposing party;
- D. to cross-examine adverse witnesses;
- E. to testify on one’s own behalf;
- F. to present witnesses and other evidence on one's own behalf;
- G. to have a record of the hearing made, by transcript, tape, or otherwise;
- H. to have all testimony presented under oath.

IV. COMMITTEE PROCESS

- A. The President/Chief Executive Officer of SAWS shall appoint a standing Contracting Committee comprising of SAWS staff. At least one Committee member will be a Vice President of SAWS and all other Committee members will be Managers or higher. If a standing Contracting Committee member has been involved in the day-to-day administration or supervision of a contract with a contractor being reviewed by the Committee, such Committee member will not serve on the Committee with regard to a complaint or appeal affecting that contractor. The President/CEO may either appoint a substitute or the Committee may proceed with fewer members, but in no event will there be less than three members available at any Committee meeting to hear evidence or take action on a complaint or appeal. The members of the Committee

hearing the complaint will be SAWS Management Officials not directly involved with the contractor being considered for bid suspension.

- B. When a SAWS Management Official submits a complaint to the Chief Operating Officer, the Chief Operating Officer will review the complaint to determine whether to convene the Contracting Committee to hear and act on the complaint. The Committee will be convened on a case-by-case basis.
- C. The Contracting Committee will review evidence, obtain testimony from witnesses, deliberate and vote on the matters brought before the Committee. The Committee will consider (i) all evidence in the complaint file pertaining to the contractor and any previously filed complaints and (ii) any other relevant evidence pertaining to the contractor, including evidence presented by SAWS Management Officials familiar with the contractor's performance.
- D. After considering all relevant evidence, the Contracting Committee will either:
 - 1) take no action other than sending a written warning notice by certified mail, return receipt requested, to the contractor (i) indicating that pursuant to these procedures, the Committee has received a complaint regarding the contractor, (ii) indicating that after reviewing the complaint and related evidence, the Committee has decided, at this time, to take no action regarding the contractor, and (iii) including any other information that the Committee, in its discretion, deems appropriate; or
 - 2) pursuant to these procedures, suspend the contractor from consideration for awards of contracts with SAWS.
- E. If the Contracting Committee decides to suspend the contractor, the Committee will send written notice as described in General Conditions, Section 4.7, Contractor Bid Suspension Policy, indicating the following:
 - 1) that, pursuant to these procedures, the contractor has been suspended from consideration for award of contracts with SAWS;
 - 2) in general terms, the reasons for the suspension;
 - 3) that the suspension commences upon issuance of the notice of suspension;
 - 4) the length of time and other relevant terms of the suspension as delineated in these procedures;

- 5) that bids or proposals will not be accepted or solicited from the contractor, and if they are received, they will not be opened and considered for award during the suspension period; and
- 6) the Contractor's right to appeal the suspension pursuant to these procedures.

V. PROCEDURE AT HEARING

The procedure described below will be followed in a general sense. The Contracting Committee may vary these procedures when necessary because of circumstances.

A. Copies of Exhibits

Whenever possible, the party wishing to introduce exhibits should make sufficient copies ahead of time. This will prevent interruptions and delays of the proceedings. Generally, in addition to those to be used by the party and the witness, copies will be made available to each of the Committee members, one for the official record and one for the representative of the other party.

B. Order of Presentation

- After the beginning formalities, each party will be allowed an opportunity to make a brief introductory statement.
- Initially, SAWS will present the evidence it believes warrants the suspension. As each witness is called, the contractor or the contractor's attorney/representative will have the right to cross-examine the witness after the witness has testified and before the next witness is called. The contractor or the contractor's attorney/representative may object to testimony and exhibits.
- After the presentation of SAWS' evidence, the contractor may present evidence, including his or her own testimony and that of others. As each witness is called, SAWS will have the right to cross-examine each witness after the witness has testified and before the next witness is called. A SAWS Management Official may object to testimony and exhibits.
- After the contractor has presented his/her case, SAWS may recall witnesses and present additional witnesses or evidence, again subject to cross-examination and objections. After this, the contractor may recall witnesses and present additional witnesses or evidence, also subject to cross-examination and objections.
- Each party may be allowed additional time to present further rebuttal evidence.

- After the presentation of the evidence, and before the close of the hearing, each party will have the opportunity to give a brief closing argument or summary of his/her position. The Committee may limit the time available to each of the parties depending on the amount of evidence, issues, or other circumstances the Committee deems appropriate.
- The Committee will ensure the orderly and efficient presentation of the evidence.
- The Committee will rule on any objection to testimony or other evidence.
- The Committee will have the right to prevent any threatening or abusive language or conduct and to exclude witnesses who engage in conduct that is disruptive of the proceedings.
- Stipulations (i.e., agreements between all affected parties) which expedite the proceedings are highly favored. Therefore, both SAWS and the contractor are encouraged to reach agreements regarding the admissibility of documents and the proposed testimony of witnesses. Where both SAWS and the contractor (or his/her attorney/representative) have agreed in writing or “on the record,” affidavits of absent witnesses may be introduced.
- All testimony will be under oath. The Committee chair or his/her designee will administer the oaths.
- In its discretion, the Committee may limit or exclude testimony that is superfluous or irrelevant.
- The Committee will utilize its discretion regarding the amount of time allowed for each proceeding and will have the authority to make decisions that will expedite the proceedings.
- In the Committee's discretion, Committee members may ask questions of any witness or party when they believe clarification or further information is needed.
- Unless testifying as an expert, no witness may testify unless he or she has personal knowledge regarding the issues, events, and matters relevant to the hearing.
- The Committee may exclude or limit witnesses who do not have personal knowledge regarding the issues, events, and matters relevant to the hearing.
- The Committee may take other appropriate action when the contractor fails to attend the hearing.

VI. POSTPONEMENTS

Postponements are not favored. However, where emergency circumstances are beyond the control of the contractor, the Contracting Committee will consider postponing the hearing. There will be no guarantee that a second postponement will be granted.

VII. SUSPENSIONS

- A. If the contractor has not been previously suspended pursuant to these procedures, the term of the suspension will be for one year from the date of issuance of the notice of suspension.
- B. If the contractor has been previously suspended pursuant to these procedures, the term of the suspension will be for two years from the date of issuance of the notice of suspension.
- C. After the suspension period is over, the contractor may resume submitting bids for SAWS contracts, provided, however, that initially SAWS will award no more than one contract to the suspended contractor. Only after the satisfactory completion of such contract will SAWS resume considering the award of multiple contracts to the contractor. The period of time after the suspension period is over but before SAWS will consider awarding multiple contracts to the contractor is referred to as the “post-suspension period.” The purpose of the post-suspension period is to provide SAWS an opportunity to confirm that the contractor has demonstrated a satisfactory level of responsibility to warrant the award of further SAWS contracts.
- D. Unless the Contracting Committee, in its sole discretion, decides otherwise, during the suspension period and the post-suspension period the contractor may not provide SAWS with labor or materials as a contractor or a subcontractor through another contractor. (This provision does not apply to the single contract that may be awarded to the contractor by SAWS during the post-suspension period or to any contracts or subcontracts in effect prior to the issuance of the notice of suspension.)
- E. If another contractor (“other contractor”) hires a suspended contractor to provide labor or material on a SAWS project while the contractor is suspended from SAWS work, SAWS may notify the other contractor that he or she has 30 days in which to remove the suspended contractor from the SAWS project. If the other contractor does not remove the suspended contractor from the SAWS project within thirty (30) days, SAWS may either (i) reject the portion of the other contractor’s work performed by the suspended contractor because it was performed by a suspended contractor, or (ii) immediately terminate the other contractor’s contract for the project.

Continued use of a suspended contractor after the thirty (30) day notice and cure period will be an event of default under any contract the other contractor has with SAWS under which the suspended contractor provides labor and/or materials.

- F. Notwithstanding the foregoing, a suspended contractor may provide equipment to SAWS as a subcontractor through another contractor, unless the Contracting Committee, in its sole discretion, decides otherwise. In addition, any contractor may hire employees of a suspended contractor as its employees and use them on a SAWS project.
- G. Unless the Contracting Committee, in its sole discretion, decides otherwise, if one or more of the former principal officers or owners of a suspended contractor forms a new business entity or joins a different business entity, or if the suspended contractor is reconstituted as or made a part of a new or different business entity by any means, the terms of the suspension will apply to the new or different business entity as if the new or different business entity were one and the same as the suspended contractor.
- H. All bids for contracts submitted to SAWS by the contractor prior to the issuance of the notice of suspension and all contracts existing between SAWS and the contractor prior to the issuance of the notice of suspension will remain valid and effective on their own accord regardless of the suspension. Notwithstanding the suspension, both SAWS and the contractor will remain obligated to perform all duties owed one another pursuant to any contracts or subcontracts in effect prior to the issuance of the notice of suspension.

VIII. APPEALS

- A. A suspended contractor may request an appeal hearing regarding the suspension, provided such request is received in writing by the Contracting Committee within ten (10) days after the contractor has received notice of the suspension. If no written request for an appeal hearing is received by the Committee within such ten (10) day period, then the decision to suspend will be final and conclusive.
- B. If an appeal hearing is requested, the Contracting Committee will schedule the appeal hearing to be held within ten (10) days after it receives the written request. The Committee will send the contractor written notice by certified mail, return receipt requested, of the time and place of the hearing.
- C. Both SAWS and the contractor will be allowed to request only one postponement of the appeal hearing. Any such request must be in writing and received by the other party at least five days before the originally scheduled date of the appeal hearing. In the event of a postponement, the Contracting Committee will reschedule the appeal hearing to be held within ten (10) days

of the date that the request for postponement was received. The Committee will send the contractor written notice by certified mail, return receipt requested, of the time and place of the rescheduled hearing.

- D. Appeal hearings will be as informal as reasonable and appropriate under the circumstances. Appeal hearings are intended to be a forum for the contractor to express to the Contracting Committee why the contractor should not be suspended and they are not to be adversarial in nature. A verbatim record is not required.
- E. The contractor may be represented by counsel at the appeal hearing.
- F. Within ten (10) days of the appeal hearing, the Contracting Committee will send the contractor written notice by certified mail, return receipt requested, of its final decision on the matter.
- G. If the Contracting Committee upholds the suspension, the contractor may request review of the decision by the President/Chief Executive Officer of SAWS by filing a written request for review with the President/CEO within ten (10) days of the date of the notice of the result of the appeal hearing. The President/CEO will review the material available from the appeal and meet with the contractor and the Committee either separately or jointly as he or she elects. The President/CEO will then send written notice of his/her decision on the suspension by certified mail, return receipt requested, to the contractor within fifteen (15) days of the date of receiving the request for review by the President/CEO.
- H. Only if the contractor has pursued both appeals and the Contracting Committee and the President/CEO have both upheld the suspension may the contractor seek further recourse by filing suit in an appropriate court of law. Any such suit must be filed within 180 days after the contractor has received notice of the President/CEO's final determination upholding the suspension. After such 180 day limitation period has elapsed, the contractor will be barred from seeking recourse in a court of law regarding the suspension. Such 180 day limitation period is necessary for SAWS to effectively administer the contracts to which it is a party. The 180 day limitation period applies only to the contractor's appeal of suspension and will not affect the obligations or rights of any party under a contract with regard to contract obligations and rights.
- I. The suspension and all other relevant provisions herein will remain in effect throughout any appeals process.
- J. For purposes of determining time periods, notices of appeal and requests for review by the President/CEO will be deemed filed when received by SAWS, and notices of decisions will be deemed given when deposited in the U.S.

Mail, certified mail, return receipt requested, addressed to the contractor at the address given on the notice of appeal or the contractor's last contract with SAWS.

Exhibit "C"

SECURITY PROCEDURES

If work will be conducted on SAWS property, on a SAWS customer's property, involve any SAWS networks or any SAWS facility, the Contractor shall ensure a Prime Contractor Data Form (PCDF) and a Background Screening Letter (provided by SAWS Security) is properly completed for all employees performing work under this Agreement and is on file with SAWS Security prior to work commencement. Any person found to have an unacceptable background check will not be allowed to perform work under this Agreement (A waiver may be given by SAWS Security for an unacceptable finding but must be signed off by the Director of SAWS Security). Sub-Contractors performing work must be listed on the PCDF and the Background Screening Letter. Contractor shall be responsible for the accuracy of information on the PCDF and the Background Screening Letter, and for obtaining any and all required items (badges and parking tags) necessary to fulfilling the work under this Agreement. The PCDF and Background Screening Letter must be sent electronically to securitygroup@saws.org. Contractor shall advise the SAWS Project Manager/Inspector of any employee terminations or changes to personnel performing work under this Agreement and the Contractor shall immediately turn in any and all badges and/or parking tags of employees who are terminated or no longer performing work under this Agreement. If there are any changes in the information contained in the PCDF or the Background Screening Letters, Contractor shall immediately notify the SAWS Project Manager/Inspector and provide updated PCDF and Background Screening Letters, with copies to securitygroup@saws.org.

Contractor, its employees, and agents shall obtain a SAWS photo identification badge (Contractor's Badge) and parking tag, prior to any work on SAWS property, which shall be used only for purposes necessary to perform the work under this Agreement. SAWS Badge Office hours are Monday, Wednesday and Friday 8:00am to 12:00pm excluding SAWS holidays (hours are subject to change). Security staff can be contacted at (210) 233-3177 or (210) 233-3338. A replacement fee may be charged for lost or damaged badges or parking tags. As a condition of final payment, Contractor shall return all badges and parking tags to the Security Office. In the event Contractor fails to return all security badges and parking tags, in addition to any other rights or remedies to which SAWS may be entitled at law or in equity, SAWS may withhold from payment to the Contractor the sum of \$500.00 dollars per badge or parking tag as liquidated damages. Contractor agrees that the actual amount of damages for failure to return the badges and/or parking tags are difficult to determine, and the liquidated damages herein are not a penalty, but are a reasonable estimate of the costs and expenses that may be incurred by SAWS for failure to return the badges or parking tags.

SAWS facilities require a SAWS employee to physically escort Contractor at all times. SAWS may, in its sole discretion, waive the escort requirements if the PCDF and a "clean" Background Screening Letter, signed by an authorized representative of Contractor are approved by SAWS Security.

Sub-Contractors must always be under escort of the Contractor while performing work on any SAWS property. Sub-Contractors must display either a company photo badge, with name, or a valid driver's license at all times while working on any SAWS property. Contractor is solely responsible for the actions of its employees, agents, sub contractors and Contractors.

Contractor **MUST** be prepared for additional security requirements at its expense if violations of SAWS Security procedures are noted. Some examples of additional requirements include hiring of SAWS approved security guards, temporary fencing, mobile Closed Circuit Television Monitoring trailer(s), or extra lighting. Notwithstanding anything herein to the contrary, any provisions in these Security Procedures that may appear to give SAWS the right to direct Contractor as to details of doing any work under this Agreement or to exercise a measure of control over any security measures or such work shall be deemed to mean that Contractor shall follow the desires of SAWS in the **results** of the work or security measures only.

Advance coordination by Contractor with SAWS Security for these security requirements is necessary to ensure no delays with timely performance of the work. In the event Contractor fails to comply with SAWS Security requirements, SAWS may, with no penalty or claim against SAWS:

- Issue a Work Stoppage Order until the security violation (s) are remedied
- Ask any unidentified or improperly identified person or equipment to leave SAWS site immediately and not return until items are remedied.

Request for Taxpayer Identification Number and Certification

**Give Form to the
 requester. Do not
 send to the IRS.**

Print or type See Specific Instructions on page 2.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
	2 Business name/disregarded entity name, if different from above	
	3 Check appropriate box for federal tax classification; check only one of the following seven boxes: <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____ Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner. <input type="checkbox"/> Other (see instructions) ▶ _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <i>(Applies to accounts maintained outside the U.S.)</i>
	5 Address (number, street, and apt. or suite no.)	Requester's name and address (optional)
	6 City, state, and ZIP code	
	7 List account number(s) here (optional)	

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number	
or	
Employer identification number	

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here	Signature of U.S. person ▶	Date ▶
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at www.irs.gov/fw9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)

- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding? on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

Note. If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following persons must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States:

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Publication 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items:

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 28% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the Part II instructions on page 3 for details),

3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code* on page 3 and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships* above.

What is FATCA reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code* on page 3 and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account, list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note. ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C Corporation, or S Corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box in line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box in line 3.

Limited Liability Company (LLC). If the name on line 1 is an LLC treated as a partnership for U.S. federal tax purposes, check the "Limited Liability Company" box and enter "P" in the space provided. If the LLC has filed Form 8832 or 2553 to be taxed as a corporation, check the "Limited Liability Company" box and in the space provided enter "C" for C corporation or "S" for S corporation. If it is a single-member LLC that is a disregarded entity, do not check the "Limited Liability Company" box; instead check the first box in line 3 "Individual/sole proprietor or single-member LLC."

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space in line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

- 1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)
- 2—The United States or any of its agencies or instrumentalities
- 3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities
- 4—A foreign government or any of its political subdivisions, agencies, or instrumentalities
- 5—A corporation
- 6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession
- 7—A futures commission merchant registered with the Commodity Futures Trading Commission
- 8—A real estate investment trust
- 9—An entity registered at all times during the tax year under the Investment Company Act of 1940
- 10—A common trust fund operated by a bank under section 584(a)
- 11—A financial institution
- 12—A middleman known in the investment community as a nominee or custodian
- 13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 5 ²
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

¹ See Form 1099-MISC, Miscellaneous Income, and its instructions.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note. You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited Liability Company (LLC)* on this page), enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note. See the chart on page 4 for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at www.ssa.gov. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/businesses and clicking on Employer Identification Number (EIN) under Starting a Business. You can get Forms W-7 and SS-4 from the IRS by visiting IRS.gov or by calling 1-800-TAX-FORM (1-800-829-3676).

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note. Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if items 1, 4, or 5 below indicate otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code* earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

- 1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983.** You must give your correct TIN, but you do not have to sign the certification.
- 2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983.** You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.
- 3. Real estate transactions.** You must sign the certification. You may cross out item 2 of the certification.
- 4. Other payments.** You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).
- 5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions.** You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account)	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Custodian account of a minor (Uniform Gift to Minors Act)	The minor ²
4. a. The usual revocable savings trust (grantor is also trustee) b. So-called trust account that is not a legal or valid trust under state law	The grantor-trustee ¹ The actual owner ¹
5. Sole proprietorship or disregarded entity owned by an individual	The owner ³
6. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	Give name and EIN of:
7. Disregarded entity not owned by an individual	The owner
8. A valid trust, estate, or pension trust	Legal entity ⁴
9. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
10. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
11. Partnership or multi-member LLC	The partnership
12. A broker or registered nominee	The broker or nominee
13. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
14. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships* on page 2.

*Note. Grantor also must provide a Form W-9 to trustee of trust.

Note. If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records from Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Publication 4535, Identity Theft Prevention and Victim Assistance.

Victims of identity theft who are experiencing economic harm or a system problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at: spam@uce.gov or contact them at www.ftc.gov/idtheft or 1-877-IDTHEFT (1-877-438-4338).

Visit IRS.gov to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

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1. **DATE (MM/DD/YYYY)** – this is the date the Certificate is generated;

2. **PRODUCER** – insert the complete name and address of the insurance agency or broker issuing this Certificate; in the adjacent cell (located just to the right of the PRODUCER cell) include CONTACT PERSON’s name, office phone, Fax number(s) and e-mail address.

3. **INSURED** – enter the complete legal name and address of the Consulting Firm, the Contractor’s Company or the Supplier’s Company (to include any dba used);

4. INSURERS AFFORDING COVERAGE

- a. **INSURER A** through **E** – enter the insurance carrier’s complete Operating Company name; **or**
- b. **NAIC #** - enter National Association of Insurance Commissioners (5 – digit) insurance carrier ID number.

NOTE:

If the name of the Insurer used cannot be located in the A.M. Best Directory, then the NAIC # will be required.

5. CERTIFICATE NUMBER/REVISION NUMBER

These two data fields, if utilized by the insurance agency or insurance broker, could be used as a quick reference number; SAWS does not require this to be used.

6. COVERAGES

- a. **INSURER Letter (INSR/LTR)** column - place the corresponding letter of the insurance carrier affording coverage by each respective type of insurance coverage;

- b. **TYPE OF INSURANCE:**
 - 1) **GENERAL LIABILITY:**
 - a) **COMMERCIAL GENERAL LIABILITY** – place an “X” in the space provided;

 - b) **OCCUR** (Occurrence based form) - place an “X” in the space provided;

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c) **GEN'L AGGREGATE LIMIT APPLIES PER:**

- For *Construction Contracts* - place an "X" in the box right in front of the word **PROJECT**; or
- For all *Other Contracts* - an "X" in the box right in front of either the word **POLICY** or **LOCATION** is acceptable.

d) **ADDL INSR and SUBR WVD** columns:

The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an "X" whether this line of insurance coverage is endorsed with both the Additional Insured and the Waiver of Subrogation.

The use of these two columns **alone** does not meet SAWS Insurance Specifications.

SAWS requires the following specific endorsement wording for the Additional Insured and Waiver of Subrogation endorsements, to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

Additional Insured:

Either use:

"The Automobile Liability, **Commercial General Liability** and Umbrella Liability policies include a blanket automatic Additional Insured endorsement that provides additional insured status to the Certificate Holder (SAWS) and the City of San Antonio only when there is a written contract between the named Insured and the Certificate Holder that requires such status."

Or use:

"The Automobile Liability, **Commercial General Liability** and Umbrella Liability policies are endorsed naming the San Antonio Water System and the City of San Antonio as an Additional Insured."

Waiver of Subrogation:

Either use:

The Automobile Liability, **Commercial General Liability** and Workers' Compensation and Umbrella Liability policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of

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San Antonio that requires such status.

Or use:

“The Automobile Liability, **Commercial General Liability**, Workers’ Compensation and Umbrella Liability policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

- e) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE (MM/DD/YYYY),** and **POLICY EXPIRATION DATE (MM/DD/YYYY)**;
- f) The minimum policy **LIMITS** for the Commercial General Liability coverage are as follows:

\$ 1,000,000.00	Occurrence Limit
2,000,000.00	General Aggregate
1,000,000.00	Products/Completed Operations Aggregate (See NOTE below)
1,000,000.00	Personal and Advertising Injury

NOTE:

The above limits for Products/Completed Operations Aggregate for all Construction Contracts is \$2 million.

2) **AUTOMOBILE LIABILITY:**

- a) Place an “X” in the box in front of each appropriate auto category for which coverage applies.
- b) **ADDL INSR and SUBR WVD** columns:

The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an “X” whether this line of insurance coverage is endorsed with both the Additional Insured and the Waiver of Subrogation.

The use of these two columns **alone** does not meet SAWS Insurance Specifications.

SAWS requires the following specific endorsement wording for the Additional Insured and Waiver of Subrogation endorsements, to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

Additional Insured:

Either use:

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“The **Automobile Liability**, Commercial General Liability and Umbrella Liability policies include a blanket automatic Additional Insured endorsement that provides additional insured status to the Certificate Holder (SAWS) and the City of San Antonio only when there is a written contract between the named Insured and the Certificate Holder that requires such status.”

Or use:

“The **Automobile Liability**, Commercial General Liability and Umbrella Liability policies are endorsed naming the San Antonio Water System and the City of San Antonio as an Additional Insured.”

Waiver of Subrogation:

Either use:

The **Automobile Liability**, Commercial General Liability and Workers’ Compensation and Umbrella Liability policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of San Antonio that requires such status.

Or use:

“The **Automobile Liability**, Commercial General Liability, Workers’ Compensation and Umbrella Liability policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

- c) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE (MM/DD/YYYY)**, and **POLICY EXPIRATION DATE (MM/DD/YYYY)**.
- d) The typical minimum limits of liability for bodily injury and property damage **combined** for this line of insurance coverage shall be not less than \$1,000,000.00 each accident.

NOTE:

If the Contractor’s Pollution Liability policy is required and the Contractor’s Pollution Liability policy **is not endorsed** to provide transportation coverage beyond the boundaries of the job site the Commercial/Business Automobile Liability policy must have the CA9948 endorsement (“**Pollution Liability – Broadened Coverage for Covered Autos – Business Auto, Motor Carrier and Truckers Coverage**” forms) - the following statement noting this endorsement shall be placed either in the blank area just below the NON_OWNED AUTOS wording on the Certificate **or** in the **DESCRIPTION OF OPERATIONS** section of the Certificate:

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“Contractor’s Commercial/Business Automobile Liability insurance coverage is endorsed with the CA9948 endorsement to provide transportation coverage beyond the boundaries of the job site.”

Policy must also be endorsed with MCS90 endorsement when hazardous material(s) are being transported.

3) **EXCESS/UMBRELLA LIABILITY** (where applicable):

- a) Coverage form used - place an “X” in the appropriate box that identifies the coverage form under which this Policy is written: **UMBRELLA LIAB** or **EXCESS LIAB**; and
- b) Occurrence or Claims-Made basis - SAWS requires an “X” be placed in the box right in front of the word **OCCUR**;
- c) **ADDL INSR and SUBR WVD** columns:

The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an “X” whether this line of insurance coverage is endorsed with both the Additional Insured and the Waiver of Subrogation.

The use of these two columns **alone** does not meet SAWS Insurance Specifications.

SAWS requires the following specific endorsement wording for the Additional Insured and Waiver of Subrogation endorsements, to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

Additional Insured:

Either use:

“The Automobile Liability, Commercial General Liability and **Umbrella Liability** policies include a blanket automatic Additional Insured endorsement that provides additional insured status to the Certificate Holder (SAWS) and the City of San Antonio only when there is a written contract between the named Insured and the Certificate Holder that requires such status.”

Or use:

“The Automobile Liability, Commercial General Liability and **Umbrella Liability** policies are endorsed naming the San Antonio Water System and the City of San Antonio as an Additional Insured.”

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Waiver of Subrogation:

Either use:

The Automobile Liability, Commercial General Liability and Workers' Compensation and **Umbrella Liability** policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of San Antonio that requires such status.

Or use:

“The Automobile Liability, Commercial General Liability, Workers' Compensation and **Umbrella Liability** policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

d) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE (MM/DD/YYYY),** and **POLICY EXPIRATION DATE (MM/DD/YYYY).**

e) The minimum limits* of liability for this line of insurance coverage shall be:

<u>\$ 2,000,000.00</u>	<u>Occurrence Limit</u>
<u>2,000,000.00</u>	<u>General Aggregate</u>

*The above limits may vary from \$5 million to \$50 million depending on the degree of and potential for greater liability exposure to SAWS. Check the General Conditions – Special Conditions section of the Bid document for the increased coverage limits.

4) **WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY:**

a) Answer the Question: ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below.

b) **ADDL INSR and SUBR WVD** columns:

The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an “X” whether this line of insurance coverage is endorsed with both the Additional Insured (which is not required by SAWS) and the Waiver of Subrogation. With this line of coverage “N/A” is already placed in the Additional Insured column on the form.

The use of the Waiver of Subrogation column **alone** does not meet SAWS Insurance Specifications.

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SAWS requires the following specific endorsement wording for only the Waiver of Subrogation endorsement, to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

Waiver of Subrogation:

Either use:

The Automobile Liability, Commercial General Liability and **Workers' Compensation** and Umbrella Liability policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of San Antonio that requires such status.

Or use:

“The Automobile Liability, Commercial General Liability, **Workers' Compensation** and Umbrella Liability policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

- c) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE (MM/DD/YYYY),** and **POLICY EXPIRATION DATE (MM/DD/YYYY).**

- d) **WORKERS' COMPENSATION (“WC”):**

SAWS requires having an “X” entered in the box right in front of the words **WC STATUTORY LIMITS.**

- d) **EMPLOYERS' LIABILITY (“E.L.”):**

The minimum policy limits of liability shall not be less than:

\$ 1,000,000.00	E.L. each Accident
1,000,000.00	E.L. Disease - Each Employee
1,000,000.00	E.L. Disease - Policy Limit

- 5) **Row of blank cells** located immediately below the **WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** row:

- a) This empty slot of spaces is typically used for such lines of coverage as **PROFESSIONAL (Engineer's & Architect's E&O) LIABILITY, CONTRACTOR'S POLLUTION LIABILITY, COMMERCIAL CRIME** and/or **BUILDER'S RISK** lines of insurance coverage.

- b) **ADDL INSR and SUBR WVD** columns:

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The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an “X” whether this line of insurance coverage is endorsed with both the Additional Insured and the Waiver of Subrogation.

Since SAWS does not require the PROFESSIONAL (Engineer’s & Architect’s E&O) LIABILITY, CONTRACTOR’S POLLUTION LIABILITY, COMMERCIAL CRIME and/or BUILDER’S RISK lines of insurance coverage to be endorsed with either of the Additional Insured or the Waiver of Subrogation endorsements, do not place anything in either of the **ADDL INSR** or **SUBR WVD** columns.

- c) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE** (MM/DD/YYYY), and **POLICY EXPIRATION DATE** (MM/DD/YYYY).
- d) The minimum limits (the per occurrence/claims-reported limit as well as the policy aggregate limit) for whichever TYPE OF INSURANCE coverage you are declaring in this OTHER space must match with or exceed limits stated in the Insurance Specifications/Requirements contained in the respective Construction Bid, RFP or RFQ document.

NOTE:

- 1. If the line of insurance coverage is either for Professional Liability or Contractor’s Pollution Liability, identify in the **DESCRIPTION OF OPERATIONS** section of the Certificate the coverage form under which the respective line of coverage is written – either:
 - a. Claims-made form; **or**
 - b. Occurrence basis.
- 2. In instances where the coverage form used is Claims-made include the “Retro- Active date” according to the following:
 - a. For all contracts requiring Professional Liability and/or Contractor’s Pollution Liability coverage, the “**Retro-Active date**” shall be the Project start date or earlier and must be identified in the **DESCRIPTION OF OPERATIONS** section of the Certificate.
 - b. That date must be maintained (carried forward) as the “**Retro-Active date**” throughout the life of the Project/Contract to include the two-year warranty period (if required) following the close out of the Project/Contract.
- 3. If the Occurrence based coverage form is declared, no further information is required; and

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4. If the Contractor’s Pollution Liability insurance coverage is required, the policy shall be endorsed to provide transportation coverage beyond the boundaries of the job site – the following statement noting this endorsement shall be placed in the **DESCRIPTION OF OPERATIONS** section of the Certificate;

“Contractor’s Pollution Liability insurance coverage is endorsed to provide transportation coverage beyond the boundaries of the job site.”

If the Contractor’s Pollution Liability policy is **not endorsed** to provide transportation coverage beyond the boundaries of the job site then the Commercial/Business Automobile Liability policy must have the CA9948 endorsement (**“Pollution Liability – Broadened Coverage for Covered Autos – Business Auto, Motor Carrier and Truckers Coverage” forms**) - the following statement noting this endorsement shall be placed either in the blank area just below the NON_OWNED AUTOS wording on the Certificate **or** in the **DESCRIPTION OF OPERATIONS** section of the Certificate:

“Contractor’s Commercial/Business Automobile Liability insurance coverage is endorsed with the CA9948 endorsement to provide transportation coverage beyond the boundaries of the job site.”

Policy must also be endorsed with MCS90 endorsement when hazardous material(s) are being transported.

**7. DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS
ADDED BY ENDORSEMENT/SPECIAL PROVISIONS**

a. DESCRIPTION OF OPERATIONS:

- 1) Enter in this space the SAWS’ Job, Contract and/or Project number such as 09-1111 **or** P-09-011-MR;
- 2) The Project or Contract name may be included but is not required - such as “42” Water Main replacement Maltzberger from Loop 410 to U.S. 281 at Isom Road Engineering Design Project **or** Construct 1 MG Composite Potable Water Elevated Storage Tank.

b. Where applicable or as needed, enter into this section, the DESCRIPTIONS of LOCATIONS, VEHICLES and/or EXCLUSIONS ADDED BY ENDORSEMENT.

c. DESCRIPTION OF SPECIAL PROVISIONS:

SPECIAL PROVISIONS to SAWS would include the wording for the Additional Insured and

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Waiver of Subrogation endorsements, declaring the type of policy coverage under which the Professional and Contractor’s Pollution Liability policies are written, 30-day Notice of Cancellation, and other miscellaneous information that may be required; the wording may require a second page to complete.

Special ENDORSEMENT’s wording required on the Certificate:

Additional Insured:

Either use:

“The Automobile Liability, Commercial General Liability and **Umbrella Liability** policies include a blanket automatic Additional Insured endorsement that provides additional insured status to the Certificate Holder (SAWS) and the City of San Antonio only when there is a written contract between the named Insured and the Certificate Holder that requires such status.”

Or use:

“The Automobile Liability, Commercial General Liability and **Umbrella Liability** policies are endorsed naming the San Antonio Water System and the City of San Antonio as an Additional Insured.”

Waiver of Subrogation:

Either use:

The Automobile Liability, Commercial General Liability and Workers’ Compensation and **Umbrella Liability** policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of San Antonio that requires such status.

Or use:

“The Automobile Liability, Commercial General Liability, Workers’ Compensation and **Umbrella Liability** policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

30-day Notice of Cancellation:

“Each of the above described policies is so endorsed requiring SAWS and the City of San Antonio to be provided thirty (30) calendar days, advance written notice of cancellation or non-renewal, and not less than ten (10) calendar days advance written notice for nonpayment of premium.”

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8. CERTIFICATE HOLDER

SAWS shall be shown as the Certificate Holder in the Certificate Holder section located in the bottom half of the standard ACORD Certificate forms as follows:

**San Antonio Water System
c/o Ebix BPO
PO Box 12010-ZD
Ref. (SAWS Contract ID/Bid/Project #)
Hemet, CA 92543**

9. CANCELLATION

Despite the wording in this section of the Certificate SAWS requires the following wording to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

30-day Notice of Cancellation:

“Each of the above described policies is so endorsed requiring SAWS and the City of San Antonio to be provided thirty (30) calendar days, advance written notice of cancellation or non-renewal, and not less than ten (10) calendar days advance written notice for nonpayment of premium.”

10. AUTHORIZED REPRESENTATIVE

The original certificate(s) or form must include at least one of the below acceptable names/signatures:

- a. Agency’s Authorized person’s (wet or stamped) signature;
- b. Agent’s (wet or stamped) signature; or
- c. Agent’s typed in name.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:		
	PHONE (A/C. No. Ext):	FAX (A/C. No):	
INSURED	E-MAIL ADDRESS:		
	INSURER(S) AFFORDING COVERAGE		NAIC #
	INSURER A :		
	INSURER B :		
	INSURER C :		
	INSURER D :		
	INSURER E :		
	INSURER F :		

COVERAGES

CERTIFICATE NUMBER:

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY						EACH OCCURRENCE	\$
	<input type="checkbox"/> COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	\$
	<input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR						MED EXP (Any one person)	\$
							PERSONAL & ADV INJURY	\$
							GENERAL AGGREGATE	\$
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	\$
	<input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC							\$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	\$
	<input type="checkbox"/> ANY AUTO						BODILY INJURY (Per person)	\$
	<input type="checkbox"/> ALL OWNED AUTOS	<input type="checkbox"/>	<input type="checkbox"/>				BODILY INJURY (Per accident)	\$
	<input type="checkbox"/> HIRED AUTOS	<input type="checkbox"/>	<input type="checkbox"/>				PROPERTY DAMAGE (Per accident)	\$
								\$
	UMBRELLA LIAB						EACH OCCURRENCE	\$
	<input type="checkbox"/> EXCESS LIAB						AGGREGATE	\$
	<input type="checkbox"/> OCCUR							\$
	<input type="checkbox"/> CLAIMS-MADE							\$
	DED							\$
	RETENTION \$							\$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						WC STATUTORY LIMITS	OTHER
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)	<input type="checkbox"/>	<input type="checkbox"/>				E.L. EACH ACCIDENT	\$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	\$
							E.L. DISEASE - POLICY LIMIT	\$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER**CANCELLATION**

	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE

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Supplemental Condition

Instruction to Bidders IB-1

Instruction to Bidders IB-1, First Paragraph of Item No. 24, Page IB-7 shall be replaced with the following:

To assist the San Antonio Water System Contracting Office in performing the bidder evaluation and subsequent recommendation of award, the apparent low bidder will submit the following items within one (1) day of the bid opening with the exception of the Record of Performance Item (c) which shall be submitted with the bid proposal. Failure to provide the required information within the specified time, may result in determining a non-responsive bidder.

Article V. – Contractor Responsibilities

Page GC 27: Remove section 5.7.1.1.8 in its entirety and replace with the following:

Installation Floater - Physical Damage Insurance which insures SAWS and the City for damages to all Property Purchased for, or Assigned to, the Project commencing on the start date through completion. Policy limits shall be in an amount equal to the total contract cost contracted herewith. The policy form shall be an All Risk form and shall include coverage for both during transit and while stored at the work site.

.Page GC 33: Section 5.13.5, last sentence shall be replaced with the following:

The Bidder is required to submit a baseline schedule as part of the bid. The baseline schedule shall be a detailed, precedence-style critical path management schedule in Microsoft Project format. The baseline schedule must encompass the entire contract duration from Notice to Proceed to the Contract End Date. This baseline schedule must show a completion date that corresponds to the Contract End Date. The baseline schedule must be inclusive of all work necessary to complete the project including sufficient time necessary for submission and review of submittals, permits, etc. For the purpose of preparing this baseline schedule, all bidders shall assume a notice to proceed date of August 30, 2016. Failure to include this baseline schedule with the bid documents may result in the bidder being considered non-responsive.

Page GC 36: Section 5.18, the first sentence is to be replaced with the following:

No Work, with the exception of such items as curing of concrete, maintenance of barricades, etc., will be allowed by the Owner from sunset to sunrise of the following day, unless directed by the Owner or requested in writing by Contractor and approved by Owner and the ROW Owner.

Article VIII. - Contract Completion Time

Section 8.6 Liquidated Damages for Failure to Complete on Time: of the General Conditions shall be amended as follows:

Add the following to the end of the paragraph:

Liquidated Damages, for the purpose of this contract, will be assessed at **\$3,300.00 per day** in addition to Remedial Requirements of Consent Decree that will be assessed for **each day** that the Contractor fails to complete the Contract by the time specified in the Contract Documents as follows:

1 st – 30 th Day	\$ 750.00 per day
31 st – 60 th Day	\$1,500.00 per day
61 st – 180 th Day	\$2,500.00 per day
More than 180 Days	\$4,000.00 per day

SPECIAL CONDITIONS

SC1. A Geotechnical Report has been developed for SAWS on this project and upon request will be made available for Contractors for informational purposes only. Please contact Rosalee Arcos at Rosalee.Arcos@saws.org or fax to 210-233-4493. SAWS will require the execution of a SAWS disclaimer form by the Contractor as a condition of and prior to the release of the report.

SC2. Article IV. Contract Administration

Section 4.4 of the General Conditions shall be amended as follows:

CONTRACTORS – The Contractor shall perform the Work with its own organization or at least 40% of the total original contract price.

The term to “perform the Work with its own organization” is defined herein as utilizing only:

- Workers employed and paid directly by the Contractor or a wholly owned subsidiary of the contractor.
- Equipment owned by the contractor or its wholly owned subsidiary.
- Rented or leased equipment operated by the Contractor’s, or its wholly owned subsidiaries, employees.
- For purposes of determining the value of the Work self-performed, the amount shall include all materials incorporated into the Work where the majority of the value of the Work involved in incorporating the material is performed by the Contractor’s own Organization, including wholly owned subsidiary; and
- Labor provided by staff leasing firms licensed under Chapter 91 of the Texas Labor code for non-supervisory personnel if the contractor or wholly owned subsidiary maintains direct control over the labor.”

The remaining sections of Article IV shall remain the same.

SC3. CONSENT DECREE NOTICE PROVISION

CONSENT DECREE NOTICE PROVISION

The San Antonio Water System (“SAWS”), the United States of America and the State of Texas have entered into a Consent Decree in Civil Action No. 5:13-cv-00666-DAE, United States of America and State of Texas v. San Antonio Water System, in the United States District Court for the Western District of Texas, San Antonio Division (the “Consent Decree”). A copy of the Consent Decree is available at

Work performed pursuant to this contract is work that SAWS is required to perform pursuant to the terms of the Consent Decree. In the event of any conflict between the terms and provisions of this Consent Decree Notice Provision and any other terms and provisions of this Contract or the Contract Documents, the terms and provisions of this Consent Decree Notice Provision shall prevail.

A. Retention of documents.

Contractor shall retain and preserve all non-identical copies of all documents, reports, research, analytical or other data, records or other information of any kind or character (including documents, records, or other information in electronic form including, but not limited to e-mails) in its or its sub-contractors' or agents' possession or control, or that come into its or its sub-contractors' or agents' possession or control, and that relate in any manner to this contract, or the performance of any work described in this contract (the "Information"). This retention requirement shall apply regardless of any contrary corporate or institutional policy or procedure or legal requirement. Contractor, Contractor's sub-contractors and agents shall retain and shall not destroy any of the Information until such time as Contractor has received written approval from the General Counsel of SAWS that the Information or any part of the Information may be destroyed. Contractor shall, within 30 days after receipt of a written request by SAWS, deliver the Information to SAWS. Contractor shall instruct and require its agents and sub-contractors performing any part of the work described in this contract to comply with the requirements of this paragraph.

B. Notification of events that may cause delay.

If any event occurs that may delay performance by Contractor, or Contractor's agents or sub-contractors of any work or obligation of any kind under this contract, Contractor shall provide notice in accordance with the Notice Provisions of this contract to SAWS within two (2) business days of the date Contractor or Contractor's agents or sub-contractors first knew that the event might cause a delay. Contractor shall provide a written explanation and description of the reasons for the delay, the anticipated duration of the delay, all actions taken or to be taken to prevent or minimize the delay, and a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay. **TIME IS OF THE ESSENCE** in the performance of the requirements of this paragraph and of any work to be performed by the Contractor in this contract.

C. Liability for stipulated penalties.

The Consent Decree provides that the United States of America, the United States Environmental Protection Agency and the State of Texas may assess stipulated penalties against SAWS upon the occurrence of certain events. To the extent that Contractor or Contractor's agents or sub-contractors cause or contribute to, in whole or in part, the assessment of any stipulated penalty against SAWS, Contractor agrees that it shall pay to SAWS the full amount of any stipulated penalty assessed against and paid by SAWS that is caused or contributed to in whole or in part by any action, failure to act, or failure to act within the time required by any provision of this contract. Contractor shall also pay to SAWS all costs, attorney fees, expert witness fees and all other fees and expenses incurred by SAWS in connection with the assessment or payment of any such stipulated penalties, or in contesting the assessment or payment of any such stipulated penalties. In addition to any and all other remedies to which SAWS may be entitled at law or in equity, Contractor expressly authorizes SAWS to withhold all amounts assessed and paid as stipulated penalties, and all associated costs, fees, or expenses from any amount unpaid to Contractor under the terms of this contract, or from any retainage provided in the contract.

SECTION 01015

SUMMARY OF WORK FOR SANITARY SEWER AND WATER LINE WORK

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section describes the SAWS 15-4503 Phase 1B Project in general as described in paragraph 1.01 E and provides an overview of the extent of the Work to be performed. Detailed requirements and extent of Work is stated in the applicable Specification Sections and as shown on the Drawings. The CONTRACTOR shall provide and pay for all labor, materials, equipment, tools, construction equipment and other facilities and services necessary for proper execution, testing, and completion of the Work required in its entirety as shown on the Drawings and as specified herein.
- B. Summary of Work for the Apache Creek Trail (North) is a separate document Section 01010.
- C. System operations: The existing upstream and downstream collection system must maintain continuous operation during the complete duration of the Project. No complete shutdowns of these systems will be allowed unless otherwise stated in the Contract Documents. Any Sanitary Sewer Overflows resulting from ongoing Construction activities shall be the responsibility of the CONTRACTOR, to include necessary system cleaning, repairs and payment of any local, state or federal fines.
- D. The Work of this Contract will be executed in a unit price and lump sum basis as shown in the Bid Proposal.
- E. The Work generally includes, but is not necessarily limited to, the following (refer to Contract Documents for further definition):
 1. SAWS Job 15-4503
 - a. 18-inch, 21-inch and 24-inch siphon across Apache Creek including siphon structures and riprap.
 - b. 36-inch and 33-inch diameter pipe – Line B – Along Potosi St, Benito Juarez, various easements, Sofia St., easements, S. Minter St., alley way, SW 19th St., Monterrey, easements, Buena Vista St., NW 21st St., alley way and NW 23rd St., from approximately 400 feet east of Zarzamora St. to Houston St.
 - c. 21-inch diameter pipe – Line D – Along W. Houston St. from NW23rd Street to NW 26th St.
 - d. 8-inch sanitary sewer line replacement along Potosi St. from Zarzamora to easement.
 - e. 8-inch water line replacement along Potosi St. from Zarzamora to easement.
 - f. 8-inch water line replacement along W. Houston St. from NW 24th St. to NW 26th St.
 - g. 12-inch water line replacement along SW 19th St. from 200 feet south of Saunders Ave. to S. Monterey St.
 - h. 8-inch sanitary sewer line along alley from 21st St. to 23rd St.
 2. Apache Creek Trail North improvements. See the plans and specifications for the trail improvements included in these contract documents.

3. General

- a. Open cut and trenchless construction of sanitary sewer including bypass pumping, as well as trench safety systems, groundwater dewatering, shoring, sheetpiling and earthwork as required.
- b. Depths of sanitary sewer vary and include areas with depths to bottom of trench in excess of 20 feet. Vertical trench protection should be anticipated due to limited construction work zone. Trench protection will be paid under the Trench Excavation Safety Protection Bid Item, bid accordingly.

F. The Work of this Contract is not necessarily limited to the above descriptions. Accordingly, the CONTRACTOR shall thoroughly familiarize himself with all the Contract Documents in order to fully understand the extent of his Work and be aware of any "cross references".

G. All Work done under this Contract shall conform to all governing local or state ordinances and laws. CONTRACTOR shall arrange and pay all cost of permits and fees, and shall confine his operations to the limits set by law. This includes the requirement for a licensed plumber and irrigator whenever applicable.

H. Portions of this Project may be subject to review and acceptance by various agencies. The CONTRACTOR will be required to coordinate with these agencies for such items as issuance of permits or Work orders, inspections during construction, and final acceptance. The agencies for this Project that may require coordination include but are not limited to the following:

1. City of San Antonio Public Works and Development Services
2. City of San Antonio Parks Department
3. Bexar County Public Works Department
4. San Antonio River Authority
5. Texas Commission on Environmental Quality
6. Texas Water Development Board
7. City Public Service Energy
8. San Antonio Water System
9. US Army Corps of Engineers

I. The CONTRACTOR shall salvage the following equipment and release to OWNER at an onsite location as designated by the OWNER: None

1.02 WORK OF OTHER CONTRACTS

A. During the Work of this Contract, construction by other CONTRACTORS for separate but related Work will be in progress adjacent to the Site. Work by these other CONTRACTORS is generally referenced as Work "by others" in the Contract Documents. The CONTRACTOR is responsible for coordinating his Work with the Work by others as necessary to avoid conflicts. If a conflict cannot be avoided, notify project inspector immediately so conflict can be resolved. The coordination is not to cause a delay of the project.

1.03 WORK SEQUENCE

A. CONTRACTOR shall develop a detailed sequence of work for OWNER and ENGINEER's review and acceptance, prior to beginning construction. The general work sequence requirements are as follows:

1. CONTRACTOR shall install temporary erosion control measures per the Drawings and requirements of these Specifications.
2. CONTRACTOR shall install traffic control measures per the Drawings and requirements of these Specifications for applicable phases of work.
3. CONTRACTOR shall construct proposed 8-inch water line replacement along Potosi St. from Zarzamora to easement prior to construction of proposed 36" or 8" sanitary sewer. Then Contractor shall construct proposed 8" sanitary sewer along Potosi St. from Zarzamora to easement followed by the 36" sanitary sewer.
4. CONTRACTOR shall construct proposed 12-inch water line replacement along SW 19th St. from 200 feet south of Saunders Ave. to S. Monterey St. prior to construction of proposed 36" sanitary sewer
5. Contractor shall construct proposed 12" water line relocation along 21st street prior to construction of proposed 36" sanitary sewer.
6. CONTRACTOR shall construct proposed 8-inch water line replacement along W. Houston St. from NW 24th St. to NW 26th St. prior to construction of proposed 21" sanitary sewer
7. Prior to constructing 36-inch, 33-inch or 21-inch sanitary sewer, pre-televise existing sewer lines as noted in plans.
8. CONTRACTOR shall phase construction of proposed 36"/33" sanitary sewer in such manner to maintain service. Provide bypass pumping as required to maintain service.
9. CONTRACTOR shall phase construction of proposed 21" sanitary sewer in such manner to maintain service. Provide bypass pumping as required to maintain service.

B. Construct Work in stages to provide proper coordination with Work by others. Coordinate the construction schedule and operations with the OWNER'S representative.

1.04 RELOCATATION OF GAS LINES AND RELOCATION/BRACING OF POWER POLES

A. Where relocation of gas lines or power poles or bracing of power poles are required, to perform work, Contractor shall coordinate with CPS Energy in advance to ensure relocation of gas line or power poles does not delay work. No contract days will be added due to delays. Delays are non-compensable.

B. Relocation of gas lines and Relocation/Bracing of Power Poles will be paid for in accordance with Section 01150 MEASUREMENT AND PAYMENT. Delays are non-compensable.

1.05 PRE-TELEVISIONING OF EXISTING SANITARY SEWER

A. Where noted on plans, pre-televise existing sewer line to confirm location of laterals. If laterals are found where none have been identified, notify OWNER. Pre-televising

should be performed in accordance with SAWS SPECIFICATION 866 SEWER MAIN TELEVISION INSPECTION and will be paid for in accordance with Section 01150 MEASUREMENT AND PAYMENT.

1.06 ABANDON SIPHON

- A. Where noted on plans, abandon existing siphon by filling pipe and siphon structures with grout. Submittals, materials and construction methods shall meet the requirements of SAWS Specification 862. Plug and abandon tie-in at siphon outlet. Take care to maintain sanitary sewer downstream of siphon that is still in service.

1.07 APACHE CREEK TRAIL NORTH

- A. Apache Creek Trail North improvements are included in this project. Separate plans and technical specifications are provided.
- B. Match rim elevation of proposed sanitary sewer manholes located within proposed Apache Creek Trail pavement to proposed finished grade of pavement.

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This section defines the method that will be used to determine the quantities of Work performed or materials supplied and establish the basis upon which payment will be made for those items that do not have a SAWS specification to adhere to.

1.02 BID

- A. Required items of Work and incidentals necessary for the satisfactory completion of the Project shall be considered incidental to the specified Work required under this contract and shall be considered as included in the unit prices bid for the various bid items. The CONTRACTOR shall prepare his bid accordingly to allow for such items:
 - 1. Not specifically listed in the bid form.
 - 2. Not specified in this section to be measured or to be included in one of the items listed in the bid form.
 - 3. To include CONTRACTOR'S overhead and profit.
- B. Work includes the furnishing of all labor, materials, equipment, tools, and related items for performing all operations required to complete the Project satisfactorily in place, as specified by the contract documents.

1.03 RELATED WORK AND SPECIFICATIONS

- A. General Conditions, Article V., Section 5.12, Shop Drawings, Product Data and Samples.

1.04 BID ITEMS DESCRIPTION

- A. Pre-Televising Existing Mains
 - 1. Description – The CONTRACTOR shall provide all labor, supervision, tools, equipment, and materials necessary to furnish and perform the work on existing sanitary sewer mains as described in SAWS Standard Specification 866, Sewer Main Televising Inspection.
 - 2. Measurement – Measurement shall be by the linear foot.
 - 3. Payment – Payment for this item will be made at the contract unit price bid for linear foot.
- B. Remove and Re-install Light Pole
 - 1. Description – The CONTRACTOR shall provide all labor, supervision, tools, equipment, and materials necessary to remove and re-install light poles as shown on plans.
 - 2. Measurement – Measurement shall be by each.
 - 3. Payment – Payment for this item will be made at the contract unit price bid for each.
- C. Siphon Inlet Box
 - 1. Description – The CONTRACTOR shall provide all labor, supervision, tools, equipment, and materials necessary to construct siphon inlet box and DIP air vent access as shown on plans.
 - 2. Measurement – Measurement shall be by lump sum.

3. Payment – Payment for this item will be made at the contract lump sum price bid for the siphon box inlet box.
- D. Siphon Outlet Box
1. Description – The CONTRACTOR shall provide all labor, supervision, tools, equipment, and materials necessary to construct siphon outlet box and DIP air vent access as shown on plans.
 2. Measurement – Measurement shall be by lump sum.
 3. Payment – Payment for this item will be made at the contract lump sum price bid for the siphon outlet box.
- E. Brace/Relocate Power Poles Allowance
1. Description – The CONTRACTOR shall coordinate with utility company and provide all labor, supervision, tools, equipment, and materials necessary to brace and /or relocate power poles as required to complete work. No contract days will be added due to delays. This allowance shall reimburse Contractor for direct fees incurred for bracing/relocation of Power Poles. Any unused portion of the allowance will be credited to the Owner by a deduct change order.
 2. Payment – Payment for this item will be made under the allowance included in the bid. Contractor shall provide receipts to SAWS for reimbursement.
- F. Gas Relocation Allowance
1. Description – Description – The CONTRACTOR shall coordinate with utility company and provide all labor, supervision, tools, equipment, and materials necessary to relocate gas lines as required to complete work. No contract days will be added due to delays. This allowance shall reimburse Contractor for direct fees incurred for relocation of gas lines. Any unused portion of the allowance will be credited to the Owner by a deduct change order.
 2. Payment – Payment – Payment for this item will be made under the allowance included in the bid. Contractor shall provide receipts to SAWS for reimbursement.
- G. Speed Hump
1. Description – The CONTRACTOR shall provide all labor, supervision, tools, equipment, and materials necessary to replace existing speed humps to existing condition or better as shown on plans.
 2. Measurement – Measurement shall be by each.
 3. Payment – Payment for this item will be made at the contract unit price bid for each.
- H. Abandon Siphon
1. Description – The CONTRACTOR shall provide all labor, supervision, tools, equipment, and materials necessary to abandon existing siphon as shown on plans. Siphon mains and structures will be abandon in accordance with SAWS spec 862.1, 862.2, 862.3, 862.4.
 2. Measurement – Measurement shall be by lump sum.
 3. Payment – Payment for this item will be made at the contract lump sum price bid for the abandonment of siphon.
- I. Air Bypass Access Vault

1. Description – The CONTRACTOR shall provide all labor, supervision, tools, equipment, and materials necessary to construct Air Bypass Access Vault as shown on plans.
 2. Air Bypass Access Vault is incidental to HDPE Air Vent pipe. Include cost in unit price for 24" HDPE Air Jumper.
- J. Manhole Removal
1. Removal of existing manhole is not paid for separately. Include in cost of proposed manhole

PART 2 PRODUCTS - Not applicable.

PART 3 EXECUTION - Not applicable.

END OF SECTION

J. Manhole Removal

1. Removal of existing manhole is not paid for separately. Include in cost of proposed manhole

PART 2 PRODUCTS - Not applicable.

PART 3 EXECUTION - Not applicable.

END OF SECTION

SECTION 03105
CONCRETE FORMWORK

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section defines requirements for design, construction, erection and removal of concrete formwork.

1.02 RELATED WORK

- A. Coordinate the requirements of this section with all other sections of Division 3 - Concrete.

1.03 REFERENCE STANDARDS

- A. American Concrete Institute (ACI).
 - 1. ACI 117: Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301: Specifications for Structural Concrete.
 - 3. ACI 347: Guide to Formwork for Concrete.

1.04 SUBMITTALS

- A. Submittals shall be made in accordance with all the requirements of the General Conditions and Division 1.
- B. Submit manufacturer's literature, data and installation instructions for all proprietary materials, manufactured form systems, ties and accessories.
- C. Submit proposed method of sealing form tie holes; coordinate with details shown.

1.05 STORAGE AND HANDLING OF MATERIALS

- A. Store materials above ground on framework or blocking. Cover wood for forms and other accessory materials with protective waterproof covering, providing for adequate ventilation. Store materials in accordance with all manufacturer's recommendations.
- B. Form lumber shall be delivered to the job site as far in advance of its use as is practical, and shall be carefully stacked clear of the ground in such a manner as to facilitate air-drying.
- C. Handle materials to prevent damage in accordance with the manufacturer's recommendations.

1.06 QUALITY ASSURANCE

- A. Design Criteria for Formwork, Falsework and Shoring

1. The design and engineering of all concrete formwork, including all shoring, bracing and reshoring, shall be the responsibility of the Contractor and shall be performed by an Professional Engineer licensed in the state where the project is located.
2. Design for loads, lateral pressure, and allowable stresses as described in ACI 347. Design for all lateral loads and other applicable requirements of controlling local building codes.
3. Camber formwork to compensate for anticipated deflection during placement of concrete when required to maintain specified tolerances.
4. Design formwork to be readily removed without impact, shock, or damage to concrete surfaces and adjacent materials.
5. Design for fresh concrete as the pressure exerted by a liquid weighing 150 pounds per cubic foot. Additionally, the rate of concrete placement, concrete temperature and all other pertinent factors shall be taken into account.
6. Design for all construction loads imposed during construction.
7. Forms shall have adequate stiffness to maintain mortar-tightness and true final dimensions of member being constructed within specified construction tolerances.
8. Falsework and shoring shall be designed to provide required strength and stiffness to insure safety and that no excessive settlement or deformation occurs.
9. Falsework and shoring shall be supported on an adequate foundation to provide required strength and stiffness to support the superimposed load without settlement.

B. Alignment Control & Allowable Tolerances

1. Construct and erect formwork in accordance with ACI 117, ACI 301 and ACI 347.
2. True alignment of walls and other vertical surfaces having straight lines shall be controlled and checked. Forming shall be arranged with provisions for adjusting the horizontal alignment after the form has be filled with concrete. Establish a transit line or other reference so that adjustments can be made to an established line while the concrete is still plastic.

PART 2 PRODUCTS

2.01 MATERIALS

A. Lumber & Plywood

1. Properly seasoned and of good quality; free from loose or unsound knots, holes, shakes, splits, decay and other imperfections that would affect its strength or adversely affect the finished concrete surface.

B. Form Linings

1. Fiberboard: Hardwood finished smooth on one side with minimum thickness of 3/16 inch.
2. Plywood: Conforming to APA HDO; exterior exposure waterproof adhesive with minimum thickness of 3/8 inch.

- C. Form Release Agent:
 - 1. A ready to use water based material formulated to eliminate or reduce surface imperfections free of kerosene, mineral oils, waxes or resins.
 - 2. Release agent shall not discolor or injuriously affect the finished concrete surface, subsequent coatings or concrete curing.
- D. Coating for Plastic Forms
 - 1. Alkali-resistant gel-coat.

2.02 FABRICATIONS

A. Forms

- 1. General
 - a. Chamfers: Provide a chamfer on all exposed edges by using either wooden or plastic chamfer strips. Chamfer strips shall be a forty-five degree right triangle in section with the two shorter sides measuring 3/4-inch.
 - b. Waterproofed Surfaces: At surfaces to be waterproofed, provide formwork with sufficient anchor pattern to facilitate bond of the membrane waterproofing.
- 2. Smooth Forms:
 - a. Construct formwork with plywood; tempered, concrete-form hardboard; dressed lumber faced with plywood or fiberboard lining; metal; plastic; or metal-framed plywood-faced panel material acceptable to the Engineer to provide continuous, straight smooth surfaces. Form material will be free of raised grain, torn surfaces, worn edges, patches, dents or other defects. Furnish material in largest practical sizes to minimize the number of joints and, when shown on the drawings, conform to the joint system shown. Form material will have sufficient strength and thickness to withstand the pressure of newly placed concrete without bow or deflection.
 - b. Smooth forms will be used on all concrete surfaces exposed to view or liquid in the completed structure.
- 3. Rough Forms:
 - a. Construct forms of dressed or undressed lumber free of knots, splits, or other defects; plywood; metal; or other material acceptable to the Engineer. Material shall have sufficient strength and thickness to withstand the pressure of newly placed concrete without bow or deflection.
 - b. Rough forms may be used on concrete surfaces that will not be exposed to view or liquid in the completed structure.

B. Void/Cartron Forms.

- 1. Use new carton forms of corrugated cardboard. Forms shall be impregnated throughout with paraffin and laminated with water resistant adhesive. Do not use trapezoidal carton forms.
- 2. Forms of the height indicated on the drawings shall be designed to support the wet concrete plus normal construction loads.
- 3. Soil retainers shall be composed of materials that are not adversely affected by moisture and as directed in the Drawings.

4. Carton forms provided around the perimeter of drilled shafts shall be installed using pre-manufactured sealed void forms with curved edges.
5. Install carton forms according to the manufacturer's recommendation and maintain in a dry condition prior to concrete placement. Carton forms that have not been maintained in a dry condition shall be replaced before concrete is placed.
6. Acceptable Manufacturers:
 - a. VoidForm Products
 - b. Savway Carton Forms
 - c. Voidco Fiberboard Void Forms

C. Metal Forms

1. All specified requirements for "Forms" regarding design, mortar tightness, geometry, bevels, chamfers, bracing, alignment, removal, re-use, oiling, etc. shall apply equally to metal forms.
2. Metal used for forms shall have adequate thickness to remain true to shape. Clamps, pins and other connecting devices shall be designed to hold the forms rigidly together and allow form removal without injury to the concrete.
3. Bolt and rivet heads on exposed surfaces shall be countersunk.
4. Metal forms that do not present a smooth surface free from rust, grease or other foreign materials that discolor concrete shall not be used.

D. Slip Forming

1. Slip forming is not permitted.

2.03 FORM ACCESSORIES

A. Form Ties

1. Form ties shall be of the removable end, permanently embedded body type and shall have sufficient strength and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders.
2. Ties of a type intended to be entirely removed shall be coated with an acceptable lubricant to safeguard against damaging the concrete during such removal. The use of wire ties will not be permitted.
3. Use removable cones of one-inch by one-inch minimum size on the end of the form tie.
4. Grout depressions left in concrete by the cones with non shrink grout after the ends of the cones have been removed.

B. Form Sealer

1. Surface sealer that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces when applied to most forms or form liners. A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting local, state, and federal regulations.

PART 3 EXECUTION

3.01 FORM CONSTRUCTION

A. General

1. All formwork, scaffolds and work platforms shall be safe and conform to OSHA Requirements.
2. Construct and maintain formwork, complying with ACI 347 and this Section so that it will maintain correct sizes of members, shape, alignment, elevation and position during concrete placement and until concrete has gained sufficient strength. Provide for openings, offsets, sinkages, keyways, recesses, moldings, anchorages and inserts, as required.
3. Construct forms for easy removal without damage to concrete surfaces.
4. Formwork shall be sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.
5. Chamfer strips shall be placed in forms to bevel all edges and corners permanently exposed to view, except the top edges of walls and slabs which are shown to be tooled. Edges of formed joints and interior corners shall not be beveled unless shown or specified otherwise. Equipment bases shall have formed beveled edges for all vertical and horizontal corners. Unless otherwise noted, bevels shall be 3/4-inch wide.
6. Form ties shall be employed in such places and at such intervals as to securely hold the forms in position during the placing of concrete, and to withstand the weight and pressure of the wet concrete.
7. Provide temporary openings at the base of column and wall forms and at other points as required to facilitate observation and cleaning immediately before concrete is placed. Temporary opening shall be 2' x 2' in size or as required by Owner's Representative.
8. If runways are required for moving equipment, provide for support of runways with struts or legs resting directly on the formwork or structural member. Do not allow runways or supports to rest on reinforcing steel.
9. Provide openings below large pipe (over 10" diameter) or large embedments to allow adequate concrete fill and minimize honeycombs and voids.
10. Construct forms with such care as to produce concrete surfaces which will not have unsightly or objectionable form marks in exposed concrete surfaces. Forms shall have all contact surfaces thoroughly cleaned before reuse.

B. Forms for Surfaces Exposed to View or Liquids:

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Form ties shall be uniformly spaced and aligned in rows.
2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.

3. Form molding shapes, recesses and projections with smooth-finish materials and install in forms with sealed joints to prevent displacement.
 4. Form exposed corners of beams and columns to produce square, smooth, solid, unbroken lines. Provide all exterior exposed corners with 3/4-inch chamfer.
 5. Arrange facing material in an orderly and symmetrical fashion. Keep the number of seams to a practical minimum. Support facing material adequately to prevent deflection in excess of allowable tolerances.
 6. For flush surfaces exposed to view in the completed structure, overlap previously placed hardened concrete with form sheathing by approximately 1-inch. Hold forms against hardened concrete to maintain true surfaces, preventing offsets or loss of mortar.
- C. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finish slab surface. Provide and secure units to support types of screeds required.
- D. Surface to Receive Membrane Waterproofing: Provide chamfers for external corners in concrete surfaces that will be covered with membrane waterproofing. Provide a continuous reglet at line of top of membrane waterproofing on vertical surfaces. Coordinate location with waterproofing applicators.

3.02 TOLERANCES

- A. Construct formwork so that concrete surfaces will conform to tolerance limits as listed in ACI 117, ACI 301 and ACI 347.
- B. Establish sufficient control points and bench marks as references for tolerance checks. Maintain these references in undisturbed condition until final completion and acceptance of the project.

3.03 ADJUSTMENTS OF FORMWORK

- A. Use wedges or jacks to provide positive adjustment of shores and struts. Wedges used for final adjustment of forms should be fastened in position after final inspection and before concrete placement.
- B. Securely brace forms against lateral deflections. Prepare to compensate for settling during concrete placement.
- C. For wall openings, construct wood forms that facilitate any necessary loosening to counteract swelling of forms.

3.04 PREPARATION OF FORM SURFACES

- A. Before placing concrete, clean surfaces of forms and embedded materials. Remove accumulated mortar, grout, rust and other foreign matter.
- B. Coat forms for exposed or painted concrete surfaces with form oil or form-release agent before placing reinforcement. Cover form surfaces with coating material used in strict accordance with the Manufacturer's printed instructions. Do not allow excess coating

material to accumulate in forms or to contact hardened concrete against which fresh concrete will be placed. Remove coating material from reinforcement before placing concrete.

- C. Other than retained-in-place metal forms, forms for unexposed surfaces may be wet with water immediately before concrete placement in lieu of coating. One exception is that when a possibility of freezing temperatures exists, use of a coating is mandatory.

3.05 REMOVAL OF FORMS

- A. Forms shall not be removed until the concrete has adequately hardened and set. Clamps or tie rods may be loosened twenty-four (24) hours after the concrete is placed; ties, except for a sufficient number to hold the forms in place, may be removed at that time.
- B. Forms on vertical surfaces, when repair of surface defects or finishing is required before concrete is aged, may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations.
- C. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging. Loosen wood forms for wall openings as soon as this can be accomplished without damage to concrete. Formwork for columns, walls, sides of beams, and other parts not supporting weight of concrete may be removed provided that concrete has hardened sufficiently to resist damage from removal operations and provided the removal of these forms will not disturb members supporting the weight of the concrete.
- D. All forms and shoring used to support weight of concrete or any construction loads shall remain in place until concrete has reached the minimum strength specified for removal of forms and shoring. In no case shall forms be removed in less than 4 days.

3.06 REMOVAL STRENGTH

- A. Control Tests: Suitable strength control tests will be used as evidence that concrete has attained specified strength for removal of formwork or shoring supporting weight of concrete in beams, slabs, and other structural members.
 1. Field-Cured Test Cylinders. When field-cured test cylinders reach the specified removal strength, formwork or shoring may be removed from the respective concrete placements. Strength data from field-cured test cylinders shall be furnished by the Contractor.
 2. Laboratory-Cured Test Cylinders. When concrete has been cured as specified for cast-in-place concrete for the same time period required by laboratory-cured cylinders to reach specified strength, the formwork or shoring may be removed from respective concrete placements. Determine the length of time that the concrete placement has been cured by totaling the number of days or fraction of days, not necessarily consecutive, during which the air temperature surrounding the concrete is above 50 degrees F and the concrete has been damp or thoroughly sealed against evaporation and loss of moisture.

- B. Compressive Strengths: The minimum concrete compressive strengths for removal of all formwork supporting the weight of concrete shall be 75 percent of the specified minimum 28 day strength of the class of concrete involved.

3.07 RESHORING

- A. When reshoring is permitted or required, plan operations in advance and secure approval of such operations. While reshoring is under way, keep live load off the new construction. Do not permit concrete beams, slab, column or other structural member to be subjected to combined dead and construction loads in excess of loads permitted for developed concrete strength at the time of reshoring.
- B. Place reshores as soon as practicable after stripping operations are complete but in no case later than the end of the working day on which stripping occurs. Tighten reshores to carry the required loads without overstressing construction. Leave reshores in place until tests representative of concrete being supported have reached specified strength.
- C. Floors supporting shores under newly placed concrete shall have their original supporting shores left in place or shall be reshored. The reshores shall be located directly under a shore position above unless other locations are permitted. Extend reshoring over a sufficient number of stories to distribute weight of newly placed concrete, forms and construction live loads in such a manner that design superimposed loads of floors supporting shores are not exceeded.
- D. Reshoring shall comply with ACI 301 and ACI 347.

3.08 FORM REUSE

- A. Do not reuse forms that are worn or damaged beyond repair. Thoroughly clean and recoat forms before reuse. For wood and plywood forms to be used for exposed smooth finish, sand or otherwise dress concrete contact surface to original condition or provide form liner facing material. For metal forms, straighten, remove dents and clean to return to original condition.

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section specifies requirements for all concrete reinforcement.

1.02 RELATED WORK

- A. Coordinate the requirements of this section with all other sections of Division 3, Concrete.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM):
1. ASTM A36: Standard Specification for Carbon Structural Steel.
 2. ASTM A184: Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
 3. ASTM A615: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 4. ASTM A706: Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 5. ASTM A775: Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 6. ASTM A1064: Standard Specification for Carbon Steel Wire and Welded Wire reinforcement, Plain and Deformed, for Concrete.
- B. American Concrete Institute (ACI):
1. ACI 117: Specifications for Tolerances for Concrete Construction and Materials.
 2. ACI 315: Details and Detailing of Concrete Reinforcement.
 3. ACI 318: Building Code Requirements for Structural Concrete.
 4. ACI 350: Code Requirements for Environmental Engineering Concrete Structures.
- C. Concrete Reinforcing Steel Institute (CRSI):
1. CRSI: Manual of Standard Practice.
 2. CRSI: Placing Reinforcing Bars.
- D. American Welding Society (AWS):
1. D1.4: Structural Welding Code – Reinforcing Steel.
- E. Wire Reinforcement Institute (WRI):
1. WWR-500-R: Manual of Standard Practice – Structural Welded Wire Reinforcement.

1.04 SUBMITTALS

- A. Submittals shall be made in accordance with all the requirements of the General Conditions and Division 1.
- B. Certificates: Submit the Manufacturer's certificate giving the properties of steel proposed for use. List the Manufacturer's test number and heat number, chemical analysis, yield point, tensile strength and percent elongation. Also identify on the certificates the proposed location of the steel in the work.
- C. Bill of Materials: Submit bills of materials to be reviewed with shop drawings.
- D. Shop Drawings:
 - 1. Show reinforcement fabrication, bar placement location, splices, spacing and bar designation, bar type, length, size, bending, number of bars, bar support type, and other pertinent information, including dimensions. Information must correspond directly to data listed on the bill of materials.
 - 2. Provide sufficient detail to permit placement of reinforcement without use of design drawings. Reproduction of design drawings for use as shop drawings is not permitted. Do not begin fabrication of reinforcing steel until after shop drawings have been reviewed by the Owner's Representative.
 - 3. Detail shop drawings in accordance with ACI 315.
 - 4. Rebar submittal shall include following information.
 - a. Grade of bars.
 - b. Table of bending dimensions, bar size, bar length, number of bars and spacing.
 - c. The reinforcing shall be listed separately for each structural element (wall, slab, footing, beam, etc.). Each element shall be labeled on the bar list and clearly identified on the shop drawings.
 - d. Each bar shall be identified such as corner bars, tie bars, vertical bars, etc.
- E. Quality Control Submittals.
 - 1. Mechanical Threaded Connections.
 - a. Provide verification that device threads have been checked and meet all requirements for thread quality, in accordance with manufacturer's published methods.
 - 2. Mill Test Reports.
 - a. Provide certified copies, evidencing compliance with the requirements of these Specifications, shall be delivered to the Owner with all deliveries of reinforcing steel.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Unloading, storing and handling bars on the job shall meet CRSI publication "Placing Reinforcing Bars", and the following:
 - 1. Deliver steel with suitable hauling and handling equipment.
 - 2. Tag steel for easy identification.
 - 3. Store to prevent contact with the ground.

4. Protect reinforcing, as far as practicable, from mechanical injury, surface deterioration and rusting caused by exposure to the weather.

1.06 NOTIFICATION

- A. Notify the Owner's Representative at least 48 hours before concrete placement so that reinforcement may be inspected and errors corrected without delaying the work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Deformed Bars: Use Grade 60 deformed bars conforming to ASTM A615 unless indicated otherwise in the drawings.
- B. Welded Wire Fabric:
 1. Welded Deformed Wire Fabric. Conform to ASTM A1064 unless indicated otherwise in the drawings.
 2. Provide wire size, spacing and type as shown.
- C. Marking: Clearly mark all bars and welded wire fabric with waterproof tags showing the number of bars, size, mark, length and yield strength. Mark steel with the same designation as the member in which it occurs. Key marks to the concrete placement number as designated on the concrete place sequence shop drawings.

2.02 MECHANICAL CONNECTIONS

- A. Reinforcing steel bars shall be spliced with a mechanical connection when called for in the drawings. Splices may also be made with a mechanical connection when permitted by the Engineer in writing.
- B. Mechanical Couplers
 1. The mechanical coupler shall meet building code requirements for development in tension or compression. The coupler may be one of two types:
 - a. Positive locking, taper threaded type coupler manufactured from high quality steel. The bar ends must be taper threaded using the manufacturer's requirements.
 - b. Mechanical butt splices utilizing lock-shear bolts and internal serrated grip rails within the coupling sleeve.
 2. The mechanical coupler shall develop both tension and compression to a minimum of 125 percent of the specified yield strength of the reinforcing bar.
 3. Acceptable Products and Manufacturers:
 - a. LENTON taper threaded couplers as manufactured by ERICO.
 - b. Bar Lock mechanical coupler system manufactured by Dayton Superior.
- C. Metal Sleeve
 1. Provide with cast filler metal, capable of developing in tension or compression a minimum of 100 percent of specified ultimate tensile strength of the bar and not less than 150 percent of the specified yield strength.

2. Acceptable Products and Manufacturers:
 - a. CADWELD Full Tensile Strength Splices, as manufactured by ERICO.

2.03 TIE WIRE

- A. Provide 16-gauge, black, soft-annealed wire where tie wire is not closer than 1 inch from surface of form after tying in place.
- B. Provide nylon-, epoxy-, or plastic-coated tie wire to fasten non-coated reinforcing steel, unless tie wire is bent to maintain a minimum of 1 inch from surface of form.
- C. Provide coated tie wire to fasten epoxy coated reinforcing steel.

2.04 BAR SUPPORTS

- A. Provide chairs, riser bars, ties and other accessories made of metal, except as otherwise specified. Bar supports and accessories shall be of the sizes required to provide concrete cover as specified. Metal bar supports and accessories shall be Class 1 or 2 conforming to the requirements of CRSI Manual of Standard Practice.

2.05 FABRICATION

- A. Bending: Shop fabricate bars to the shapes shown on the drawings by cold bending. Bends shall conform to the minimum bend diameters specified in ACI 318. Do not heat, straighten or rebend bars without specific written approval from the Engineer. Field bending of bars is not permitted.
- B. Splices: Locate splices as shown on the drawings. Where it is necessary to splice reinforcement at locations other than shown on the drawings, the splices shall be approved by the Engineer. Use a minimum number of splices located at the points of minimum stress. Stagger splices in adjacent bars. Length of lap splices shall be in accordance with ACI 315, unless called out in the Drawings. When there is a conflict between ACI 315 and the Drawings, the more restrictive provision shall apply.
- C. Fabrication Tolerances:
 1. Bars must conform to the fabrication tolerances listed in all reference specifications. When there is a conflict in the reference specifications the more restrictive requirement shall apply.

PART 3 EXECUTION

3.01 GENERAL

- A. Meet all requirements of the CRSI and WRI documents referenced in this Section.

3.02 CLEANING

- A. Clean reinforcement of all scale, loose or flaky rust or other foreign material, including oil, mud or coating that will reduce the bond to concrete.

3.03 PLACING REINFORCING BARS

- A. Placement in Forms: Use spacers, chairs, wire ties and other accessory items necessary to properly assemble, space and support reinforcing. Wire ties through forms and temporary spacers will not be allowed. Provide accessories of sufficient number, size and strength to adequately prevent deflection or displacement of reinforcement due to construction loads or concrete placement. Use appropriate accessories to position and support bolts, anchors and other embedded items. Tie reinforcing bars at each intersection and to accessories. Blocking reinforcement with concrete or masonry is prohibited.
- B. Placement for Concrete on Ground: Support reinforcement on precast concrete blocks spaced at approximately 3 feet on centers each way. Use a minimum of one block for each 9 square feet. Tie blocks to at least one reinforcing bar using tie wires embedded in the block.
- C. Placement Tolerances: Meet the placement tolerances listed in all reference specifications. When there is a conflict in the reference specifications the more restrictive requirement shall apply.
- D. Interferences: If reinforcing interferes with the location of other reinforcing steel, conduits or embedded items, bars may be moved within specified tolerances or one bar diameter whichever is greater. If greater movement of bars is required to avoid interference, notify the Owner's Representative. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without approval of the Owner's Representative.
- E. Protection, Spacing and Positioning:
 - 1. Conform to reviewed shop drawings, Project Drawings, and all applicable reference specifications. When there is a conflict in the reference specifications the more restrictive requirement shall apply.
 - 2. Bundle or space bars as approved on shop drawings, instead of bending where construction access through reinforcing is necessary.
- F. Splices:
 - 1. Do not splice bars, except at locations shown on the Drawings or the reviewed shop drawings, without approval of the Engineer.
 - 2. Lap Splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
 - 3. Stagger splices in adjacent bars.
- G. Construction Joints.
 - 1. Place reinforcing continuous through construction joints.
- H. Reinforcement Around Openings:
 - 1. Place an equivalent area of steel around pipe or opening and extend on each side sufficiently to develop bond in each bar unless otherwise noted in the Drawings.

2. Refer to Details on Drawings for bar extension length of each side of opening.
3. Where welded wire fabric is used, provide extra reinforcing using fabric or deformed bars.

3.04 PLACING WELDED WIRE FABRIC

- A. Install wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh plus 2 inches, or 6 inches, whichever is larger. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.
- B. Tie laps and splices securely at ends and at least every 24 inches with 16-gauge black annealed steel wire.
- C. Place welded wire fabric on concrete blocks at proper distance above bottom of slab and rigidly support equal to that furnished for typical deformed bar reinforced steel.
- D. Do not use fabric that has been rolled. Install flat sheets only.

3.05 FIELD BENDING

- A. Field bending of reinforcing steel bars is not permitted.

3.06 FIELD CUTTING

- A. Reinforcing bars cut on the job shall be cut by shearing or sawing. Do not cut bars with a cutting torch.

3.07 MECHANICAL SPLICES AND CONNECTIONS

- A. Use only in areas shown in the Drawings or specifically approved in writing by the Engineer.
- B. Install as required by Manufacturer.
- C. Carefully inspect each splice and verify that each component meets Manufacturer's requirements.
- D. Maintain minimum edge distance and concrete cover.

END OF SECTION

SECTION 03250

CONCRETE JOINTS AND EMBEDDED ITEMS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section specifies requirements for all concrete joints and embedded items for all cast-in-place concrete.

1.02 RELATED WORK

- A. Division 3 – Concrete
- B. Division 5 - Metals
- C. Division 11 - Equipment
- D. Division 15 - Mechanical
- E. Coordinate work of this section with all other sections to obtain a proper installation. Review all drawings and specifications for additional requirements for joints and embedded items.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM):
 1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 2. ASTM C881 - Standard Specifications for Epoxy-Resin-Base Bonding Systems for Concrete.
 3. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 4. ASTM C1059 - Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
 5. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
 6. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 7. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 8. ASTM D1751 - Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 9. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 10. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness.

11. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.
12. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

B. American Concrete Institute (ACI)

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 503.2 - Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive.

C. U.S. Army Corps of Engineers (CRD)

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

1.04 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions and Division 1 - General Requirements.

B. Shop Drawings. Submit shop drawings showing all concrete joints, proposed sequences for concrete placement and type of concrete specified.

C. Product Data.

1. Submit manufacturer's technical literature on all products proposed for review. The submittal shall include the manufacturer's installation and/or application instruction.
2. When substitutions are proposed for acceptable brands of materials specified herein, submit brochures and samples of proposed substitutions to the Engineer for approval before delivery to the project.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All materials used for joints in concrete shall be stored and covered to prevent contact with the ground and to avoid contact with weather and direct sunlight. Follow all additional requirements of the manufacturer.

PART 2 PRODUCTS

2.01 CONCRETE EXPANSION JOINTS (GENERAL)

A. Expansion Joint Sealant

1. Single or multi-component cold-applied polyurethane elastomeric joint sealant conforming to ASTM C920. Sealant must be appropriate for the specific application. Provide joint primer according to Manufacturer's recommendation.
2. Material Properties:
 - a. Ultimate hardness (ASTM D2240, Type A, Shore): 20 to 45.
 - b. Tensile strength (ASTM D412): 200 psi minimum.
 - c. Ultimate elongation (ASTM D412): 400% minimum.
 - d. Tear strength (ASTM D624, die C): 75 psi per inch of thickness, minimum.
 - e. Color: gray.

- B. Expansion Joint Filler
 - 1. Resilient non-bituminous material conforming to ASTM D1752. Material must be compatible with the joint sealant.
- C. Joint Accessories
 - 1. Backer Rod
 - a. Extruded closed-cell polyethylene foam rod compatible with the joint sealant. Rod shall be 25% larger than the joint opening.
 - 2. Bond Breaker Tape
 - a. Polyethylene or TFE-fluorocarbon self adhesive tape, compatible with the joint sealant.

2.02 CONCRETE EXPANSION JOINTS (EXTERIOR ROADWAY & PAVEMENTS ONLY)

- A. Expansion Joint Sealant
 - 1. Hot-poured elastic joint sealant conforming to ASTM D6690. Sealant must be appropriate for concrete pavement. Provide joint primer according to Manufacturer's recommendation.
- B. Expansion Joint Filler
 - 1. Preformed bituminous type conforming to ASTM D994. Material must be compatible with the joint sealant.

2.03 CONCRETE BONDING AGENT

- A. Concrete Exposed to Water and/or Chemicals
 - 1. ASTM C881, Type IV. Grade and Class shall be as required for the project application. A field service representative of the Manufacturer shall be available during initial application to instruct the Contractor in the proper use of the product when so requested by the Engineer or the Owner.
- B. Concrete Not Exposed to Water or Chemicals
 - 1. Acrylic bonding agent conforming to ASTM C1059.

2.04 BOND BREAKER

- A. 30-pound asphalt saturated felt or polyethylene membrane.

2.05 EXPANSION JOINT DOWELS

- A. Smooth steel bars shall conform to the requirements of Section 03200. Cut dowels to length at shop or mill before delivery to the site. Dowels must be straight and clean, free of loose flaky rust and loose scale.

2.06 EXPANSION JOINT DOWEL SLEEVES

- A. Standard weight galvanized pipe conforming to ASTM A53.

2.07 WATERSTOPS

- A. General: All waterstop materials shall be compatible with potable water applications per AWWA and any other industry standards.
- B. Polyvinyl Chloride Waterstops
 - 1. Material Requirements
 - a. Waterstops shall be extruded from virgin polyvinyl chloride compound and shall conform to the requirements of the Corps of Engineers Specification CRD-C572. Waterstops shall be uniform in dimension, homogenous and free from porosity. No reclaimed or scrap material may be used.
 - b. Tensile strength: 1400 psi minimum
 - c. Ultimate Elongation: 280 percent minimum
 - 2. Construction Joints
 - a. Ribbed type without center bulb
 - b. 6 inch minimum width
 - c. 3/8 inch minimum thickness
 - 3. Expansion Joints
 - a. Dumbbell type with a minimum 3/4-inch inside diameter center bulb.
 - b. 9 inch minimum width
 - c. 3/8 inch minimum thickness
- C. Hydrophilic Waterstops
 - 1. Hydrophilic waterstop materials shall be bentonite-free and expand by a minimum of 80% of dry volume in the presence of water to form a water-tight joint without damaging the concrete in which it is cast.
 - 2. The material shall absorb water and cause an increase in volume in a completely reversible and repeatable process. The material shall be dimensionally stable after repeated wet-dry cycles with no deterioration in swelling potential.
 - 3. Minimum cross sectional dimensions are 3/16 inch by 3/4 inch.
 - 4. Provide only where specifically indicated in the Project Documents.
- D. Hydrophilic Sealants
 - 1. Hydrophilic sealant shall be compatible with hydrophilic waterstop and shall firmly adhere to concrete, metal and PVC in a dry or damp condition. When cured, it shall be elastic indefinitely.
- E. Hydrophilic Injection Resin
 - 1. Hydrophilic injection resin shall be acrylate-ester based with a viscosity of less than 50 cps. The resin shall be water soluble in its uncured state, solvent free and non-water reactive. In its cured state it shall form a solid hydrophilic flexible material resistant to permanent water pressure and compatible with bitumen, joint sealants and concrete.

2.08 EPOXY ANCHORS

- A. Refer to Section 05051.

- B. If Section 05051 is not in the Project Documents, provide the following:
1. Provide stainless steel adhesive anchors and hardware complying with ASTM F593, AISI Type 316 headed with stainless steel nuts and washers.
 2. Adhesive system shall Hilti HIT-HY200 adhesive, by Hilti. No substitutions will be considered.
 3. Embedment depth of the anchor shall provide pullout strength equal to the allowable tensile capacity of the anchor, unless otherwise noted in the Drawings. Reduction in pullout strength due to spacing and edge distances shall be made.

2.09 MISCELLANEOUS EMBEDDED METAL ITEMS

- A. Miscellaneous embedded metal items shall conform to the requirements Section 05051 or the section of the specifications to which they apply. In the case of conflicting requirements, the most restrictive requirements shall apply.
- B. Use "Form Saver" or "Threaded Coupler" to avoid drilling holes in the forms.
- C. Paint aluminum contact surfaces with a zinc rich primer where aluminum items are embedded in concrete.

PART 3 EXECUTION

3.01 CONSTRUCTION JOINTS

- A. General
1. Make construction joints only at locations shown and required on the Contract Drawings, the reviewed shop drawings or as directed or approved by the Engineer. Any additional construction joints or relocation of construction joints shown on the drawings that are proposed by the Contractor must be submitted to the Engineer for review.
 2. In addition to construction joints explicitly shown in the Drawings, provide and locate additional construction joints as follows:
 - a. In walls locate vertical construction joints at a maximum spacing of 40 feet.
 - b. In foundation slabs and slabs-on-grade locate construction joints at a spacing of 50 feet maximum. Place concrete in a strip pattern, unless otherwise indicated in the Contract Drawings, to a maximum of 2500 square feet in any one placement.
 - c. In structural slabs and beams locate construction joints at a maximum spacing of 50 feet. Locate construction joints in compliance with ACI 301, unless otherwise indicated in the drawings, to a maximum of 2500 square feet in any one placement.
 3. Allow a minimum of three (3) days to elapse before placing concrete adjacent to a slab or wall previously placed.
 4. All joints shall be perpendicular to main reinforcement; continue all reinforcing across the joint.
 5. Provide waterstops in all wall and slab construction joints as specified or in all water bearing structures, all below grade joints and at locations shown on the Drawings.

B. Construction Joint Preparation

1. The joint surface of the previously cast member or existing concrete in all cases shall be cleaned free of all oil, grease, curing compound, dirt, or laitance, and shall be wetted. Cleaning shall be accomplished by high pressure water jet, wet sand blasting, dry sand blasting, or scrubbing, singly or in combination, as required and shall remove loosened particles of aggregate, damaged concrete at surface, and other substances which may prevent complete adhesion. Remove accumulated concrete on projecting reinforcing steel.
2. Construction joints shall be roughened mechanically to a full amplitude of ¼ inch. Thoroughly clean joint surfaces as described in this Section. Coat joints with neat cement slurry with the consistency of a heavy paste and scrub into surfaces by means of a stiff bristled brush. Place new concrete before cement paste dries. As an alternative to using a neat cement slurry, a bonding agent may be utilized.

3.02 EXPANSION JOINTS

- A. Do not extend reinforcement or other embedded metal items that are continuously bonded to concrete through any expansion joints.
- B. Position dowels accurately if called for in the Drawings. Support dowels against displacement during concrete placement and vibration. Install dowel sleeve grout-tight to prevent bonding of the dowel during concrete placement.
- C. Position expansion joint filler material accurately. Support against displacement during concrete placement and vibration. Place filler the full depth of the member less an allowance to form a groove for sealant as detailed.

3.03 CONTROL JOINTS

- A. Control joints shall be provided in non-water bearing slabs-on-grade only as shown in the Drawings and specified herein.
- B. Make top grooves for control joints in slabs on grade as detailed and seal as specified. Grooves may be made with joint forming strip, via tooling or may be sawed.
- C. If control joints are sawed, properly time cutting with concrete set. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses have developed sufficiently to induce cracking and within twelve (12) hours of concrete placement. The Contractor shall have at least one spare saw available during the sawing operation.
- D. Control joints shall be cleaned and filled with expansion joint sealant. Inject sealant through a nozzle into the bottom of the joint, filling the entire joint space without air voids.

3.04 WATERSTOPS

A. General

1. Provide PVC waterstops in all horizontal and vertical joints in foundation slabs and peripheral walls of all structures up to a minimum of 12 inches above final ground level and all walls and slabs of liquid-containing structures or compartments to a

minimum of 12 inches above maximum liquid level unless specifically shown otherwise on the Drawings.

B. PVC Waterstops

1. Each piece of premolded PVC waterstop must be of maximum practicable length for a minimal number of end joints.
2. All PVC waterstops shall be continuous, and so jointed as to form a complete barrier to the passage of water through any construction, control/contraction or expansion joint.
3. Joints in PVC waterstops shall be made by heat sealing in accordance with the requirements of the Manufacturer. The joints in strips of waterstop shall be such that the entire cross section of the joint shall be dense, homogeneous and free of all porosity. All finished joints shall have a tensile strength of not less than 75% of the material of the strip as extruded.
4. All PVC waterstops shall be installed so that half its width will be embedded on each side of the joint. Tie the waterstop to the reinforcement at a maximum spacing of 18 inches to ensure that the waterstop will be held securely in true position and in straight alignment in the joint during placement and vibration of concrete.
5. Care shall be exercised to ensure that the PVC waterstop is completely embedded in concrete and without voids.

C. Hydrophilic Waterstops

1. Install all hydrophilic waterstops as called for in the Contract Drawings in accordance with the Manufacturer's requirements. Install hydrophilic sealant in accordance with all Manufacturer's requirements.
2. The hydrophilic waterstop shall be installed in a bed of hydrophilic sealant compatible with the hydrophilic waterstop before skinning and curing begins so that any irregularities in the concrete surface are completely filled and the waterstop is bonded to the sealant. After the sealant has cured, secure the waterstop to the concrete in accordance with the Manufacturer's instructions.
3. Prior to installation of the hydrophilic sealant, clean the concrete surface to removed laitance and any other materials that will adversely affect bonding of the sealant to the concrete.

3.05 SEALING JOINTS

- A. Clean, prime and apply sealants in accordance with Manufacturer's recommendations.
- B. Sealant shall be applied when the ambient temperature is between 40° F and 90° F, unless recommended otherwise by the sealant Manufacturer.
- C. During application, exercise care to prevent sealant from spilling onto surfaces adjacent to joints.

3.06 DOWELS

- A. Where indicated on Drawings, install dowels at right angles to construction joints and expansion joints. Align dowels accurately with finished surface. Rigidly hold in place and support during concrete placement.

3.07 SETTING ANCHORS

- A. Anchor embedded reinforcing, bolts and other items as shown on the Drawings into existing concrete with an epoxy in accordance with these Specifications and all Manufacturer's recommendations.

3.08 SETTING ANCHOR BOLTS

- A. Set anchor bolts for structural steel specified in Division 5 - Metals, according to this Section.
- B. Install equipment anchor bolts as required by the equipment Manufacturer.
- C. Provide accurately made templates for positioning anchor bolts.

3.09 EMBEDDED ITEMS

A. Placement

1. Place embedded items to least impair strength of the structure. Obtain approval of locations for embedded items not shown on the Drawings before placement of concrete. Should locations of embedded items be detrimental to the strength of the structure, notify the Owner's Representative and relocate items as directed by the Owner.
2. Do not cut or reposition reinforcing steel to facilitate installation of inserts, conduit, sleeves, anchor bolts, mechanical openings and similar items without prior approval of the Engineer, except that reinforcing bars may be moved one bar diameter or within tolerances specified in the Concrete Reinforcement section without approval of the Engineer as long as minimum specified reinforcing cover requirements are maintained.
3. It is the Contractor's responsibility to coordinate the requirements for embedded items and to ensure that embedded items are properly placed.

B. Installation

1. Accurately position and support embedded items against displacement during concrete placement.
2. Voids in sleeves, inserts, anchors, etc., shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.
3. Conduits, pipes and inserts of aluminum shall not be embedded in structural concrete unless effectively coated or covered to prevent aluminum-concrete reaction or electrolytic action between aluminum and steel.
4. Except when plans for conduits and pipes are approved by the Engineer, conduits and pipes embedded within a slab, wall or beam shall satisfy the following:

- a. They shall not be larger in outside dimension than $\frac{1}{3}$ the overall thickness of slab, wall or beam in which they are embedded.
- b. They shall not be spaced closer than three diameters or widths on center.
- c. They shall not significantly impair the strength of the member.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section contains all requirements for cast-in-place structural concrete.

1.02 RELATED WORK

- A. Coordinate the requirements of this section with all other sections of Division 3, Concrete.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM).
 1. ASTM C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
 2. ASTM C33: Standard Specification for Concrete Aggregates
 3. ASTM C39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 4. ASTM C42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 5. ASTM C87: Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
 6. ASTM C94: Standard Specification of Ready-Mixed Concrete
 7. ASTM C109: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
 8. ASTM C125: Terminology Relating to Concrete and Concrete Aggregates
 9. ASTM C143: Standard Test Method for Slump of Hydraulic Cement Concrete
 10. ASTM C150: Standard Specification for Portland Cement
 11. ASTM C156: Standard Test Method for Water Retention Through Liquid Membrane-Forming-Curing Compounds for Concrete
 12. ASTM C171: Standard Specification for Sheet Materials for Curing Concrete
 13. ASTM C172: Standard Practice for Sampling Freshly Mixed Concrete
 14. ASTM C173: Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
 15. ASTM C191: Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle
 16. ASTM C192: Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

17. ASTM C231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
18. ASTM C260: Standard Specification for Air-Entraining Admixtures for Concrete
19. ASTM C289: Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
20. ASTM C293: Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)
21. ASTM C309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
22. ASTM C494: Standard Specification for Chemical Admixtures for Concrete
23. ASTM C579: Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
24. ASTM C580: Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
25. ASTM C595: Standard Specification for Blended Hydraulic Cements
26. ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
27. ASTM C806: Standard Test Method for Restrained Expansion of Expansive Cement Mortar
28. ASTM C827: Standard Test Method for Change in Height at Early Stages of Cylindrical Specimens of Cementitious Mixtures
29. ASTM C845: Standard Specification for Expansive Hydraulic Cement
30. ASTM C856: Standard Practice for Petrographic Examination of Hardened Concrete
31. ASTM C878: Standard Test Method for Restrained Expansion of Shrinkage-Compensating Concrete
32. ASTM C1077: Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
33. ASTM C1107: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
34. ASTM C1240: Standard Specification for Silica Fume used in Cementitious Mixtures
35. ASTM E329: Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

B. American Concrete Institute (ACI).

1. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavy-weight and Mass Concrete.
2. ACI 214: Guide to Strength Test Results of Concrete

3. ACI 223: Guide for the Use of Shrinkage Compensating Concrete
4. ACI 301: Specification for Structural Concrete
5. ACI 302.1: Guide for Concrete Floor and Slab Construction
6. ACI 304: Guide for Measuring, Mixing, Transporting & Placing Concrete
7. ACI 304.2R: Placing Concrete by Pumping Methods
8. ACI 305R: Guide to Hot Weather Concreting
9. ACI 306R: Guide to Cold Weather Concreting
10. ACI 308: Guide to Curing Concrete
11. ACI 308.1: Specification for Curing Concrete
12. ACI 309: Guide for Consolidation of Concrete
13. ACI 318: Building Code Requirements for Structural Concrete.
14. ACI 350: Code Requirements for Environmental Engineering Concrete Structures

1.04 SUBMITTALS

- A. Submittals shall be made in accordance with all the requirements of the General Conditions and Division 1.
- B. Submit for review a proposed design mix for each concrete strength and class required by these Specifications. Failure to include any items of information noted in this paragraph for a given concrete strength or type will be cause for requirement of a resubmittal. Information to be submitted for each strength and class shall include the following items:
 1. Concrete mix design
 - a. Constituent quantities per cubic yard.
 - b. Sources of all concrete mix components including coarse aggregate, fine aggregate, cement, water, admixtures, and pozzolans where included.
 - c. Cement type and manufacturer, include chemical analysis (mill test report) for each cement type to be used.
 - d. Pozzolan type and source; include chemical analysis for each pozzolan type to be used.
 - e. Water/cement ratio, by weight.
 - f. Air content
 - g. Mix design slump.
 - h. Average compressive strengths conforming to the requirements of ACI 318 – Chapter 5, Section 5.3.2 at 28 days. Provide both average strengths and sample standard deviation. Provide results at 7 and 14 days if available.
 - i. Laboratory shrinkage test results for concrete mix designs, where specified.
 2. Aggregate:
 - a. Laboratory sieve analysis, conforming to ASTM C-33.
 - b. Verification that aggregate is not "deleterious," or "potentially deleterious." Provide ASTM C289 test results if available. Otherwise provide documentation or other certification that aggregate does not contain deleterious substances and has been used without issues on previous projects.

3. Admixtures. Submit Manufacturer's data brochures on all admixtures proposed for use and provide certification of compliance with specified ASTM standards for each admixture.
- C. Submit concrete placement drawings showing pour sequence, lift numbers, locations of all joints, concrete mix being placed, concrete finishes, and all pertinent embedments including embedded plates, sleeves, pipes, conduits, anchors, etc., where applicable. Where the Drawings permit the Contractor to select joint locations, show the selected dimensions on the placement drawings. Approval of the placement drawings shall not relieve the Contractor of the responsibility of placing all concrete and embedments as specified.
 - D. If cold weather or hot weather concrete conditions are anticipated on the Project, submit a work plan for cold weather concreting and/or for hot weather concreting, describing proposed methods and procedures for mixing, delivering, placing, finishing, and curing concrete. Include also procedures to be implemented upon abrupt changes in weather conditions or due to equipment failures. If a plan for either is not submitted and cold or hot weather concrete conditions are present, the Contractor will not be allowed to pour concrete until a plan is received and reviewed as long as cold or hot weather conditions are present on the Project.
 - E. Furnish a delivery ticket for ready mixed concrete to the Owner's Representative as each truck arrives. Each ticket shall provide a printed record of the weight of cement batched and each separate aggregate individually batched. Use the type of indicator that returns for zero punch or returns to zero after a batch is discharged. Clearly indicate the weight of fine and coarse aggregate, cement, and water in each batch, the quantity delivered, the time any water is added, and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of mix trucks.
 - F. Submit Manufacturer's data sheets and product specifications for curing compounds and items specified in other Sections including form release agents, bonding agents, etc. Identify the locations where each will be used in the Work as a part of the submittal.
 - G. Submitted data shall demonstrate compliance with all requirements of this Specification or deviations shall be clearly noted.

1.05 STORAGE OF MATERIALS

- A. Cement: Store cement in watertight buildings, bins or silos to provide protection from dampness and contamination. Improperly stored cement shall not be used. No cement shall be used that has been stored on the site for more than 90 days or that is lumped or caked.
- B. Aggregate: Arrange and use aggregate stockpiles to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates. Build stockpiles in successive horizontal layers not exceeding three feet in thickness. Complete each layer before the next is started. Do not use frozen or partially frozen aggregates.
- C. Sand: Before using, allow sand to drain until a uniform moisture content is reached.

- D. Admixtures: Store admixtures to avoid contamination, evaporation or damage. For those used in the form of suspensions or nonstable solutions, provide suitable agitating equipment to assure uniform distribution of ingredients. Protect liquid admixtures from freezing and other temperature changes which would adversely affect their characteristics.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete work of similar scope and complexity with similar materials as found on this Project.
- B. Manufacturer's Qualifications: An experienced manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment. Manufacturer must be certified by the National Ready Mix Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- C. Testing Agency Qualifications: An experienced independent testing agency, acceptable to authorities having jurisdiction and the Engineer that is qualified according to ASTM C1077 and ASTM E329 to conduct the testing indicated.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from a single source and each admixture from the same manufacturer.
- E. Concrete Consistency
 - 1. Test for slump shall be performed at the job site immediately prior to placing in accordance with ASTM C143. Slump tests shall be performed for each batch of concrete to indicate workability and consistency from batch to batch.
 - 2. If the slump is greater than the specified maximum, the concrete shall be rejected. Concrete showing either poor cohesion or poor coating of the coarse aggregate with paste shall be remixed.
 - 3. If the slump is within the allowable limit, but excessive bleeding, poor workability, or poor finishability are observed, the concrete shall be rejected and changes in the concrete mix shall be made only by an adjustment of one or more of the following:
 - a. The gradation of aggregate.
 - b. The proportion of fine and coarse aggregate.
 - c. The percentage of entrained air, within the allowable limits.
- F. Concrete Temperature
 - 1. Concrete temperature shall be taken immediately before placement with the point of measurement being in the chute or bucket.
 - 2. Perform temperature test for each batch and record result on batch ticket.
- G. Concrete Air Content
 - 1. Test for air content shall be made on a fresh concrete sample for each batch prior to placing in forms.

2. Air content for concrete made of ordinary aggregates having low absorption shall be made in accordance with either ASTM C231, or ASTM C173. If light weight aggregates or aggregates with high absorptions are used, use ASTM C173.

H. Compressive Strength

1. Compression test specimens shall be made, cured and tested in accordance with ASTM C31 and ASTM C39.
2. Compressive strength tests shall be made on cylinders at 7 and 28 days. The value of each test result shall be the average compressive strength of 2 cylinders taken at the same time from the same batch of concrete. For the 28 day cylinders, the strength level shall be satisfactory if the test result exceeds the required design compressive strength and no individual strength result falls below the required design strength by more than 500 psi.
3. Compressive test specimens shall be 6" x 12" cylinders; 4" x 8" cylinders are not permitted.
4. The number of sets of concrete test cylinders to be cast for each concrete pour shall be as follows. A "set" of test cylinders consists of six cylinders, two to be broken and strengths averaged at seven days; and two broken and strengths averaged at 28 days. Two hold cylinders will remain unbroken so that they will be available to be broken upon unforeseen circumstances or upon the option of the Engineer to break cylinders at different times.

Volume of Concrete Poured (CY)	Minimum No. of Sets of Cylinders
0-25	1
26-75	2
76-150	3
151-250	4
251-400	5
401-550	6

I. Failure to Meet Requirements

1. The Owner may withhold payment for any section of concrete which does not meet the requirements of the Plans and Specifications. Withheld payment shall be based upon unit prices established for concrete if available. Payment shall be withheld until the unacceptable concrete has been repaired or removed and replaced or otherwise brought into conformance with the Plans and Specifications.
2. Concrete Strength
 - a. If the 28 day strength test results fall below required values, additional curing may be performed and test cores may be obtained in accordance with ASTM C42 with approval of the Engineer. Additional curing, core removal and testing shall be at the Contractor's expense.
 - b. If the strength results from test cores do not exhibit the required strength, the Owner reserves the right to require strengthening, replacement of substandard materials and/or additional testing at the Contractor's expense.
3. Other Concrete Properties

- a. If concrete properties besides strength do not meet required values, the Engineer may require concrete samples to be obtained in accordance with ASTM C42 and evaluated in accordance with ASTM C856 at the Contractor's expense.
- b. If concrete properties besides strength do not meet required values, and the results of additional examination per ASTM C856 are deemed unsatisfactory at the sole discretion of the Owner, the Owner reserves the right to require strengthening, replacement of substandard materials and/or additional testing at the Contractor's expense.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Cementitious Materials

- 1. Portland Cement:
 - a. Type II or Type I/II conforming to ASTM C 150. Use the same brand of cement upon which the selection of concrete was based. Only one brand of each type will be permitted in any one structure, unless otherwise specified.
 - b. Cement shall be low alkali; The total alkali content calculated as the percentage of sodium oxide (Na₂O) plus 0.658 times the percentage of potassium oxide (K₂O) shall not exceed 0.60.
 - c. Cement used in concrete placed in openings in existing water bearing structures shall be shrinkage compensating cement, ASTM C845.
- 2. Fly Ash:
 - a. Fly ash, when used, shall meet the requirements of ASTM C618, Class F, except as follows:
 - (i) The loss on ignition shall not exceed 4.0%.
 - (ii) The maximum percent of sulfur trioxide (SO₃) shall be 4.0%.
 - b. Fly ash shall be considered a cementitious material for concrete proportioning.
 - c. Fly ash content shall not exceed 30% by weight of the total cementitious content (Portland cement plus fly ash) of the concrete.

B. Coarse Aggregate

- 1. Crushed stone or gravel conforming to ASTM C33, in the specified gradation size. Use aggregate from only one source in a single structure. Aggregate shall not be "deleterious," or "potentially deleterious," per ASTM C289 and shall not contain deleterious substances.

Gradation No. 467 (max aggregate size 1 1/2")		
Sieve Size	Percent Retained	Percent Passing
2"	0	100
1 1/2"	0-5	95-100
3/4"	30-65	35-70
3/8"	70-90	10-30

No. 4	95-100	0-5
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Gradation No. 57 (max aggregate size 1")		
Sieve Size	Percent Retained	Percent Passing
1 1/2"	0	100
1"	0-5	95-100
1/2"	40-75	25-60
No. 4	90-100	0-10
No. 8	95-100	0-5

Gradation No. 67 (max aggregate size 3/4")		
Sieve Size	Percent Retained	Percent Passing
1"	0	100
3/4"	0-10	90-100
3/8"	45-80	20-55
No. 4	90-100	0-10
No. 8	95-100	0-5

Gradation No. 8 (max aggregate size 3/8")		
Sieve Size	Percent Retained	Percent Passing
1"	0	100
3/8"	0-15	85-100
No. 4	70-90	10-30
No. 8	90-100	0-10
No. 16	95-100	0-5

C. Fine Aggregate

1. Washed and screened natural sand or sand manufactured by crushing stone conforming to ASTM C33 and meeting the following gradation. Use aggregate from only one source in a single structure. Aggregate shall not be "deleterious," or "potentially deleterious," per ASTM C289 and shall not contain deleterious substances

Sieve Size	Percent Retained	Percent Passing
3/8"	0	100
No. 4	0-5	95-100
No. 8	0-20	80-100
No. 16	15-50	50-85
No. 30	40-75	25-60
No. 50	70-90	10-30
No. 100	90-98	2-10

D. Mixing Water: Potable and complying with ASTM C94

- E. Admixtures: Using the following admixtures as required or permitted. The use of calcium chloride will not be permitted. The products must conform to the referenced standards.
1. Air-Entraining Admixture. Conform to ASTM C260.
 2. Chemical Admixtures. Conform to ASTM C494.
 3. Set retarding Admixtures. Conform to ASTM C494, types B or D only. Follow all Manufacturer's recommendations.
 4. Water Reducing Admixture. Conform to ASTM C494, types A or D only. Follow all Manufacturer's recommendations.
 5. High-Range Water Reducing Admixtures (HRWR). Conform to ASTM C 494 Type F or G. Follow all manufacturer's recommendations.

2.02 CHEMICAL HARDENER

- A. Provide a clear chemical hardener as called for in the Drawings. Coordinate concrete mix design, air content requirements and placement procedures with the chemical hardener manufacturer.
- B. Provide one of the following products:
1. MASTERTOP 110 ABR/Maximent® HD; by BASF.
 2. Diamond-Plate; by Euclid.

2.03 CURING MATERIALS:

- A. Membrane Curing Compound.
1. Conform to ASTM C309, commercial curing compound which will not permanently discolor concrete.
 2. All curing compound shall contain a dye of color strength to render the film distinctly visible on the concrete for at least 4 hours after application.
- B. Sheet Curing Material.
1. Conform to ASTM C 171.
 - a. Waterproof paper
 - b. Polyethylene film
 - c. White burlap-polyethylene sheeting

2.04 CONCRETE PROPORTIONING

- A. Design Criteria
1. Use ACI 211.1 as the basis for selecting the proportions of ingredients to produce concrete having proper durability, strength, workability appearance and other required properties. Proportion ingredients to produce a homogenous mixture, which will work readily into corners and angles of forms and around reinforcement by methods of placing and consolidation employed on the work, but without permitting materials to segregate or allowing excessive free water to collect on the surface.

2. Strength: All concrete is required to have an average 28 day compressive strength at or greater than specified strength. Establish the required average compressive strength in accordance with ACI 301.
3. Entrained Air: Air-entrain all concrete, unless otherwise specified. Drilled shafts do not require air entrainment unless placed underwater. Provide for not less than three percent (3.0%) nor more than six percent (6.0%) by volume of total entrapped and entrained air for normal weight concrete.
4. Slump: Provide adequate slump to produce acceptable workability, do not exceed maximum specified slump.
5. Admixtures: Proportion admixtures according to the Manufacturer's recommendations. All admixtures shall be batched at the batch plant only.

B. Concrete Classification

Class	Min. 28-Day Compressive Strength (psi)	Max. Coarse Aggregate Size (in.)	Max. Water Cement Ratio	Max. Slump (in.)	Min. Cement Content (per CY)
A	4000	1.5 (No. 467)	0.45	5	517 lb (5.5 sacks)
B	3000	1.5 (No. 467)	0.50	4	517 lb (5.5 sacks)
C	4000	1.0 (No. 57)	0.45	4	564 lb (6.0 sacks)
D	5000	0.75 (No. 67)	0.45	5	611 lb (6.5 sacks)
E	1500	1.5 (No. 467)	0.70	4	376 lb (4.0 sacks)
F	4000	0.375 (No. 8)	0.50	8	611 lb (6.5 sacks)

NOTE: Maximum slump shown may be increased to 9 in. if HRWR admixture is used.

C. Concrete Usage

Class	Usage
A	All reinforced concrete unless otherwise specified
B	Concrete Encasement; Sidewalks, Curbs, Driveways
C	Drilled Shafts; Pumped Concrete; Thin Wall Sections
D	Precast Concrete and Panels
E	Lean Concrete Backfill; Foundation Seal; Blocking/Cradling
F	Underground Duct Banks

2.05 OFF SITE BATCH PLANT

- A. Batch plants shall be an established concrete batching facility meeting the requirements of the Concrete Plant Standards of the Concrete Plant Manufacturers Bureau.

2.06 CONCRETE MIXING

A. Ready-Mixed Concrete:

1. Mix and transport ready-mixed concrete according to ASTM C94.
2. Provide a suitable measuring device capable of measuring mixing water for each batch. Note the number of gallons of water as batched on printed batching tickets.
3. Compensate for varying moisture contents of both coarse and fine aggregates and change batch weights of materials if necessary before batching.
4. Provide adequate facilities for accurate measurement and control of each material entering each batch of concrete. Accuracy of weighing equipment must conform to applicable requirements of ASTM and NRMCA for such equipment.
5. Provide recorders/printers to produce tickets. Each ticket will provide a printed record of volume of water and weights for cement as batched and for separate aggregates as batched individually. Use the type of indicator that returns for zero punch or to zero after a batch is discharged. Clearly indicate by stamped letters or numerals the difference between aggregates and cement as batched. Show the time of day stamped or printed at intervals of not more than six minutes. The delivery ticket shall also show the volume of water, in gallons, added at the batch plant. Deliver recorded ticket copies with concrete. The testing agency will keep one copy.

B. Transit Mix Truck Requirements:

1. Clean each transit mix truck drum and reverse drum rotation before the truck proceeds under the batching plant.
2. Keep the water tank valve on each transit truck locked at all times that the truck is in use. Any addition of water must be directed by the Engineer. Added water must be incorporated by additional mixing of at least 35 revolutions.
3. Equip each transit-mix truck with a continuous, nonreversible, revolution counter showing the number of revolutions at mixing speeds. Counter shall be reset to zero at the batch plant. Concrete may be rejected if counters have fewer than 70 or more than 150 turns when they arrive at the site.
4. Transit mix trucks are to be in good working condition. Trucks which are not mechanically sound, have worn or obstructed mixing fins, have non-functioning drum counters, or leaking water valves shall not be used.

C. Admixtures:

1. Charge air-entraining and chemical admixtures into the mixer as a solution using an automatic dispenser or similar metering device. Do not use admixtures in powdered form.
2. Two or more admixtures may be used in the same concrete, provided that the admixtures in combination retain full efficiency and have no deleterious effect on

the concrete or on the properties of each other. Inject the admixtures separately during the batching sequence.

3. Add retarding admixtures as soon as practicable after the addition of cement.

PART 3 EXECUTION

3.01 PREPARATION

- A. Notify the Owner's Representative upon completion of various portions of the work required for placing concrete so inspection may be made as early as possible. Keep the Owner's Representative informed of the anticipated concrete placing schedules.
- B. All items, including lines and grades, forms, waterstops, reinforcing, inserts, piping, electrical, plumbing and the Contractor's concreting materials and equipment shall be complete and in compliance with the plans and specifications before proceeding with concrete placement.
- C. Concrete finishing shall be completed in daylight hours. When this is not possible, brilliantly light the work site so that all operations are plainly visible.
- D. Prior to and during concrete placement, forms shall be clean of any and all foreign matter.
- E. Mix concrete only in quantities for immediate use. Discard concrete which has set; re-tempering is not permitted. Completely discharge concrete at the site within one hour and 30 minutes after adding cement to aggregate. In hot weather, reduce this time to one hour or less to prevent stiffening of concrete before it is placed.
- F. Protection from Adverse Weather: If adverse weather is imminent, no concrete placement is permitted. Do not permit rainwater to increase mixing water or to damage the surface finish. If rainfall occurs after placing operations begin, provide adequate covering to protect the work.
- G. If concrete arrives at the project with slump below that specified, water may be added only if the addition of water does not exceed either the maximum permissible water-cement ratio or maximum slump. Mix adjustments to obtain specified slump must be approved by the Engineer.
- H. Cold Weather Concreting
 1. If the air temperature is at or below 40 degrees F, cold weather concreting shall be performed in accordance with ACI 306. This includes cases where the temperature drops below 40 degrees F after concrete operations have been started. The temperature shall be taken in shade away from artificial heat.
 2. When air temperatures are at or below 40 degrees F, heated mixing water or a combination of heated mixing water and heated aggregates shall be used, if required, to raise the concrete temperature to 70 degrees F. The temperature of the heated water or aggregates shall not exceed 150 degrees F when entering the mixer.
 3. Concrete placement is not permitted when the air temperature is at or below 35 degrees F. The temperature shall be taken in shade away from artificial heat.

4. Salts, chlorides, chemicals or other foreign materials shall not be mixed with the concrete to prevent freezing or act as an accelerator.
5. When freezing temperatures may be expected during the curing period, the concrete shall be maintained at a temperature of at least 50 degrees F for five days or 70 degrees F for three days after placement. Concrete and adjacent form surfaces shall be kept continuously moist. Sudden cooling of concrete shall not be permitted.

I. Hot Weather Concreting.

1. Hot weather concreting shall comply with ACI 305. At air temperature of 90 degrees F or above, concrete shall be kept as cool as possible during placement and curing.
2. The temperature of the concrete when placed in the work shall not exceed 90 degrees F. Use chilled water or ice to reduce the temperature of the concrete as required.
3. Concrete shall be placed in the forms without the addition of any more water than is required by design. No excess water may be added to the concrete surface to aid in finishing. Control of the initial set and extending the time for finishing may be accomplished through the use of admixtures in accordance with these Specifications.
4. Plastic shrinkage cracking, due to rapid evaporation of moisture, shall be prevented. Concrete shall not be placed when the evaporation rate (actual or anticipated) equals or exceeds 0.2 pound per square foot per hour, as determined by Figure 2.1.5 in ACI 305.

3.02 EMBEDDED ITEMS

- A. Refer to Section 03250.

3.03 JOINTS

- A. Construction, control, isolation and expansion joints shall be installed and sealed as called for by the Plans and in accordance with Section 03250.

3.04 WATERSTOPS

- A. PVC and hydrophilic waterstops shall be installed as called for by the Plans and in accordance with Section 03250.

3.05 GROUTING

- A. Perform all grouting as called for by the Plans and in accordance with Section 03600.

3.06 CONCRETE TRANSPORTATION AND CONVEYING

- A. Delivery tickets shall be required for each batch and shall be in accordance with ASTM C94, Section 16. Each ticket must clearly show the amount of water, in gallons, that can be added to the mixer truck at the site without exceeding the maximum water-cement ratio for that mix design.

- B. Handle concrete from mixer to placement as quickly as practicable while providing concrete of required quality in the placement area. Use methods which prevent loss of ingredients and segregation.
 - 1. Troughs, chutes and pipes shall be steel or steel lined.
 - 2. When steep slopes are necessary, provide baffles.
 - 3. Keep chutes, troughs and pipes clean and free from coatings of hardened concrete.
 - 4. Concrete pumping is permitted and shall comply with ACI 304.2R.

3.07 CONCRETE PLACEMENT

A. Preparation

- 1. Sprinkle semi-porous subgrades to eliminate suction.
- 2. Seal extremely porous subgrades in an approved manner.
- 3. Clean and prepare existing concrete surface in accordance with these Specifications prior to placing new concrete.

B. General

- 1. Deposit concrete continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of cold joints, seams or planes of weakness within the section. If the section cannot be placed continuously, place construction joints as specified or as approved.
- 2. Proceed with placement at a rate such that concrete which is being integrated with fresh concrete is still plastic. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials.
- 3. Remove temporary spreaders from forms when the spreader is no longer useful. Temporary spreaders may remain embedded in concrete only if made of galvanized metal or concrete, and if prior approval has been obtained.
- 4. Do not start placing of concrete in supported elements until concrete previously placed in columns and walls is no longer plastic.
- 5. Deposit concrete as nearly as practicable in its final position to avoid segregation. Do not subject concrete to a procedure which will cause segregation.
- 6. Deposit concrete through vertical drop chutes of rubber or metal of satisfactory size when operations involve placing concrete from above.
- 7. Concrete shall not be dropped more than 10 feet when HRWR admixture is used and 5 feet without HRWR.
- 8. Where surface mortar is to be the basis of a finish, especially those designated to be painted, work coarse aggregate back from forms with a suitable tool to bring the full surface of mortar against the form. Prevent formation of excessive surface voids.

C. Slabs

- 1. After suitable bulkheads, screeds and if specified, jointing materials, have been positioned the concrete shall be placed continuously between construction joints,

beginning at a bulkhead, edge form, or corner. Each batch shall be placed into the edge of the previously placed concrete to avoid stone pockets and segregation.

2. If there is a delay in casting, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints.
3. Concrete shall then be brought to correct level with a straightedge and struck off. Bullfloats or darbies shall be used to smooth the surface, leaving it free of humps or hollows.

D. Formed Concrete

1. Place concrete in forms using tremie tubes and taking care to prevent segregation. Bottom of tremie tubes shall be in contact with the concrete already placed.
2. In walls, place concrete in 12" to 24" lifts, keeping the surface horizontal. Compaction shall be by vibrator and shall be supplemented by hand puddling; puddling shall be continuous while pouring concrete and shall be done primarily between forms and reinforcing steel, around openings, or wherever needed to prevent honeycomb, fill voids or drive out large air bubbles.

E. Concrete Poured Against Rock

1. Where concrete is poured against undisturbed rock, especially in drilled shafts, place concrete as soon as practicable after excavation to prevent weathering of exposed rock.
 - a. For footings and slabs, place mud slabs within 4 hours after the excavation is at final grade.
2. Remove all water from excavation or shaft before placing concrete.

3.08 CONSOLIDATION OF CONCRETE

A. All concrete shall be placed and consolidated with mechanical vibrators.

1. A minimum frequency of 7000 revolutions per minute is required for mechanical vibrators.
2. Do not use vibrators to transport concrete within forms.
3. Insert vibrators and withdraw at points from 18 to 30 inches apart. At each insertion, vibrate sufficiently to consolidate concrete, generally until a liquefied appearance is produced on the surface. Do not over-vibrate causing segregation.
4. Keep a spare vibrator on the site during concrete placing operations.. No concrete shall be ordered until sufficient approved vibrators (including standby units in working order) are on the job.

B. Concrete for slabs shall be compacted with vibrating screeds and internal vibrators.

C. Internal vibrators shall be used; form attached vibrators are not permitted.

3.09 FINISHING OF FORMED SURFACES

A. Forms shall be removed as specified in Section 03105. Patch, repair, finish and clean concrete within 7 days of form removal in accordance with the Specifications. Cure concrete as finishing progress in accordance with the Specifications.

- B. No Finish: A finish is not required on surfaces which are not visible from the inside or outside of the structure or more than 12 inches below finished grade
- C. Smooth Form Finish:
 - 1. Unless otherwise specified, all surfaces not meeting the requirements for “no finish” shall receive a smooth form finish. Use a smooth form finish on all surfaces exposed to view and liquid.
 - 2. Provide a smooth, hard uniform texture on the concrete surface. Use plywood or fiberboard linings or forms in as large sheets as practicable and with smooth, even edges and close joints.
 - 3. Patch tie holes and defects. Rub fins and joint marks with carborundum stone to leave a smooth, unmarred finish surface.
- D. Related Unformed Surfaces: Tops of piers, walls, bent caps and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed. Float unformed surfaces to a texture reasonably consistent with that of the formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

3.10 FINISHING SLABS AND SIMILAR FLAT SURFACES

- A. Comply with the recommendations in ACI 302.1R for screeding, restraightening and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Finish slabs and similar flat surfaces monolithically and apply as indicated in the Plans and as follows:
 - 1. Rough Finish.
 - a. Tank floors and slabs that receive grout or additional concrete toppings.
 - b. Provide a rough surface by screeding only without further finish.
 - 2. Trowel Finish
 - a. Slab surfaces exposed to view, liquids or to be covered with a coating system, flooring coverings or membranes.
 - b. After apply float finish, apply trowel finish and consolidate by hand or power driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 3. Broom Finish
 - a. Sidewalks, walkways and platforms.
 - b. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.11 CONCRETE CURING

- A. All concrete shall be cured in accordance with the Specifications. The curing methods shall be wet curing, sheet materials or membrane curing compound. Unless the curing method is specified otherwise, select the appropriate curing method.

B. Length of Curing Period

1. A "curing day" shall be any day on which the atmospheric temperature taken in the shade, or the air temperature adjacent to the concrete, remains above 50 degrees F for at least 18 hours.
2. Continuously cure concrete for a period until 7 curing days have been reached. In cold weather, curing may be terminated after a period of 14 consecutive days.

C. Wet Curing

1. Immediately after the finishing operations are completed or forms are stripped, the concrete shall be covered with wet cotton mats or with a temporary covering of canvas or burlap, thoroughly saturated with water before placement. A temporary covering shall be used when factors dictate that cotton mats cannot be placed immediately after finishing operations without marring the finishing of the concrete surface.
2. When temporary coverings are used keep them in place only until the surface has sufficiently hardened so that a cotton mat can be substituted without marring or disturbing the concrete finish.
3. The coverings shall remain in contact with the concrete for the duration of the curing period.
4. The coverings shall be kept saturated with water for a period of 4 days after the concrete has been placed.
5. Water used for curing shall be potable and free from any injurious materials or deleterious substances.

D. Sheet Curing

1. Immediately after the finishing operations are completed or forms are stripped, install sheet curing materials in accordance with all Manufacturer's recommendations.
2. Sheet curing shall be in contact with the entire concrete surface so as to prevent drying for the duration of the curing period.
3. When pedestrian traffic is unavoidable, provide suitable walkways to protect the sheet material.

E. Membrane Curing

1. Membrane curing compound is not permitted on surfaces to be rubbed or on surfaces to receive additional concrete, grout, plaster or coatings.
2. Immediately after the finishing operations are completed or forms are stripped, apply membrane curing compound solution under pressure with a spray nozzle so the entire exposed surface is completely covered with a uniform film. The rate of application shall insure complete coverage but shall not exceed 150 square feet per gallon of curing compound.
3. After application and under normal conditions, the curing compound shall be dry to the touch within 1 hour and shall be dry thoroughly and completely within 4 hours.

When thoroughly dry it shall provide a continuous flexible membrane free from cracks and pinholes and shall remain intact during the required curing period.

4. If the membrane seal is broken during the curing period, immediately repair it with additional curing compound.

F. After the curing period, the temperature of the exposed surface shall not be permitted to drop faster than 30 degrees F in 24 hours.

3.12 CONCRETE SURFACE REPAIRS

A. Repair defective areas immediately after the removal of forms in accordance with Section 03740.

B. If the concrete surface is bulged, uneven or exhibits defects which in the Engineer's opinion cannot be satisfactorily repaired, remove and replace the entire concrete section as directed.

C. Patch tie holes immediately after removal of forms. After cleaning and thoroughly dampening the tie hole, fill solid with non-shrink, non-metallic grout.

3.13 FIELD QUALITY CONTROL

A. Concrete Testing

1. General

a. Tests shall be required throughout the work to monitor the quality of concrete. Take all samples in accordance with ASTM C172.

b. Testing of concrete shall be conducted by an independent, qualified testing agency.

END OF SECTION

SECTION 03600

GROUT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide all labor, materials, equipment, and incidentals as shown, specified and required to furnish and install grout.

1.02 RELATED WORK

- A. Coordinate the requirements of this section with all other sections of Division 3, Concrete.

1.03 REFERENCE STANDARDS

- A. American Concrete Institute (ACI)
 - 1. ACI 211.1, Practice for Selecting Proportions for Normal, Heavy-Weight and Mass Concrete.
 - 2. ACI 301, Specification for Structural Concrete.
- B. American Society for Testing and Materials (ASTM).
 - 1. ASTM C33, Specification for Concrete Aggregates.
 - 2. ASTM C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
 - 3. ASTM C150, Specification for Portland Cement.
 - 4. ASTM C230, Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.
 - 5. ASTM C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical- Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concrete.
 - 6. ASTM C579, Standard Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes.
 - 7. ASTM C827, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
 - 8. ASTM C882, Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - 9. ASTM C937, Specification for Grout Fluidifier for Preplaced-Aggregate Concrete.
 - 10. ASTM C939, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - 11. ASTM C1107, Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).

12. ASTM C1181, Standard Test Method for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.

1.04 SUBMITTALS

A. Grout Mix Design:

1. For Grout Fill and Construction Joint Grout, submit the following:
 - a. grout mix design
 - b. laboratory test reports for grout strength tests.

B. Reports and Certificates, submit the following:

1. For proprietary materials, submit copies of Manufacturer's certification of compliance with the specified properties for Class I, II, and III grouts.
2. Certified testing lab reports for tests specified herein for nonproprietary materials.
3. Certifications that all grouts used on the project are free of chlorides or other chemicals causing corrosion.
4. Manufacturer's specifications and installation instructions for all proprietary materials.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Grout materials from Manufacturers shall be delivered in unopened containers and shall bear intact manufacturer's labels.

B. Storage of Materials: Grout materials shall be stored in a dry shelter and shall be protected from moisture.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed grout work of similar scope and complexity with similar materials as found on this Project.

B. Testing Agency Qualifications: An experienced independent testing agency, acceptable to authorities having jurisdiction and the Engineer that is qualified according to applicable ASTM standards to conduct the testing indicated.

C. Field Tests:

1. Compression test specimens shall be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the Engineer to ensure continued compliance with these specifications. The specimens will be made by the Engineer or its representative.
2. Compression tests and fabrication of specimens for non-shrink grout shall be performed as specified in ASTM C109. A set of three specimens will be made for testing at seven days, 28 days, and each additional time period as appropriate.
3. Compression tests and fabrication of specimens for epoxy grout shall be performed as specified in ASTM C579, Method B. A set of three specimens will be made for testing at seven days, and each earlier time period as appropriate.

4. The cost of all laboratory tests on grout will be borne by the Owner, but Contractor shall assist in obtaining specimens for testing. However, Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not conform to the requirements of the specifications. Contractor shall supply all materials necessary for fabricating the test specimens.

PART 2 PRODUCTS

2.01 GROUTS

- A. General: Non-shrink grout shall be a prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout specified herein shall be that recommended by the Manufacturer for the particular application.
- B. Class 1 Non-Shrink Grout:
 1. Required minimum 28 day compressive strength is 7000 psi.
 2. Shall meet the requirements of ASTM C1107 and the minimum compressive strength requirements when tested using the amount of water required to achieve the following properties:
 - a. Flowable consistency (125 to 145 percent flow on ASTM C230, five drops in 3 seconds).
 3. The grout shall not bleed when tested at maximum allowed water.
 4. The non-shrink property is not based on a chemically generated gas or gypsum expansion.
 5. Product and Manufacturer: Provide one of the following:
 - a. Master Flow 100, as manufactured by BASF Building Systems.
 - b. Five Star Grout, as manufactured by Five Star Products.
- C. Class 2 Non-Shrink Grout:
 1. Required minimum 28 day compressive strength is 7000 psi.
 2. Shall meet the requirements of ASTM C1107 Grades B and C and minimum compressive strength requirements when tested using the amount of water required to achieve the following properties:
 - a. Fluid consistency (20 to 30 seconds in accordance with ASTM C 939).
 3. The length change from placement to time of final set shall not have a shrinkage greater than the amount of expansion measured at 3 or 14 days. The expansion at 3 or 14 days shall not exceed the 28-day expansion.
 4. The non-shrink property is not based on a chemically generated gas or gypsum expansion.
 5. Product and Manufacturer: Provide one of the following:
 - a. Masterflow 928, as manufactured by BASF Building Systems.
 - b. Five Star Fluid Grout 100, as manufactured by Five Star Products, Inc.

D. Class 3 Non-Shrink Epoxy Grout:

1. Epoxy grout shall be a pourable, non-shrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted, unless specifically recommended by the Manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.
2. Required minimum 7 day compressive strength is 13,000 psi when tested in accordance with ASTM C579.
3. The following properties shall be attained with the minimum quantity of aggregate allowed by the manufacturer.
 - a. The vertical volume change at all times before hardening shall be between 0.0 percent shrinkage and four percent expansion when measured according to ASTM C827 (modified for epoxy grouts by using an indicator ball with a specific gravity between 0.9 and 1.1). Alternately, epoxy grouts which maintain an effective bearing area of not less than 95 percent are acceptable.
 - b. The length change after hardening shall be negligible (less than 0.0006 in/in) and the coefficient of thermal expansion shall be less than 0.00003 in/in/F when tested in accordance to the requirements of ASTM C531.
 - c. The compressive creep at one year shall be negligible (less than .001 in/in) when tested under a 400 psi constant load at 140°F in accordance to the requirements of ASTM C1181.
 - d. The grout shall be capable of maintaining at least a flowable consistency for a minimum of 30 minutes at 70°F.
 - e. The shear bond strength to Portland cement concrete shall be greater than the shear strength of the concrete when tested in accordance to the requirements of ASTM C882.
 - f. The effective bearing area shall be a minimum of 95 percent.
4. Product and Manufacturer: Provide one of the following:
 - a. Sikadur 42 Grout Pak, as manufactured by Sika Corporation.
 - b. DP Five Star Epoxy Grout, as manufactured by Five Star Products.

E. Grout Fill & Topping Grout:

1. Grout for topping of slabs and concrete fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as specified herein. All materials and procedures specified for normal concrete in Section 03300 shall apply except as noted otherwise herein.
2. Topping grout and concrete fill shall contain a minimum of 517 pounds of cement per cubic yard (5.5 sacks) with a maximum water cement ratio of 0.45.
3. Minimum 28 day compressive strength shall be 4000 psi.
4. Coarse aggregate shall be No. 8 (3/8" max) per Section 03300.
5. Fine aggregate shall be as required in Section 03300.

6. Slump shall be adjusted to match placement and finishing conditions, but shall not exceed 4 inches.
7. Final mix design shall be as determined by trial mix design under supervision of the approved testing laboratory.
8. Where grout placement is thicker than 4 inches, use Class A concrete as specified in Section 03300.

F. Requirements for Grout Fill and Topping Grout

1. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for grout required. Comply with ACI 211.1 and report to Engineer the following data:
 - a. Complete identification of aggregate source of supply.
 - b. Tests of aggregates for compliance with specified requirements.
 - c. Scale weight of each aggregate.
 - d. Absorbed water in each aggregate.
 - e. Brand, type and composition of cement.
 - f. Brand, type and amount of each admixture.
 - g. Amounts of water used in trial mixes.
 - h. Proportions of each material per cubic yard.
 - i. Gross weight and yield per cubic yard of trial mixtures.
 - j. Measured slump.
 - k. Measured air content.
 - l. Compressive strength developed at seven days and 28 days, from not less than three test specimens cast for each seven day and 28 day test, and for each design mix.
2. Laboratory Trial Batches: When laboratory trial batches are used to select grout proportions, prepare test specimens and conduct strength tests as specified in ACI 301, Section 4.
3. Field Experience Method: When field experience methods are used to select grout proportions, establish proportions as specified in ACI 301, Section 4.
4. Admixtures: Use air-entraining admixture in all grout. Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control. Do not use admixtures which have not been incorporated and tested in the accepted design mix, unless otherwise authorized in writing by Engineer.

- G. Grout Applications: The following is a listing of typical applications and the corresponding type of grout which is to be used. Unless indicated otherwise in the Drawings, grouts shall be provided as listed below.

Application	Grout Type
Beam Base Plates	Class 1
Column Base Plates	Class 2
Equipment & Tank Base Plates	Class 2
Machinery Base Plates	Class 3
Filling blockout spaces for embedded items (railing posts, gate guide frames, etc.)	Class 2
Toppings & fill 4 inches or less	Grout Fill & Topping Grout
Toppings & fill greater than 4 inches	Class A Concrete (Section 03300)
All other applications	Class 1

2.02 CURING MATERIALS

- A. Curing materials shall be as specified in Section 03300 and as recommended by the Manufacturer of prepackaged grouts.

2.03 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor shall examine the substrate and conditions under which grout is to be placed and notify Engineer, in writing, of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.02 INSTALLATION

A. General:

1. Place grout as shown on the Drawings and in accordance with manufacturer's instructions. If Manufacturer's instructions conflict with the Specifications do not proceed until Engineer provides clarification.
2. Manufacturers of proprietary products shall make available upon 72 hours notification the services of a qualified, full time employee to aid in assuring proper use of the product under job conditions.
3. Placing grout shall conform to temperature and weather limitations in Section 03300.

4. Grout shall be cured following Manufacturer's instructions for prepackaged grout and the requirements in Section 03300.
- B. Columns, Beams and Equipment Bases:
1. After shimming base plate to proper grade, securely tighten anchor bolts. Properly form around the base plates, allowing sufficient room around the edges for placing the grout. Adequate depth between the bottom of the base plate and the top of concrete base must be provided to assure that the void is completely filled with the grout.
- C. Handrails and Railings:
1. After posts have been properly inserted into the holes or sleeves, fill the annular space between posts and sleeve with the grout. Bevel grout at juncture with post so that moisture flows away from post.
- D. Topping Grout:
1. All mechanical, electrical, and finish work shall be completed prior to placement of topping grout. The base slab shall be given a roughened textured surface by sandblasting or hydro-blasting exposing the aggregates to ensure bonding to the base slab.
 2. Apply topping grout as shown in the Drawings; the minimum thickness of grout topping shall be 1-inch.
 3. The base slab shall be thoroughly cleaned and wetted prior to placing topping and fill. No topping shall be placed until the slab is complete free from standing water. A thin coat of neat Type II cement slurry shall be broomed into the surface of the slab and topping shall be placed while the slurry is still wet. The topping shall be compacted by rolling or tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment Manufacturer after the grout is brought to the established grade.
 4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.
 5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement or mixture of dry cement and sand shall be applied to the surface.
 6. Cure and protect the grout topping as specified in Section 03300.
- E. Grout Fill
1. All mechanical, electrical, and finish work shall be completed prior to placement of grout fill. Grout fill shall be mixed, placed, and finished as required in Section 03300.

2. The minimum thickness of grout fill shall be 1 inch. Where the finished surface of grout fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3 1/2 inches wide by 1 1/2 inches deep.
3. The surface shall be tested with a straight edge to verify that the surface slopes uniformly to drain and to detect high and low spots which shall be immediately eliminated. When the grout fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. During finishing, no water, dry cement or mixture of dry cement and sand shall be applied to the surface.

END OF SECTION

SECTION 03740

CONCRETE REPAIR AND MODIFICATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to cut, remove, repair or otherwise modify parts of in-place concrete.
- B. Work under this Section may also be performed as a remedy for improperly or poorly placed concrete, or concrete damaged during construction operations. Such work shall be performed only after receiving written directions from the Engineer.

1.02 RELATED WORK

- A. Division 3 – Concrete
- B. Division 5 – Metals

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM).
 1. ASTM C78 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
 2. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
 3. ASTM C293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading).
 4. ASTM C321 - Standard Test Method for Bond Strength of Chemical-Resistant Mortars.
 5. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
 6. ASTM C496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 7. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 8. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
 9. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
 10. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
 11. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.04 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions and Division 1 - General Requirements.
- B. Submit a Schedule of Demolition which includes the detailed methods of demolition to be used at each location.
- C. Submit a Plan of Repair for any structure that requires repair which includes the detailed methods of repair to be utilized.
- D. Submit Manufacturer's technical literature on all product brands proposed for use. The submittal shall include the manufacturer's installation and/or application instructions.
- E. When substitutions for acceptable brands of materials specified herein are proposed by the Contractor, submit Manufacturer's substitutions for approval prior to delivery to the Site. Submitted data shall demonstrate compliance with all requirements of this Specification or deviations shall be clearly noted.

1.05 QUALITY ASSURANCE

- A. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the Engineer.
- B. No proposed or existing structure shall be repaired or otherwise altered until authorization is given by the Engineer. Notify the Engineer of any defects in the original construction and submit a proposed repair plan for review.
- C. When removing materials or portions of existing structures and when making openings in existing structures, all precautions shall be taken and all necessary barriers, shoring and bracing, and other protective devices shall be erected to prevent damage to the structures beyond the limits necessary for the new work to protect personnel, to control dust, and to prevent damage to the structures or contents by falling or flying debris.
- D. Manufacturer qualifications. The manufacturer of the specified products shall have a minimum of 5 years experience in the manufacture of such products, and shall have an ongoing program to provide training and technical support for the Contractor's personnel.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver the specified products in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers.
- B. Store products as recommended by the Manufacturer.

PART 2 PRODUCTS

2.01 GENERAL

- A. Materials shall comply with these Specifications and any applicable federal, state or local regulations.

- B. All materials used shall be approved for use in potable water facilities.

2.02 REPAIR CONCRETE

- A. Use Class A concrete in accordance with Section 03300 for large volume repairs unless otherwise directed.

2.03 REPAIR MORTAR

- A. Repair mortar shall be a polymer modified prepackaged cementitious repair mortar.
- B. Use an appropriate product for the specific application in accordance with all Manufacturer's requirements and recommendations.
- C. Material Properties.
 1. Compressive strength (ASTM C109):
 - a. 3800 psi min. at 7 days.
 - b. 4800 psi min. at 28 days.
 2. Splitting Tensile strength (ASTM C496):
 - a. 500 psi min. at 28 days.
 3. Flexural strength (ASTM C78):
 - a. 1300 psi min. at 28 days.
 4. Bond strength (ASTM C882 Modified):
 - a. 2000 psi min. at 28 days.
 5. Color to match surrounding material color which is exposed to view.
- D. Products and Manufacturers:
 1. SikaTop 121 Plus as manufactured by Sika Corporation.
 2. SikaTop 122 Plus as manufactured by Sika Corporation.
 3. SikaTop 123 Plus as manufactured by Sika Corporation.
 4. EMACO R310 CI, as manufactured by BASF.

2.04 STRUCTURAL CRACK INJECTION

- A. Concrete Sealing Epoxy
 1. High strength moisture insensitive epoxy system in compliance with ASTM C881, Type IV, Grade 3, Class B & C and with the following properties:
 - a. Tensile properties at 14 days (ASTM D638)
 - (i) Tensile strength: 5,500 psi
 - (ii) Minimum elongation: 2%
 - b. Compressive properties at 28 days (ASTM D695)
 - (i) Compressive strength: 10,000 psi
 - (ii) Modulus of elasticity: 300,000 psi
 - c. Flexural strength: 12,000 psi at 14 days (ASTM D790)
 - d. Compressive strength: 14,000 psi (ASTM D695)
 - e. Bond strength: 2,200 psi after 2 days (ASTM C882)
 - f. Maximum water absorption of 0.1 percent after 24 hours

2. The color of the sealing epoxy shall match the existing color of surrounding concrete surfaces if exposed to view.

B. Epoxy Injection Resin

1. High modulus, low viscosity epoxy crack injection system in compliance with ASTM C881, Type IV, Grade 1, Class B&C and with the following properties:
 - a. Tensile properties at 14 days (ASTM D638)
 - (i) Tensile strength: 5,500 psi
 - (ii) Minimum elongation: 2%
 - b. Compressive properties at 28 days (ASTM D695)
 - (i) Compressive strength: 10,000 psi
 - (ii) Modulus of elasticity: 300,000 psi
 - c. Flexural strength: 12,000 psi (ASTM D790)
 - d. Bond strength: 2,800 psi after 2 days (ASTM C882)
 - e. Maximum water absorption of 0.15 percent after 24 hours

2.05 WATERPROOFING INJECTION

A. Concrete Expansion Joint and Active Crack Sealing

1. SikaFix HH Hydrophilic as manufactured by Sika Corporation.

B. Water Infiltration Under Pressure

1. SikaFix HH+ as manufactured by Sika Corporation.

PART 3 EXECUTION

3.01 GENERAL

- A. Apply methods specified in this Section as indicated on the Drawings, as specified, or as directed and/or approved by the Engineer. Finishes, joints, reinforcements, sealants, etc., shall be as specified in their respective Sections of the Specifications.
- B. All commercial products specified in this Section shall be mixed and applied in strict compliance with the Manufacturer's recommendations.
- C. In all cases where concrete is repaired in the vicinity of an expansion joint or isolation joint, the repairs shall be made to preserve the isolation between components on either side of the joint.
- D. When drilling holes in concrete for dowels or bolts, drilling shall stop if reinforcing steel is encountered. The hole shall be relocated to avoid reinforcing and the existing hole patched with repair mortar per this Section. Reinforcing shall not be cut. Where possible, reinforcing locations shall be identified prior to drilling using non-destructive methods such as "rebar locators", GPR, etc. so that drilled hole locations may be adjusted to avoid reinforcing interference prior to drilling.

3.02 CONCRETE REMOVAL

A. General

1. Concrete specified to be left in place which is damaged by the Contractor shall be repaired by approved means to the satisfaction of the Engineer at no cost.

B. Concrete Removal Equipment

1. Use sawing equipment capable of sawing concrete to the specified depth.
2. Use power driven chipping tools no heavier than a 30 lb. class for bulk concrete removal and no heavier than a 15 lb. class for removal of concrete beneath reinforcing steel or along the edges of the repair area.
3. Hydrodemolition equipment may be used with prior written approval of the Engineer or via an approved Schedule of Demolition.

C. Concrete Removal Procedures and Requirements

1. Concrete removal shall be initiated by first saw cutting to a depth of 1 inch (or by line drilling if saw cutting is not feasible) at the given removal limits. Remove concrete to the required depth by chipping or jack-hammering, as appropriate, in areas where concrete is to be taken out. Use the smallest equipment possible to avoid bruising or damaging concrete outside the removal zone and in accordance with this Section. Remove concrete in such a manner that surrounding concrete, existing reinforcing to be left in place and existing in place equipment are not damaged.
2. All existing reinforcing exposed during concrete removal that will be covered with new material shall be undercut, exposing the entire perimeter of the bar, a minimum of 1 inch or 1.5 times the maximum aggregate size of the repair material, whichever is greater. Reinforcing to be left in place shall not be damaged during demolition.
3. Where existing reinforcing is exposed due to saw cutting or core drilling and no new material is to be placed on the cut surface, a coating or surface treatment of epoxy paste shall be applied to the entire cut surface to a thickness of 1/4 inch. Reinforcing shall be drilled and ground to establish minimum cover requirements prior to application of the surface treatment.

3.03 REPAIR PREPARATION

A. Surface Preparation

1. Where bonding to existing surfaces, clean and remove all deteriorated materials, dirt, oil, grease, and all other bond inhibiting materials from the surface by abrasive blasting, grinding, etc. as approved by the Engineer. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded into parent concrete.
2. Where bonding new concrete to existing concrete, the existing surface shall be roughened to a minimum 1/4 inch amplitude or greater if a larger amplitude is required by the repair material manufacturer.

B. Existing Reinforcing Steel

1. Existing reinforcing which is exposed shall be cleaned by mechanical means to remove all loose material and corrosion products before proceeding with the repair.

3.04 REPAIR EXECUTION

- A. Install any required formwork in accordance with Section 03100.
- B. Prior to installing the repair concrete, or mortar, clean the concrete surface and apply mortar or epoxy bonding agents as required for Construction Joints in accordance with Section 03250. Apply a hydrophilic waterstop per Section 03250 for water retaining structures or if called for in Drawings.
- C. Install repair concrete, mortar or other repair material in accordance with all manufacturer's instructions and Section 03300. In the event of a conflict between the manufacturer's instructions and Section 03300, the more restrictive requirement shall apply.
- D. Cure the repair in accordance with all manufacturer's instructions and Section 03300. In the event of a conflict between the manufacturer's instructions and Section 03300, the more restrictive requirement shall apply.

3.05 EPOXY CRACK INJECTION

- A. Flush out cracks and voids with chemical agent or chemical solvent to remove dirt and laitance prior to epoxy injection.
- B. Provide temporary entry ports spaced to accomplish movement of fluids between ports, complying with Manufacturer's recommendations. Provide seal at concrete surface to prevent epoxy leakage.
- C. Inject epoxy into prepared ports under appropriate pressure, using equipment appropriate for the particular application. Begin injection at lower entry port and continue until adhesive appears at adjacent entry port; continue from port to port until each crack is filled.
- D. After epoxy adhesive has set, remove temporary seal and excess adhesive. Grind surfaces smooth.

END OF SECTION

SECTION 05051

ANCHOR BOLTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section specifies anchor bolts and embedded anchorages into concrete.

1.02 RELATED WORK

- A. Division 3 – Concrete
- B. Division 5 – Metals
- C. Division 11 - Equipment
- D. Division 15 - Mechanical
- E. Coordinate work of this section with all other sections to obtain a proper installation. Review all drawings and specifications for additional requirements for anchor bolts and anchorages.

1.03 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC).
 - 1. Steel Construction Manual.
- B. American Concrete Institute (ACI)
 - 1. ACI 318: Building Code Requirements for Structural Concrete
 - 2. ACI 350: Code Requirements for Environmental Engineering Concrete Structures
- C. International Code Council (ICC)
 - 1. International Building Code (IBC)
- D. American Society of Civil Engineers (ASCE)
 - 1. ASCE-7: Minimum Design Loads for Buildings and Other Structures
- E. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 4. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - 5. ASTM A194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - 6. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - 7. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 8. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

9. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
10. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
11. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
12. ASTM F594 - Standard Specification for Stainless Steel Nuts.

1.04 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings as specified in Division 1, General Provisions. Give sufficient detail to permit anchor bolt installation without referring to design drawings.
2. Drawings must include all anchor bolts and embedded anchorages, bolt setting and erection templates.
3. Provide Manufacturer's specifications, load tables and installation instructions.
4. Erection drawings shall be sealed by a Licensed Professional Engineer in the State in which the project is will be built.
5. Provide a letter sealed by a Licensed Professional Engineer in the State in which the project will be built stating that all anchor bolts and anchorages not specifically shown on the structural drawings are adequate for the application and meet all design requirements in the Drawings and referenced codes.

1.05 PRODUCT DELIVERY AND STORAGE

- ##### A.
- If materials must be stored, keep them off the ground and clean, free of dirt, mud, grease or oil. Protect bolts and anchorages from corrosion and/or deterioration.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

- ##### A.
- When the size, length, and material or load carrying capacity of the anchor bolts or anchorages are not shown in the Drawings, provide the following:
1. For cast-in-place anchor bolts or anchorages:
 - a. Provide the material type, size, length, and arrangement required to resist all loads and load combinations given in the latest version of the IBC Building Code, ASCE-07 and the Drawings. In the case of conflicting requirements, the most restrictive requirements will control.
 2. For post-installed anchor bolts or anchorages:
 - a. Provide the material type, size, length, minimum embedment and arrangement required to resist all loads and load combinations given in the latest version of the IBC Building Code, ASCE-07 and the Drawings. In the case of conflicting requirements, the most restrictive requirements will control.
 - b. Provide required adhesive and installation requirements.

2.02 MATERIALS

A. Anchor Bolts:

1. Provide anchor bolts as shown in the Drawings.
2. Provide stainless steel anchor bolts and hardware complying with ASTM F593, Condition CW, AISI Type 316 headed with stainless steel nuts and washers.

3. For equipment, provide 316 stainless steel anchor bolts that meet the manufacturer's requirements for size and strength. Comply with manufacturer's requirements for embedment length and projection.
4. Protect threads and shank from damage during placement of concrete, installation of equipment and erection of structural steel.

B. Adhesive Anchors:

1. Provide stainless steel adhesive anchors and hardware complying with ASTM F593, Condition CW, AISI Type 316 headed with stainless steel nuts and washers.
2. Adhesive system shall be Hilti HIT-HY200 adhesive, by Hilti. No substitutions will be considered.
3. Embedment depth of the anchor shall provide concrete breakout and pullout strength equal to the steel tensile capacity of the anchor, unless otherwise noted in the Drawings. Reduction in concrete breakout and pullout strength due to spacing and edge distances shall be made.

C. Expansion Anchors

1. Expansion anchors will not be allowed for structural connections unless specifically called for in the Drawings.
2. Where expansion anchors are called for in other sections, provide Type 316 stainless steel expansion anchors.
 - a. Kwik Bolt by Hilti.
 - b. Easy-Set by Simpson.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Assure that embedded items are protected from damage and are not filled in with concrete.
- B. Set bolts as shown in the Drawings or as required using templates or other devices to insure accurate placement and to prevent drift during concrete placement.
- C. Fully consolidate plastic concrete around anchor bolts per the requirements Division 3 Sections.
- D. For adhesive anchors and adhesive materials, Contractor shall comply with all Manufacturer's installation instructions. Properly clean out holes per manufacturer's required procedures prior to installation of adhesive.

3.02 CLEANING

- A. After embedding concrete is placed, remove protection and clean bolts and inserts.

END OF SECTION

SECTION 05125
STRUCTURAL STEEL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section specifies primary structural steel elements such as columns, girders, beams, trusses and railing, including connections, bracing, bearing plates, leveling plates, bolts and other items.

1.02 RELATED WORK

- A. Division 3 – Concrete
- B. Division 5 – Metals
- C. Division 9 - Coatings

1.03 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC).
 - 1. Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - 2. Steel Construction Manual.
 - 3. Code of Standard Practice for Steel Buildings and Bridges.
 - 4. Design Guide 27 – Structural Stainless Steel
- B. American Welding Society (AWS):
 - 1. D1.1 Structural Welding Code - Steel.
 - 2. D1.6 Structural Welding Code – Stainless Steel.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - 4. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 6. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - 7. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
 - 8. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - 9. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

10. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
11. ASTM A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
12. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
13. ASTM A992 - Standard Specification for Structural Steel Shapes.
14. ASTM A1085 - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).
15. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

D. The Coatings Society (SSPC):

1. SSPC Painting Manual, Volumes 1 & 2.

E. Research Council on Riveted and Bolted Structural Joints (RCRBSJ):

1. Specification for Structural Joints Using ASTM A325 or A490 Bolts.

1.04 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings as specified in Division 1, General Provisions. Give sufficient detail to permit steel erection without referring to design drawings.
2. Drawings must include all structural steel items, welds, connections, bolt setting and erection diagrams. Show holes, cuts, reinforcing and other details required to prepare each item for erection to receive other work. Show location, types and sizes of welds and fastenings, including a bill of materials.
3. Erection drawings shall be sealed by a Licensed Professional Engineer in the State in which the project is will be built.
4. Provide a letter sealed by a Licensed Professional Engineer in the State in which the project will be built stating that all connections not specifically shown on the design structural drawings have been designed and detailed under their supervision.

- B. Certificates: Submit certified mill reports from the steel supplier. Reports must provide heat or melt number mill analysis and test results for structural steel. If reports are not submitted or if the material cannot be positively identified and directly related to the reports, steel quality tests will be required at no cost to the Owner.

1.05 PRODUCT DELIVERY AND STORAGE

- A. Schedule material delivery so that items may be erected promptly after arrival.
- B. If materials must be stored, keep them off the ground and clean, free of dirt, mud, grease or oil. Store in such a manner to avoid member distortion. Protect steel from corrosion and/or deterioration.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural Steel:

1. All rolled structural shapes, plates and bars must meet the standards for ASTM A992 and ASTM A572, Grade 50 unless otherwise noted on the Drawings.
 2. Clip angles, stiffeners, plates and other detail items must conform to standards of the main member to which the items are attached.
- B. Stainless Steel:
1. Use the stainless steel grade indicated on the drawings (304 or 316). Where the grade is not specified use AISI 316. Use a weldable (304L or 316L) grade of stainless steel for welded items.
 2. For all stainless steel, required yield strength is 50,000 psi unless otherwise noted on the Drawings.
- C. Steel Pipe
1. Conform to ASTM A53, Type E or S, Grade B, welded or seamless. No hydrostatic tests required.
- D. Structural Steel Tubing:
1. Conform to ASTM A500, Grade B, with minimum yield strength of 46,000 psi.
- E. Bolts: Use bolts conforming to the referenced standard.
1. High-strength bolts, bearing-type connections conforming to ASTM A325.
 2. Standard machine bolts conforming to ASTM A276 Type 316SS.
 3. Anchorage furnished by steel fabricator; refer to Section 05051.
- 2.02 SUBSTITUTIONS
- A. Substitution of sections or details is not permitted without prior approval. If items shown are not readily obtainable, request permission to substitute for the specified item. Substitutions may be allowed on items of equal or superior properties which conform to design criteria.
- 2.03 FABRICATION
- A. Begin fabrication of structural steel only after shop drawings have been reviewed with no exceptions taken. Fabricate according to AISC reference standards, codes, and these specifications unless directed or shown otherwise.
- B. Fabricate and assemble structural assemblies in the shop to the greatest extent possible.
- C. Drill, punch, cut and tap steel as required for anchorage, connection, or accommodating other work as shown, specified, or otherwise directed. Items with burned holes are considered defective and must be removed and replaced.
- 2.04 GALVANIZING:
1. Hot-dipped zinc coat structural items specifically designated as galvanized after fabrication. Conform to the applicable standard, ASTM A123 or ASTM A153.
 2. Use repair coating which conforms to ASTM A780. Acceptable products include:
 - a. Carboline Carbo Zinc No. 11.
 - b. Galv-Weld Products Galv-Weld Alloy.
 - c. Koppers Organic Zinc coating.
 3. All structural steel not called to be coated in the Drawings or Specifications shall be galvanized.

2.05 WELDING

- A. Perform welding in accord with the AWS reference standard. Use procedures such as preheat or interpass temperature as recommended by AWS standards.
- B. All shop and field welding must be performed by qualified welders who hold current welding certificates.
- C. Surfaces to be welded must be free of loose scale, slag, rust, grease, paint and other foreign material. Mill scale which withstands vigorous wire brushing may remain.
- D. Joint surfaces must be free of fins and tears caused by shearing. Wherever practicable, prepare edges by gas cutting using a mechanically guided torch.
- E. Electrodes:
 - 1. For structural steel, use AWS Low Hydrogen, Electrode E70XX Series suitable for the welding process used.
 - 2. For stainless steel, use 70 ksi minimum tensile strength filler material suitable for the base metal and welding process in accordance with AWS specifications.
 - 3. Protect electrodes from exposure to moisture and coating.
- F. If shop welding is done by automatic, submerged arc process, verify that physical properties of deposited weld metal will be similar to properties of the base metal.
- G. No welding shall be done when the temperature of the base metal is below 32°F.
- H. The cover bead or finish pass must have a smooth, uniform surface with reinforcement of 1/16 to 1/8 inch. Surface voids, cracks in finish weldments, or undercutting of base metal at the fusion line is not acceptable.

2.06 SURFACE PREPARATION AND PAINTING

- A. All surfaces shall be prepared and finished in accordance with City of San Antonio Specification 514 unless otherwise noted in the Drawings. Structural Steel shall be shop primed. Stainless steel not to be coated unless specifically called for in the Drawings.
- B. Galvanize structural steel items specifically shown or specified as galvanized. Members that are warped during the galvanizing process will be rejected.

2.07 INSPECTION AND TESTING

- A. Mill or shop inspection and non-destructive testing (in addition to field inspection and non-destructive testing) may be done by the Owner.
- B. Inspection in mill, shop, or field in no way relieves the Contractor from his responsibility to furnish satisfactory materials. Right is reserved to reject material at any time before final acceptance if material and workmanship do not conform to drawings and specifications.

PART 3 EXECUTION

3.01 ERECTION

- A. Erect the structure according to AISC specifications and codes and reviewed shop drawings.
- B. Give careful attention to leveling and plumbing of structural steel at all stages of construction.

- C. Provide temporary shoring and bracing of sufficient strength to support imposed loads. Remove temporary shoring and bracing when permanent members are fully in place and all final connections have been made.
- D. Furnish templates for setting anchor bolts in concrete.
- E. Support column base plates on steel wedges with no portion of a wedge within one inch of base plate edge. Apply grout at base plates according to Manufacturer's recommendations.
- F. Driftpins may be used only to bring parts together if used carefully so as not to distort or damage metal.
- G. Connections will be welded or bolted as shown. Weld as previously specified in this section. Install high strength bolts according to the RCRBSJ reference standard. Tighten by turn-of-the-nut method.
- H. Use of a gas cutting torch for correcting fabrication errors in the field will not be permitted. Field holes shall be drilled.

3.02 COATING REPAIRS

- A. Repair and touch-up field welds, abraded areas, damaged or defective areas and rust spots in accordance with Section 09900.
- B. Galvanized Surfaces:
 - 1. Galvanized surfaces damaged from welding, handling, or installation shall be repaired immediately after installation with galvanizing repair material. Galvanizing repair shall be performed and completed before concrete is placed. Any member requiring repair of more than 2% of the surface area shall be rejected and replaced.

END OF SECTION

SECTION 05505

MISCELLANEOUS METAL FABRICATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section specifies metal elements including but not limited to the following. All items listed are not necessarily included in the project, see Project Drawings for specific project requirements.
 - 1. Shelf angles.
 - 2. Steel framing and supports for equipment and where framing and supports are not specified in other Sections.
 - 3. Pipe bollards.
 - 4. Prefabricated access hatches.
 - 5. Aluminum construction, including:
 - a. Aluminum ladders.
 - b. Aluminum stairs and platforms.

1.02 RELATED WORK

- A. Division 3 – Concrete
- B. Division 5 – Metals
- C. Division 9 - Coatings

1.03 REFERENCE STANDARDS

- A. International Code Council
 - 1. International Building Code (IBC)
- B. American Society of Civil Engineers (ASCE)
 - 1. ASCE-7: Minimum Design Loads for Buildings and Other Structures
- C. The Aluminum Association
 - 1. Aluminum Design Manual.
- D. American Institute of Steel Construction (AISC).
 - 1. Steel Construction Manual.
 - 2. Design Guide 27 – Structural Stainless Steel.
- E. American Welding Society (AWS):
 - 1. D1.1 Structural Welding Code - Steel.
 - 2. D1.2 Structural Welding Code – Aluminum
 - 3. D1.3 Structural Welding Code – Sheet Steel
 - 4. D1.6 Structural Welding Code – Stainless Steel
- F. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A48 - Standard Specification for Gray Iron Castings.

3. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
4. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
5. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
6. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
7. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
8. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and General Applications.
9. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
10. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
11. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
12. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
13. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
14. ASTM A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
15. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
16. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
17. ASTM A992 - Standard Specification for Structural Steel Shapes.
18. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
19. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
20. ASTM B26, Specification for Aluminum-Alloy Sand Castings.
21. ASTM B136, Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum.
22. ASTM B137, Standard Test Method for Measurement of Coating Mass Per Unit Area on Anodically Coated Aluminum.
23. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
24. ASTM B210, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
25. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

26. ASTM B241, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
 27. ASTM B244, Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.
 28. ASTM B247, Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings.
 29. ASTM B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 30. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- G. The American Society of Safety Engineers (ASSE)
1. ASSE A1264.1, Safety Requirements for Workplace Walking/Working Surfaces & Their Access; Workplace Floor, Wall & Roof Openings; Stairs & Guardrails Systems
- H. The Society for Protective Coatings (SSPC):
1. SSPC Painting Manual, Volumes 1 & 2.
- I. United States Department of Labor:
1. OSHA Regulations (Standards - 29 CFR); Part 1926 - Safety and Health Regulations for Construction.
- 1.04 SUBMITTALS
- A. Shop Drawings:
1. Submit shop drawings as specified in Division 1, General Provisions.
 2. Submit detailed shop drawings showing sizes of members, method of assembly, anchorage, and connection to other members for approval prior to fabrication.
 3. Provide a letter sealed by a Licensed Professional Engineer in the State which the project will be built stating that all connections not specifically shown on the design structural drawings have been designed and detailed under his supervision.
- B. Certificates: Submit certified mill reports from the material supplier. Reports must provide heat or melt number mill analysis and test results for structural steel. If reports are not submitted or if the material cannot be positively identified and directly related to the reports, material quality tests will be required at no cost to the Owner.
- 1.05 COORDINATION
- A. The Work of this Section shall be completely coordinated with the Work of other Sections. Verify at the Site the dimensions and the Work of other trades adjoining items of Work in this Section before fabricating or installing the items specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the Work of other Sections.
- 1.06 PRODUCT DELIVERY AND STORAGE
- A. Schedule material delivery so that items may be installed promptly after arrival.
- B. If materials must be stored, keep them off the ground and clean, free of dirt, mud, grease or oil. Store in such a manner to avoid member distortion. Protect steel from corrosion and/or deterioration.

PART 2 PRODUCTS

2.01 GENERAL

- A. For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.02 ALUMINUM

A. Materials

1. Aluminum structural shapes, bars and plates:
 - a. Alloy 6061-T6.
2. Extruded aluminum pipe:
 - a. Alloy 6063-T6 or 6061-T6.
3. Aluminum Castings:
 - a. Alloy 535.

B. Fabrication

1. Follow general fabrication requirements elsewhere in this Section.
2. Fabricate miscellaneous aluminum shapes and plates as shown. Furnish welded and mitered angle frames and other fabrications complete with welded anchors attached. Furnish all miscellaneous aluminum shown but not otherwise detailed. Structural shapes and extruded items shall comply with the dimensions on the Drawings within the tolerances published by the Aluminum Association.
3. Weld aluminum work on the unexposed side when possible in order to prevent pitting or discoloration of exposed aluminum surfaces.

C. Finishes

1. All exposed aluminum surfaces shall have anodized finish unless otherwise specified. Apply a coat of methacrylate lacquer to all aluminum before shipment.

2.03 FERROUS METALS

A. Structural Steel:

1. All rolled structural shapes, plates and bars must meet the standards for ASTM A992 and ASTM A572, Grade 50 unless otherwise shown in the Drawings.
2. Clip angles, stiffeners, plates and other detail items must conform to standards of the main member to which the items are attached unless noted otherwise.

B. Steel Pipe

1. Conform to ASTM A53, Type E or S, Grade B, welded or seamless. No hydrostatic tests required.

C. Structural Steel Tubing:

1. Conform to ASTM A500, Grade B, with minimum yield strength of 46,000 psi.

D. Stainless Steel:

1. Use the stainless steel grade indicated on the drawings (304 or 316). Where the grade is not specified use AISI 316. Use a weldable (304L or 316L) grade of stainless steel for welded items.

2. For all stainless steel, required yield strength is 50,000 psi unless otherwise noted in the Drawings.
- E. Slotted Channel Framing:
1. Galvanized steel cold-formed metal channels with flange edges returned toward web and with 9/16-inch wide slotted holes in webs at 2 inches on center.
 2. Fabricate from steel conforming to ASTM A1101, GR 33.
 3. Channel width:
 - a. As indicated on the Drawings.
 4. Channel depth:
 - a. As indicated on the Drawings.
- F. Gray-Iron Castings:
1. Gray iron castings conforming to ASTM A48, Class 30 unless another class is indicated or required by structural loads.
- 2.04 FASTENERS:
- A. Provide ASTM F593, Type 316 fasteners for exterior use or when called for in the Drawings.
- B. Structural Steel Bolts, Nuts & Washers
1. Bolts & Nuts:
 - a. Use high-strength bolts, conforming to ASTM A325 with hex nuts.
 2. Washers
 - a. Plain washers, use round, carbon steel, ASME B18.22.1.
 - b. Lock washers, use helical, spring type, carbon steel, ASME B18.22.1.
- 2.05 SHELF ANGLES
- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated in the Drawings.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity-wall exterior wythe.
- C. Galvanized shelf angles to be installed in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete unless otherwise indicated in the Drawings.
- 2.06 PIPE BOLLARDS
- A. Fabricate pipe bollards from Schedule 80 steel pipe. Cap bollards consistent with details in the Drawings.
- B. Where indicated, fabricate bollards with steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for anchor bolts. Base plate and anchor bolts size shall be as shown on Drawings. Where bollards are to be anchored to sloping concrete slabs, angle base plates for plumb alignment of bollards.

2.07 PREFABRICATED ACCESS HATCHES

A. Hatches:

1. General Requirements:

- a. Provide prefabricated access hatches of the sizes and types shown on the Drawings.
- b. Door leaf(s) shall be aluminum diamond plate as shown on Drawings.
- c. Unless otherwise noted on the Drawings, use pivot torsion bars for counterbalance or spring operators for easy operation. Doors shall open to 90 degrees with automatic door hold open and shall be provided with a grip handle to release the cover for closing.
- d. Hardware shall be durable and corrosion resistant with Type 316 stainless steel hardware used throughout. Provide removable lock handle.
- e. Provide factory mill finish and bituminous coating to the exterior of the frames. Where specified to be watertight, a 1-1/2-inch drainage coupling shall be provided in the perimeter channel frame.
- f. Break bond between dissimilar metals using a heavy coat of alkali resistant bituminous paint, or other coating recommended by the Manufacturer that will provide equivalent protection. Otherwise, hatches used at exposed exterior locations shall be weather stripped or sealed to resist penetration of water. Embedded frame with embedment anchors shall be supplied by the hatch Manufacturer.
- g. Manufacturers shall provide access hatch with aluminum safety grating panel installed beneath access covers to provide additional protection against fall through accidents when the cover is left in the open position. The aluminum grating panel shall be designed, anchored, etc., by the hatch Manufacturer.

2. Load Requirements:

a. Pedestrian Access Only:

- (i) Hatches subjected to pedestrian access only shall be designed to withstand an unfactored live load of 125 pounds per square foot.

b. Vehicular Access:

- (i) Hatches subjected to vehicular traffic shall be designed to withstand an unfactored concentrated wheel loading (live load) of 16,000 lbs with an impact factor of 1.33 over a 20 inch by 10 inch tire contact area or an unfactored live load of 250 pounds per square foot, whichever produces the greatest stresses.

3. Acceptable Manufacturers: Subject to compliance with requirements, provide prefabricated roof hatch units by one of the following:

- a. Halliday Products, Inc., Orlando, FL.
- b. Bilco Company; New Haven, CT.
 - (i) Type J for Single Leaf.
 - (ii) Type JD for Double Leaf.

B. Roof Scuttles:

1. General Requirements:

- a. Provide prefabricated roof scuttles of the sizes and types shown on the Drawings.

2. Cover:
 - a. Galvanized steel with 3-inch bedded flange, neatly welded. Curb shall be 12-inch in height and galvanized steel.
 - b. Cover shall be equipped with an automatic hold-open arm complete with vinyl grip handle to permit easy release.
 - c. Equip units with complete hardware set including padlock, and both interior and exterior hatch handles. All hardware shall be Type 316 stainless steel.
3. Provide factory mill finish and bituminous coating to the exterior of the frames. Break bond between dissimilar metals as specified for Hatches.
4. Roof Scuttles shall be weather stripped or sealed to resist penetration of water as required. Embedded frame with embedment anchors shall be supplied by the Manufacturer.
5. Acceptable Manufacturers: Subject to compliance with requirements, provide prefabricated roof scuttle units by one of the following:
 - a. Halliday Products, Inc., Orlando, FL.
 - b. Bilco Company; New Haven, CT.

2.08 ALUMINUM LADDERS

A. Performance Criteria

1. Fixed ladders and side extensions shall meet the load requirements of ASCE-7, Section 4.5.4.
2. Fixed ladders and accessories shall be certified as meeting current requirements of IBC, ASCE-7 and OSHA.

B. Materials:

1. Side Rails/Safety Cages, Rail Extension, and Platform:
 - a. Aluminum plates, alloy 6061-T6
 - b. Aluminum extrusions, alloy 6063-T5.
2. Rungs:
 - a. Knurled or serrated aluminum bars, 1.25-inch in square section, alloy 6061-T6.
 - b. Weld size and filler material shall meet required design strength.
3. Rail Extension:
 - a. Minimum 3'-6" above the landing and shall be fitted with deeply serrated, square, tubular grab rails.
4. Safety cage:
 - a. Provide safety cage on all ladders over 20 feet unless otherwise noted in the Drawings.
5. Landing Platform:
 - a. Provide at 30 foot intervals above the bottom of the ladder, complete with 1-1/2 inch or greater diameter tubular aluminum guard rails and decks of serrated aluminum treads.
6. Wall/Floor Support Brackets.:
 - a. Aluminum plates, alloy 6061-T6.
 - b. 316 SS fasteners/rigid attack/locking.

C. Acceptable Manufacturers:

1. O'Keefe's.
 2. Alaco.
- D. Ladder safety post extensions
1. Each fixed ladder occurring below a hatch door shall be provided with an attached telescoping safety post extension of aluminum construction. Unit shall be completely assembled with stainless steel fasteners and brackets for securing to the ladder rungs provided by the Manufacturer.
 2. Acceptable Manufacturers: Bilco - Ladder Up Safety Post, Model 2; or equal.
- 2.09 GALVANIZING:
- A. Hot-dipped zinc coat structural items specifically designated as galvanized after fabrication. Conform to the applicable standard, ASTM A123 or ASTM A153.
 - B. Use repair coating which conforms to ASTM A780. Acceptable products include:
 1. Carboline Carbo Zinc No. 11.
 2. Galv-Weld Products Galv-Weld Alloy.
 3. Koppers Organic Zinc coating.
 - C. Unless otherwise noted all structural steel shall be galvanized.
- 2.10 FABRICATION
- A. Fabricate according to industry reference standards, codes, and these specifications unless directed or shown otherwise.
 - B. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
 - C. Shear and punch metals cleanly and accurately. Remove burrs.
 - D. Ease exposed edges to a radius of approximately 1/32-inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - E. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

- H. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
- I. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- J. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- K. Remove sharp or rough areas on exposed traffic surfaces.
- L. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.11 WELDING

- A. Perform welding in accord with the AWS reference standard. Use procedures such as preheat or interpass temperature as recommended by AWS standards.
- B. All shop and field welding must be performed by qualified welders who hold current welding certificates.
- C. Surfaces to be welded must be free of loose scale, slag, rust, grease, paint and other foreign material. Mill scale which withstands vigorous wire brushing may remain.
- D. Joint surfaces must be free of fins and tears caused by shearing. Wherever practicable, prepare edges by gas cutting using a mechanically guided torch.
- E. Electrodes:
 1. For structural steel, use AWS Low Hydrogen, Electrode E70XX Series suitable for the welding process used.
 2. For stainless steel, use 70 ksi minimum tensile strength filler material suitable for base metals and welding process in accordance with AWS specifications.
 3. For aluminum, use filler alloy 5356 in accordance with AWS specifications.
 4. Protect electrodes from exposure to moisture and coating.
- F. If shop welding is done by automatic, submerged arc process, verify that physical properties of deposited weld metal will be similar to properties of the base metal.
- G. No welding shall be done when the temperature of the base metal is below 32°F.
- H. The cover bead or finish pass must have a smooth, uniform surface with reinforcement of 1/16 to 1/8 inch. Surface voids, cracks in finish weldments, or undercutting of base metal at the fusion line is not acceptable.

2.12 SURFACE PREPARATION AND PAINTING

- A. All surfaces shall be prepared and finished in accordance with Division 9 requirements unless otherwise noted in the Drawings. Structural steel shall be shop primed. Stainless steel shall not be coated unless otherwise specified in the Drawings or elsewhere in the Specifications.

- B. Galvanize structural steel items specifically shown or specified as galvanized in the Drawings. Members that are warped during the galvanizing process will be rejected.

2.13 INSPECTION AND TESTING

- A. Mill or shop inspection and non-destructive testing (in addition to field inspection and non-destructive testing) may be done by the Owner.
- B. Inspection in mill, shop, or field in no way relieves the Contractor from his responsibility to furnish satisfactory materials. Right is reserved to reject material at any time before final acceptance if material and workmanship do not conform to drawings and specifications.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install items according to industry specifications and codes and reviewed shop drawings.
- B. Fastening to In-Place Construction:
 - 1. Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts and other connectors.
- C. Cutting, Fitting, and Placement:
 - 1. Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.02 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including Manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

3.03 INSTALLING PIPE BOLLARDS

- A. Anchor bollards in place with concrete footings as shown in the Drawings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

3.04 INSTALLING LADDERS

- A. Install ladders to comply with requirements of the Drawings, Specifications and any Manufacturers' written instructions and requirements.

3.05 ADJUSTING AND CLEANING

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces. Apply by brush or spray to provide a minimum 2.0-mil (0.05mm) dry film thickness.
2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in City of San Antonio Specification Section 514 Painting.

B. Repair of Galvanized Surfaces:

1. Thoroughly clean field welds, bolted connections, abrasions, abraded areas and galvanized surfaces damaged from welding, handling, or installation shall be repaired immediately after installation with galvanizing repair material. Apply matching galvanized repair coat as specified in this Section. Galvanizing repair shall be performed and completed before concrete is placed. Any member requiring repair of more than 2 percent of the surface area shall be rejected.

END OF SECTION

SECTION 05530

METAL GRATINGS AND COVER PLATES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to install metal gratings and floor cover plates along with embedded metal frames as shown on the Drawings or specified.

1.02 RELATED WORK

- A. Division 3 – Concrete
- B. Division 5 – Metals
- C. Division 9 – Coatings

1.03 REFERENCE STANDARDS

- A. International Code Council
 - 1. International Building Code (IBC)
- B. American Society of Civil Engineers (ASCE)
 - 1. ASCE-7: Minimum Design Loads for Buildings and Other Structures
- C. The Aluminum Association
 - 1. Aluminum Design Manual.
- D. American Institute of Steel Construction (AISC).
 - 1. Steel Construction Manual.
 - 2. Design Guide 27 – Structural Stainless Steel.
- E. American Welding Society (AWS):
 - 1. D1.1 Structural Welding Code – Steel
 - 2. D1.2 Structural Welding Code – Aluminum
 - 3. D1.6 Structural Welding Code – Stainless
- F. American Society for Testing and Materials (ASTM):
 - 1. ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and General Applications.
 - 2. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
 - 3. ASTM A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - 4. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 - 5. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - 6. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

7. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

G. National Association of Architectural Metal Manufacturers (NAAMM)

1. ANSI/NAAMM MBG531 - Metal Bar Grating Manual.
2. ANSI/NAAMM MBG532 - Heavy Duty Metal Bar Grating Manual.
3. ANSI/NAAMM MBG533 - Welding Standards For Fabrication of Steel, Stainless Steel and Aluminum Bar Grating.
4. NAAMM MBG534 - Metal Bar Grating Engineering Design Manual.

1.04 SUBMITTALS

A. Shop Drawings

1. Submit shop drawings as specified in Division 1, General Provisions.
2. Submit detailed shop drawings showing sizes of members, method of assembly, anchorage, and connection to other members for approval prior to fabrication.

B. If cover plate design and details are not shown in the Drawings, provide a letter sealed by a Licensed Professional Engineer in the State which the project will be built stating that the proposed cover plates and details have been designed and detailed under their supervision and meet all codes referenced by this Section and requirements of this Section.

C. Submit Manufacturer's product data for gratings and cover plates including span and deflection tables and details of construction.

D. Submit Manufacturer's installation instructions.

E. Submit samples of gratings and cover plates, if requested by the Owner's Representative.

1.05 COORDINATION

A. The Work of this Section shall be completely coordinated with the Work of other Sections. Verify at the Site the dimensions and the Work of other trades adjoining items of Work in this Section before fabricating or installing the items specified.

B. Furnish to the pertinent trades all items included under this Section that are to be built into the Work of other Sections.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect gratings and cover plates against scratching, splashes, mortar, paint and other damage during transportation, storage, installation, and until adjacent work by other trades is complete.

PART 2 PRODUCTS

2.01 GENERAL

A. Provide products that conform to the following unless otherwise shown on the Drawings.

2.02 PERFORMANCE CRITERIA

A. Grating:

1. Design Loads, choose whichever gives the greatest stresses:

- a. Pedestrian Access Only
 - (i) Uniform Live Load: 125 psf
 - (ii) Concentrated Live Load: 1,500 lbs
 - (iii) Maximum Clear Span Deflection:
 - (a) L/360 or 1/4 inch, whichever is less, under uniform loading of 100 psf.
 - b. Vehicular Access
 - (i) Uniform Live Load: 250 psf
 - (ii) Concentrated Live Load: 16,000 lb wheel load with an impact factor of 1.33 over a 20 inch by 10 inch tire contact area.
 - (iii) Maximum Clear Span Deflection:
 - (a) L/360 or 1/4 inch, whichever is less, under uniform loading of 100 psf.
2. Bar Layout:
- a. Bearing bars shall be 3/16 inches minimum spaced at a maximum of 1 3/16 inches on center.
 - b. Cross bar spacing shall not exceed 4 inches on center.
- B. Checkered Cover Plate:
- 1. Design Loads, choose whichever gives the greatest stresses:
 - a. Pedestrian Access Only
 - (i) Uniform Live Load: 125 psf
 - (ii) Concentrated Live Load: 1,500 lbs
 - (iii) Maximum Clear Span Deflection:
 - (a) L/360 or 1/4 inch, whichever is less, under uniform loading of 100 psf.
 - b. Vehicular Access
 - (i) Uniform Live Load: 250 psf
 - (ii) Concentrated Live Load: 16,000 lb wheel load with an impact factor of 1.33 over a 20 inch by 10 inch tire contact area.
 - (iii) Maximum Clear Span Deflection:
 - (a) L/360 or 1/4 inch, whichever is less, under uniform loading of 100 psf.

2.03 MATERIALS

- A. Weight Limit and Lifting Requirements
 - 1. Provide grating and cover plates in individual pieces that do not exceed 50 lbs. in weight unless otherwise shown in the Drawings.
 - 2. Provide lifting hooks for cover plate per the Drawings. If not shown in the Drawings, provide lifting hooks in each corner of an individual cover plate that allows for balanced lifting of the plate.
- B. Rectangular Bar Grating and Appurtenances
 - 1. General Requirements

- a. Provide grating of the material, depths, and bearing bar thicknesses as shown on the Drawings and as specified. If not shown on the Drawings, provide grating that meets the performance criteria in 2.02.
 - b. Grating shall be banded along edges and around openings two inches or greater in diameter/dimension with a bar of the same depth and thickness as the bearing bars. Bearing or cross bars shall be welded to the banding bar.
 - c. Embedded grating support frames shall be of the same material as the grating, unless otherwise shown on the Drawings.
 - d. Attach grating to supports using sturdy 16 gauge saddle type clips and fasteners, or approved equal.
2. Aluminum Grating
- a. Alloy 6061-T6 or 6063-T6 conforming to ASTM B221
- C. Cover Plates
1. General Requirements
- a. Provide cover plates of the material, depths, and with stiffening members as detailed on the Drawings and as specified. If not detailed on the Drawings, provide cover plates that meet the performance criteria in 2.02.
 - b. Cover plates shall be tread plate having a raised figure pattern on one surface to provide improved traction.
2. Steel Cover Plates
- a. Steel cover plates shall be galvanized ASTM A572, Grade 50 steel plate or ASTM A240 316L stainless steel plate (25 ksi min. yield strength) as called for in the Drawings.
 - b. Frames and supports shall match the cover plate material.
 - c. Fastening devices and hardware shall match the cover plate material.
3. Aluminum Cover Plates
- a. Alloy 6061-T6.
 - b. Frames and supports shall be all aluminum construction.
 - c. Fastening devices and hardware shall be Type 316 stainless steel.
 - d. Mill finish.

2.04 FABRICATION

- A. Provide work true to detail; with clean, straight, sharply defined profiles, and smooth surfaces of uniform color and texture free from defects impairing strength or durability.
- B. Field verify dimensions and support locations prior to fabrication.
- C. Provide connections and accessories of sufficient strength to safely withstand stresses and strains to which they will be subjected. Threaded connections shall be made so that the threads are concealed by fitting.
- D. Angle frames for grating and floor plates shall be mitered and welded at corners and with welded strap anchors or headed studs attached.
- E. Welded joints shall be rigid and continuously welded or spot welded as specified or shown. Dress the face of welds flush and smooth. Exposed joints shall be close fitting and located where least conspicuous.

- F. Welding of parts shall be in compliance with the latest edition of the applicable AWS welding code. Welding only to be done where shown, specified, or permitted by the Engineer. Welding shall be done by welders certified to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.
- G. Weld aluminum work on the unexposed side when possible in order to prevent pitting or discoloration.
- H. Grating sections shall be fabricated so that longitudinal and cross bars in adjacent sections shall be in line when erected. Grating shall be furnished in reasonable size pieces, avoiding patchwork, with due regard for neat overall appearance.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that opening sizes and dimensional variations are acceptable for installation of grating or cover plates at the specified tolerances. Report any non-complying areas to the Construction manager prior to proceeding with installation.

3.02 INSTALLATION

- A. Install all items furnished except items to be embedded in concrete which shall be installed under Division 3. Install items to be attached to concrete or masonry after such work is completed and in compliance with the details shown.
- B. Field cutting of finished surfaces is not allowed unless specifically approved by the Engineer. When cutting is approved, use mechanical cutting tools; do not use flame cutting tools.
- C. Secure grating with fastening devices as specified to prevent movement, except where removable grating is called for on Drawings.
- D. Unless otherwise shown, cover plates shall be shop drilled using countersunk holes for bolting hardware. Supporting embedded framing shall be field drilled using the cover plate as a template.
- E. Where aluminum contacts a dissimilar metal, field-apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dissimilar metal.
- F. Where aluminum contacts masonry or concrete, field-apply a heavy brush coat of zinc chromate primer to the masonry or concrete. For embedded items, coat the embed.
- G. Where aluminum contacts wood, field-apply two coats of aluminum metal and masonry paint to the wood.

3.03 FIELD QUALITY CONTROL

A. TOLERANCES

1. Maximum space between adjoining or abutting sections: ¼-inch.
2. Maximum variation from top surface plane of adjoining or abutting sections or structure: 1/8-inch.

END OF SECTION

SECTION 09981

CORROSION PROTECTION FOR CONCRETE STRUCTURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Section 03300 – Concrete for Structures.

1.02 SUMMARY

- A. This specification covers work, materials and equipment required for protecting the interior of concrete structures by monolithic spray-application of a high-build, solvent-free epoxy coating to provide corrosion protection. Procedures for surface preparation, cleaning, application and testing are described herein.
- B. For cementitious coatings, refer to SAWS Standard Specification Item 850.

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 1. ASTM D 638 - Tensile Properties of Plastics.
 2. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics.
 3. ASTM D 695 - Compressive Properties of Rigid Plastics.
 4. ASTM D 4541 - Pull-off Strength of Coatings Using a Portable Adhesion Tester.
 5. ASTM D 2584 - Volatile Matter Content.
 6. ASTM D 2240 - Durometer Hardness, Type D.
 7. ASTM D 543 - Resistance of Plastics to Chemical Reagents.
 8. ASTM C 109 - Compressive Strength Hydraulic Cement Mortars.
- B. NACE (National Association of Corrosion Engineers) - Industrial maintenance Painting.
- C. NPCA (National Paint and Coatings Association) Guide to U.S. Government Paint Specifications.
- D. PDCA (Painting and Decorating Contractors of America) - Painting - Architectural Specifications Manual.
- E. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.
- F. Los Angeles County Sanitation District – Evaluation of Protective Coatings for Concrete.
- G. SSPWC 210-2.3.3 - Chemical resistance testing published in the Standard Specifications for Public Works Construction, 1997 edition (otherwise known as “The Greenbook”).

1.04 SUBMITTALS

- A. The following items shall be submitted:

1. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.
2. Material Safety Data Sheets (MSDSs) for each product used.
3. Project specific guidelines and recommendations.
4. Applicator Qualifications
 - a. Manufacturer certification that Applicator has been trained and approved in the handling, mixing and application of the products to be used.
 - b. Certification that the equipment to be used for applying the products has been manufactured or approved by the epoxy coating manufacturer and Applicator personnel have been trained and certified for proper use of the equipment.
 - c. Three (3) years experience and five (5) recent references of projects of similar size and scope and Applicator must provide references indicating successful application on underground concrete or masonry substrates of a minimum 100,000 sf of the specified 100% solids, high-build solvent-free epoxy coating by heated, plural component spray application.
 - d. Proof of any required federal, state or local permits or licenses necessary for the project.
5. Letter acknowledging the additional warranty terms as discussed in Paragraph 1.08/B of this Specification.

1.05 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality epoxy resin products with 3 years experience.
- B. Applicator: Company specializing in epoxy resin products with 3 years experience. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE and SSPC standards and the epoxy coating manufacturer's recommendations.
- C. Product Labels: Include manufacturer's name, type of coating, stock number, color and label analysis on label of containers.
- D. Single Source Responsibility: Provide primer, epoxy and fillers produced by same manufacturer as final coats. Use only products approved by epoxy manufacturer, and use only within recommended limits.
- E. Do not paint over code-required labels, such as Underwriters' Laboratories and Factory Mutual, or equipment identification, performance rating, name or nomenclature plates.

1.06 DELIVERY, STORAGE , AND HANDLING

- A. Delivery: Deliver materials in original containers with seals unbroken and labels intact.
- B. Storage: Contractor shall designate a specific space at the project site for storing and mixing materials. Protect this space and repair all damage resulting from use. Do not store kerosene nor gasoline in this space. Remove oily rags at the end of each day's work. Products are to be kept dry, protected from weather and stored

under cover within the temperature ranges recommended by the manufacturer. Products are to be stored and handled according to their MSDSs.

1.07 PROJECT CONDITIONS:

- A. Environmental Requirements: Applicator shall conform with all local, state and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.
- B. Maintain the temperature inside the structure at not less than 60° F and no more than 100° F during painting and finishing.
- C. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 65° F and below 120° F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 ft.-candles measured mid-height at substrate surface.
- E. Do not apply coating in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the coating manufacturer's printed instructions. Coating may be continued during inclement weather only if the areas and surfaces to be coated are enclosed and heated within the temperature limits specified during application and drying periods of 24 hours between coats and 72 hours after final coat.
- F. Protection: provide sufficient drop cloths to fully protect adjacent finished work.

1.08 WARRANTY

- A. Manufacturer shall warrant all work against defects in materials and applicator shall warrant all work against defects in workmanship for a period of two (2) years, unless otherwise noted, from the date of final acceptance of the project. Manufacture / Applicator shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during said two (2) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the Owner.
- B. Manufacture / Applicator shall provide an extended warranty for a period of three (3) additional years from the end of the two (2) year standard warranty period.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Standard Portland cement or new concrete (not quick setting high strength cement) must be well cured prior to application of the epoxy coating.

2.02 ACCEPTABLE MANUFACTURERS

- A. The epoxy products specified herein are manufactured by Carboline Company (Plasite 4500) and are intended to establish a standard of quality. Other

acceptable manufacturers include Raven Lining Systems, Inc. (405 Epoxy Coating System) and Chesterton (ARC 125). Other non-polyurethane SAWS Standards Committee approved sanitary sewer epoxy coatings may be submitted for consideration as approved equals.

- B. Colors: The Owner will select colors. Regardless of which brand of epoxy is selected for use, the Contractor shall intermix and blend as required to obtain an exact match to each color on the color schedule.

2.03 EPOXY COATING

- A. The epoxy coating system will consist of a 100% solids, solvent-free two-component epoxy resin system thixotropic in nature and filled with select fillers to minimize permeability and provide sag resistance acceptable to these specifications:

Product Type:	Amine Cured Epoxy
Color:	Blue
Solids Content (vol %):	100
Mix Ratio:	3:1 (or 4:1)
Compressive Strength (minimum), psi:	14,800
Tensile Strength:	7,600
Tensile Elongation (minimum), %:	1.50
Flexural Modulus, psi:	600,000
Hardness, Type D:	80
Bond Strength - Concrete:	>Tensile Strength of Concrete
Chemical Resistance:	N/A
Severe Municipal Sewer:	All Types of Service
Successful Pass:	Sanitation District of L.A. County Coating Evaluation Study or SSPWC 210.2.3.3

2.04 EPOXY COATING APPLICATION EQUIPMENT

- A. Manufacturer approved heated plural component spray equipment shall be used in the application of the specified epoxy coating.

PART 3 EXECUTION

3.01 ACCEPTABLE APPLICATORS

- A. Epoxy coating must be applied by a Certified Applicator of the epoxy coating manufacturer and according to manufacturer specifications.

3.02 EXAMINATION

- A. Applicator shall verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Applicator shall examine surfaces scheduled to be finished prior to commencement of work. Report to OWNER any condition that may potentially affect proper application.

- C. Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.
- D. Any active flows shall be dammed, plugged or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated. Flows should be totally plugged and/or diverted when coating the invert. All extraneous flows into the concrete structure at or above the area coated shall be plugged and/or diverted until the epoxy has set hard to the touch.
- E. Installation of the epoxy coating shall not commence until the concrete substrate has properly cured in accordance with these specifications.
- F. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated.

3.03 SURFACE PREPARATION

- A. Applicator shall perform all surface preparation and epoxy coating installation.
- B. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface or replaced.
- C. Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the epoxy coating to be applied. Surfaces to receive epoxy coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the epoxy coating and the substrate.
- D. All surfaces should be inspected by the Inspector during and after preparation and before the epoxy coating is applied.

3.04 APPLICATION OF EPOXY COATING

- A. Workmanship shall be of the highest quality. Application procedures shall conform to the recommendations of the epoxy coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.
- B. The spray equipment shall be specifically designed to accurately ratio and apply the specified epoxy coating materials and shall be regularly maintained and in proper working order.
- C. The epoxy coating material must be spray applied by a Certified Applicator of the epoxy coating manufacturer.
- D. Specified surfaces shall be coated by spray application of a moisture tolerant, solvent- free, 100% solids, epoxy coating as further described herein. Application shall consist of a 4-8 mil coat of Aquatapoxy A-10 conductive primer, followed by

two (2) coats of the approved epoxy liner to achieve the specified 150 mil minimum thickness. Spray application shall be to a minimum wet and dry film thickness as defined below:

Concrete, New/Smooth Junction: 150 mils minimum, thickness coating

- E. If necessary, subsequent top coating or additional coats of the epoxy coating should occur as soon as the base coat becomes tack free, (normally within 2 to 4 hours) but no later than the recoat window (normally 24 hours at 70°F) for the specified products. Additional surface preparation procedures per Manufacturer's recommended specifications will be required if this recoat window is exceeded.
- F. Do not paint over code-required labels such as Underwriter's Laboratories and Factory Mutual, or equipment identification, performance rating, name or nomenclature plates.

3.05 TESTING AND INSPECTION

- A. During application, Applicator shall regularly perform and record epoxy coating thickness readings with a wet film thickness gage meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, to ensure a monolithic coating and uniform thickness during application. A minimum of three readings per 200 square foot area shall be recorded. Applicator shall submit all documentation on thickness readings to Inspector on a daily basis when coating application occurs.
- B. Applicator shall perform holiday detection on all surfaces coated with the epoxy coating in the presence of Inspector. After the epoxy coating has set hard to the touch, surfaces shall first be dried, an induced holiday shall then be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99). All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional epoxy coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the epoxy coating manufacturer's recommendations. Note: this procedure is sometimes difficult or impossible to perform in tight manhole or vault structures or may provide unreliable readings when testing coatings applied to concrete.
- C. Measurement of bond strength of the protective coating to the substrate shall be made at regular intervals and along different sections of the structure. At the sole discretion of the Engineer, a minimum of three (3) successful pull test evaluations (glue failure constitutes an unsuccessful pull) shall be made every 1,000 square feet of coated structure. Bond strength shall be measured in accordance with ASTM D4541. Any areas detected to have inadequate bond strength shall be evaluated by the Project Engineer. Further bond tests may be performed in that area to determine the extent of potentially deficient bonded area and repairs shall

be made by Applicator in strict accordance with manufacturer's recommendations.

- D. A final visual inspection shall be made by the Inspector and Applicator. Any deficiencies in the finished coating shall be marked and repaired by Applicator according to the procedures set forth herein.

END OF SECTION

SECTION 15089

HDPE PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. This section is a supplement to "SAWS Standard Material Specifications for High Density Polyethylene pipe (HDPE)."
- B. This section governs the furnishing and installing of high density polyethylene pipe (HDPE) where the pipe will be used to:
 - 1. Convey sanitary sewer flows within a pressurized sewer siphon.
 - 2. Transfer the sewer's system air from an upstream siphon structure to a downstream siphon structure.
- C. Furnish labor, materials, equipment and incidentals necessary to install polyethylene pipe, and complete installation in accordance with the Contract Documents. The finished pipe shall be continuous over the entire length of the sewer between manholes and be free from defects.

1.02 QUALITY ASSURANCE

- A. Polyethylene pipe jointing shall be performed by personnel trained in the use of the thermal butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall have received training in the proper methods for handling and installing the polyethylene pipe. Training shall be performed by a qualified representative of the pipe manufacturer. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction.

1.03 SUBMITTALS

- A. Submittals shall be in accordance with SAWS General Conditions and shall include:
 - 1. Shop Drawings, catalog data, and manufacturer's technical data showing complete information on material composition, color, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendation for handling, storage, and repair of pipe and fittings.

1.04 STANDARDS

- A. Comply with local governing regulations if more stringent than specified herein. Piping shall meet the following standards and shall be a part of this Section as if written here in their entirety.
 - 1. American Society for Testing and Materials (ASTM) Standards:

ASTM F1473 Test Method for Notch Tensile Test to Measure the Resistance

ASTM D2122 Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM F2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe

ASTM D2837 Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials

ASTM D3035 Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter (up to 3-Inch IPS)

ASTM D3350 Specification for Polyethylene Plastics Pipe and Fittings Material

ASTM F714 Specification for Polyethylene (PE) Plastic Pipe (SDR-PR)

2. American Water Works Association (AWWA) Standards:

AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 through 64

AWWA M55 Polyethylene (PE) Pipe Design and Installation

1.05 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

- A. Transport, handle, and store pipe and fittings as recommended by manufacturer.
- B. Deliver, store, and handle other materials as required to prevent damage.
- C. All pipe and appurtenances are subject to inspection. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Owner's Project Representative at the Contractor's expense, before proceeding further.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe: Polyethylene Plastic Pipe shall be high density polyethylene pipe (HDPE).
 - 1. Appropriate for use as a gravity sanitary sewer and meet the
 - 2. Solid wall high density polyethylene for pressure sewer siphon pipe and air piping shall meet the applicable requirements of AWWA C906 "Polyethylene (PE) Pressure Pipe and Fittings, 4 through 64 Inches, for Water Distribution" (Ductile Iron Pipe Sizing), ASTM F714 "Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter", ASTM D3350, Ductile Iron Pipe Sizing.
 - 3. All pipe shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
 - 4. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
 - 5. Dimension Ratios: The minimum wall thickness of the polyethylene pipe shall meet the following:
 - a. Pressure Applications: AWWA C906 DR-17 Pressure Class 125 psi, Ductile Iron Pipe Sizing.
 - 6. All HDPE shall be carbon black or solid gray stabilized throughout the structural wall for ultra-violet protection. The pipe shall have a near white inside diameter to facilitate future TV inspection.

- B. Polyethylene Fittings: The polyethylene fittings shall be manufactured from a polyethylene compound which conforms to ASTM D3350 cell class PE445574C or E material. Fittings shall be manufactured by the same manufacturer as the pipe.
 - 1. Pipe fittings shall have a long-term hydrostatic strength rating of 1600 psi or more at 23 degrees Celsius, in accordance with ASTM D2837.
 - 2. Environmental stress crack resistance (ESCR) of the material shall meet the requirements as specified in ASTM D3350 Cell Classification of 7 for a 500-hour PENT material using ASTM F1473 (PENT).

2.02 MATERIALS TEST

- A. Tests for compliance with this Section shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate of compliance with ISO 9000 shall be furnished, by the manufacturer for all material furnished under this Section. Polyethylene plastic pipe and fittings may be rejected for failure to meet any of the requirements of this Section.

PART 3 EXECUTION

3.01 HANDLING

- A. The joints shall be handled near the middle with wide web slings and spreader bars. Rope slings also work well with straight lengths. The use of chains, end hooks or cable slings that may scar the pipe are not permitted. The following procedures shall be observed when handling HDPE pipe.
 - 1. Always stack the heaviest series of pipe at the bottom.
 - 2. Protect the pipe from sharp edges when overhanging the bed of a truck or trailer by placing a smooth, rounded protecting strip on the edge of the bed.
 - 3. The load should be anchored securely to prevent slippage.
- B. Lengths of small-diameter, lightweight pipe can be unloaded manually.
- C. Pipe applications shall normally be handled by:
 - 1. Unloading the pipe from the truck in a row along the side of the installation area and moving the fusion unit along the row of joints.
 - 2. Stacking the pipe beside the fusion unit and trailing the pipe out after fusion, then dragging the long length of pipe into place for installation. It is suggested that as the pipe is fused and moved through the fusion machine, additional joints of pipe should be placed in the moveable jaw side of the machine for each subsequent fusion. This prevents the hydraulic system of the machine from having to pull the previously fused long length.
- D. Dragging the pipe into place is permitted provided the pipe isn't damaged from sharp rocks or excessive abrasion created by pulling the pipe great distances.

3.02 STORAGE

- A. If the pipe must be stacked for storage, avoid excessive stacking heights. Out-of-roundness can be created in the lower rows of pipe, due to excessive stacking heights. The limitation on storage height is 8 rows for pipe 6 inches or less, 3 rows for pipe 8 inches or less, 2 rows for pipe 32 inches or less and 1 row for pipe 63 inches or less.

- B. Care shall be taken to ensure that the pipe is stacked in straight rows. The expansion and contraction caused by uneven heating by the sunlight shall be prevented by restraining the racks.
- C. Pipe laid directly on the ground shall be placed on an area free of loose stones or sharp objects. Scarring or gouging of the pipe shall be avoided.

3.03 PIPE JOINING

- A. The polyethylene pipe shall be assembled and joined at the Site using the thermal butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.
- B. The butt-fused joint shall be in true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. When cool, all weld beads shall then be removed from outside surface such that the joint surfaces shall be smooth. The fused joint shall be watertight and shall have a tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the Owner's Project Representative. All defective joints shall be cut out and replaced at no cost to the Owner. Any section of the pipe with a gash, blister, abrasion, nick, scar or other deleterious fault greater in depth than 10 percent of the wall thickness, shall not be used and must be removed from the Site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Owner's Project Representative shall be discarded and not used.

3.04 BENDING PIPE

- A. HDPE may be cold-bent to a minimum radius of 40 times the pipe diameter as it is installed, eliminating the need in many cases for elbows for slight bends. The minimum bending radius that can be applied to the pipe without kinking varies with the diameter and wall thickness of the pipe. Contractor shall conform to manufacturer's recommendations. If adequate space is not available for the required radius, a fitting of the desired angle shall be fused into the piping system to obtain the necessary change in direction.

3.05 INSTALLATION BELOW GROUND

- A. Pipe Laying:
 - 1. When pulling pipe, either a pulling head or a suitable wraparound sleeve with rubber protective cover shall be used to prevent the pulling cables from damaging the pipe. The pipe shall not be pulled by the flanged end.
 - 2. Open cut installations shall be in accordance with Section SS804 "Excavation, Trenching and Backfill."
- B. Grouting (Continuous or at Manholes): Pipe running through a manhole wall shall be anchored by wall anchor to the pipe and encasing them in the wall of the manhole.

3.06 FIELD QUALITY CONTROL

- A. Field testing shall be conducted in accordance with SAWS Standard Specification Item No. 849, and Supplementary Specification S849.
- B. Hydrostatic Testing for pressure piping systems shall be performed in accordance with ASTM F2164. Testing pressure shall not exceed 1.5 times the system design pressure and total testing time including the time required to pressurize, stabilize, hold test pressure, and depressurize should not exceed 8 hours. If 5 psi is lost during testing pipeline must be repressurized.
- C. Air testing of air piping systems shall be performed in accordance with ASTM F1417. The specified rated test pressure shall be maintained for 10 minutes to 1 hour (dependent on pipe diameter and according to ASTM F1417), but not more than 1 hour. Test pressure ratings shall not be exceeded. Consult pipe manufacturer for maximum allowable test pressure.
- D. HDPE pipe deflection shall not exceed deflection percentages identified in ASTM F1962 or manufacturer's maximum allowable deflection, whichever is lower. Allowable pipe deflection varies based on DR rating. The following maximum deflection percentages can be used for the following DR ratings: DR21 – 7.5 percent, DR17 – 6.0 percent, DR15.5 – 6.0 percent, DR13.5 – 6.0 percent, DR11 – 5.0 percent, DR9 – 4.0 percent, DR7.3 – 3.0 percent. Deflection measurements can be taken by mandrel or by measurement of inside diameter before and after backfill operations.
- E. Do not enclose or cover any Work until inspected.

3.07 REJECTION

- A. Pipe/Fittings: If any material intended for use in the construction of the Project has been inspected and rejected after such material has been delivered to the Site, all such rejected material shall be immediately removed from the property by the CONTRACTOR.

3.08 CLEAN AND ADJUST

- A. Remove surplus pipeline materials, tools, rubbish and temporary structures and leave the construction site clean, to the satisfaction of the Owner's Project Representative.

END OF SECTION

SECTION 15113

STOP LOG AND FRAMES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes the furnishing and the subsequent installation of fabricated stainless steel stop log frames and stop logs, complete with all other appurtenances necessary for a complete and operating installation, as shown on Plans and as specified herein.

1.02 RELATED WORK

- A. Division 1: General Requirements.
- B. Division 5: Metals.
- C. Division 3: Concrete.

1.03 SUBMITTALS

- A. Submittals shall be prepared and submitted in accordance with San Antonio Water System General Conditions.
- B. Submittals shall include a firm production and delivery schedule of stop logs, frames, and all accessories. The production and delivery schedule shall consider normal submittal review time as specified in San Antonio Water System General Conditions and shall be in accordance with the construction schedule specified in Specification Item No. 1110 – Progress Schedule.
- C. The following submittals are required, at a minimum, in addition to the applicable requirements of San Antonio Water System General Conditions.
 - 1. Detailed drawings specific to the stop logs and frames provided with dimensions and weights.
 - 2. Construction features and materials of construction with ASTM designations.
 - 3. List of any deviations from the requirements of these specifications.
 - 4. Design and detail of the stop log frame brackets and anchor bolts.
 - 5. Engineering data and descriptive literature for all stop logs.
 - 6. MANUFACTURER's installation and testing instructions, including leakage testing instructions and storage recommendations.
 - 7. Welding procedures and qualifications. Stop log frames shall be welded using the welding process described in AWS D1.6 or ASME Section IX. Welders and welding processes shall be qualified and maintained as required by AWS D1.6 Section 4. Visual inspections shall be according to AWS D1.6 Section 6.
 - 8. Other information necessary for complete review by ENGINEER.
- D. Start-up and test schedule.
- E. Field test data and test records.
- F. Provide an Affidavit of Compliance according to AWWA C561, Article 6.3.
- G. O&M Manuals in accordance with San Antonio Water System General Conditions.
- H. Partial or incomplete submittals will not be reviewed by the ENGINEER.

1.04 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. AMERICAN SOCIETY OF TESTING MATERIALS (ASTM)
 - 1. ASTM A240 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - 2. ASTM A276 Standard Specification for Stainless Steel Bars and Shapes
 - 3. ASTM B584 Standard Specification for Copper Alloy Sand Castings for General Applications
 - 4. ASTM D2000 Standard Classification System for Rubber Products in Automotive Applications
 - 5. ASTM D3935 Standard Specification for Polycarbonate (PC) Unfilled and Reinforced Material
 - 6. ASTM D4020 Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
 - 7. ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
 - 8. ASTM F594 Standard Specification for Stainless Steel Nuts
- C. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
- D. AMERICAN WELDING SOCIETY (AWS)
- E. INTERNATIONAL STANDARD ORGANIZATION (ISO)

1.05 QUALITY ASSURANCE

- A. Minimum 10 years' experience in production of equipment substantially similar to the equipment specified
- B. Stop log frame MANUFACTURER shall have experience in the production of substantially similar equipment, and shall provide evidence of satisfactory operation in at least 20 separate installations. At least 5 installations shall have a minimum of 5 years in service.
- C. MANUFACTURER's shop welds, welding procedures, and welders shall be qualified and certified in accordance with the requirements of the latest edition of ASME, Section IX or AWS D1.6.
- D. Stop log frames and stop logs shall be shop inspected for proper operation prior to shipping.
- E. Stop log frame MANUFACTURER shall be ISO 9001 certified or approved equal quality control measures.
- F. The stop log frame MANUFACTURER shall furnish a qualified field representative for a minimum of 1 working day per structure to inspect all equipment described herein after installation, to advise CONTRACTOR and OWNER during start-up and testing, and to instruct OWNER's personnel in routine maintenance and troubleshooting procedures. CONTRACTOR shall coordinate the scheduling of such training and start-up assistance with the OWNER.
- G. MANUFACTURER's installation report is required prior to final acceptance.
- H. All stop log frames and stop logs specified in this section shall be supplied by a single MANUFACTURER.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle all appurtenances with care. Frames, stop logs and appurtenances which are cracked, chipped, distorted or otherwise damaged or dropped will not be acceptable. Protect all threads, seats, ends, etc. from damage and corrosion.
- B. Store all frames, stop logs and appurtenances in approved enclosed shelter or properly covered and off the ground, and in accordance with MANUFACTURER's recommendations.
- C. Stop log frames shall be delivered to the site fully assembled. Stop log frames shall not be delivered to the site in sections for assembly by the CONTRACTOR.

1.07 WARRANTY

- A. Provide two year warranty under provisions of the General Conditions.

PART 2 PRODUCTS

2.01 MANUFACTURER(S)

- A. Fabricated stainless steel stop log frames and stop logs shall be manufactured by one of the following:
 - 1. Fontaine Industries, Ltd.
 - 2. Whipps
 - 3. HydroGate Corp.

2.02 MATERIALS AND/OR EQUIPMENT

- A. General
 - 1. All materials used in the fabrication of stop logs and frames for shall be inherently corrosion resistant where exposed to raw wastewater.
 - 2. Minimum thickness of any structural member, shall be 0.25 inches unless otherwise specified.
 - 3. All welds shall be passivated.
 - 4. Stop logs and frames shall be designed for installation and operation to accommodate the clearances and limitations available in the proposed structure.
 - 5. Stop logs and frames shall be substantially watertight with leakage not to exceed 0.1 gpm per foot of seating perimeter at design seating head.
 - 6. Field welding is not permitted.
- B. Performance
 - 1. Stop logs and frames shall be substantially watertight under the design head conditions as shown in the Stop Log Frame Schedule.
 - a. Under design seating head, leakage shall not exceed 0.10 gallons per minute per foot of seating perimeter.
 - b. Under design unseating head, leakage shall not exceed 0.10 gallons per minute per foot of seating perimeter.
 - 2. The stop log's sealing system shall have been tested through a cycle test in an abrasive environment and should show the leakage requirements are still obtained after 25,000 cycles with minimum deterioration. Documentation of testing shall be provided with submittal drawings.
- C. Materials
 - 1. Frame: Stainless steel, ASTM A276, Type 316/316L
 - 2. Stop Log: Stainless steel, ASTM A276, Type 316L
 - 3. Guides: Ultra-high-molecular-weight polyethylene (UHMWPE), ASTM D-4020

4. Side and Top Seals: UHMWPE, ASTM D4020
 5. Bottom Seal: Resilient neoprene, ASTM D2000 Grade 2 BC 510
 6. Fasteners: Stainless steel, ASTM F593 or F594 GR2
 7. Gasket (between frame and wall): EPDM
- D. All required attaching bolts; anchor bolts and accessories shall be furnished with the equipment and shall be Type 316 stainless steel. Anchor bolts shall be minimum diameter of 0.75 inches.
- E. Frame
1. Frame shall be constructed of 316/316L structural members or formed plate welded to form a rigid one-piece frame. Minimum thickness 0.25 inches.
 2. Frame shall be of a design suitable for mounting as detailed in the project plans. Should structural modifications be necessary, CONTRACTOR shall be required to retain the services of an Engineer licensed in the State of Texas, at no additional cost to the OWNER, to design the revisions, signed and sealed plans and calculations shall be submitted to ENGINEER for review. Necessary work required to meet the revised design shall be completed by CONTRACTOR at no additional cost to OWNER.
 3. Frame configuration shall be of the flush-bottom type and shall allow the replacement of the top and side seals without removing the frame from the wall.
 4. Design for maximum design head specified in the stop log schedule, with a minimum safety factor of 5 for the ultimate tensile, compressive and shear strength.
- F. Stop Log
1. Stop Log shall consist of a type 316L flat plate reinforced with formed plates or structural members to limit deflection to 1/1000 of the stop log's span under the maximum design head or 0.0625 inch whichever is less. Minimum thickness 0.25 inch.
 2. Provide two lifting hooks/bars and stoppers welded to the stop log to allow an alternate lifting method to be used to unseat and lift the stop log. Design each hook/bar to be capable of lifting the stop log against maximum design head conditions.
 3. Each stop log shall be limited to a maximum of 6.25 inches in height.
 4. Provide a lifting devise capable of locking and lifting the stop logs provided.
- G. Guides and Seals
1. Guides shall be of such length as to support the slide fully in the open position.
 2. Minimum face width of 1-inch
 3. J-seals shall not be acceptable
 4. Field replaceable without removing frame.
 5. Anchor bolts shall not pass through guides and seals
 6. Seating and sliding surface shall provide a low coefficient of friction with the surface of the slide
 7. Side and top seals shall be of one of the alternative designs below
 - a. Seal Design A shall be a UHMWPE fixed sealing surface that surrounds the clear opening. It shall be held in place in the guide by 316 stainless steel fasteners. The seal compression may be maintained by UHMWPE filed adjustable pressure pads mounted to the slide with 316 stainless steel fasteners.
 - b. Seal Design B shall be a neoprene crown seal with UHMWPE bearing bars attached to the slide with 316 stainless steel fasteners. The crown seal shall be actuated by water pressure in either the seating or unseating direction. Primary contact with the slide shall be through the UHMWPE bearing bar. The neoprene shall not be solely relied upon for the contact seal. Seal compression may be maintained by UHMWPE field adjustable pressure pads mounted to the guide with 316 stainless steel fasteners.
 - c. Seal Design C shall be UHMWPE self-adjusting type seals utilizing a continuous compression cord or pad to ensure contact between the seals and the slide. Side seals shall be held in place between the front and back angles of the guide or within a single

piece mounting. Side seal held in place in the guide with 316 stainless steel bolts. Top seal UHMWPE self-adjusting type with compression cord or pad.

8. The sealing system shall maintain efficient sealing in any position of the slide and allow the water to flow only in the opened part of the frame from either direction.
9. The bottom seal shall be set into the bottom member of the frame or mounted on the bottom of the slide and shall form a flush-bottom. The bottom seal shall be mechanically fastened to the bottom member of the frame or the slide. Bottom seals that are attached through the use of adhesives only are not acceptable.

H. Protective Coating

1. Coat all moving surfaces with waterproof grease. Paint is not required for stainless steel surfaces.

2.03 STOP LOG AND FRAME SCHEDULE

A. Stop Log and Frame Schedule

<i>Tag No.</i>	<i>Location</i>	<i>Type</i>	<i>Stop Log Size (WxH)</i>	<i>Design Water Depth</i>
N/A	Siphon Inlet	Stop Log and Frame*	44" x 54"	54"
N/A	Siphon Outlet	Stop Log and Frame*	60" X 84"	84"

***FRAME SHALL EXTEND TO TOP OF STRUCTURE**

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install gates and appurtenances per MANUFACTURER's detailed instructions in such a manner that will prevent leakage around the seats and binding of the stop logs during operation.
- B. Metals surfaces shall be free from oil, grease, loose mill scale, loose paint, surface rust, and other debris or objectionable coatings prior to placing concrete against surface.
- C. Anchor bolts, and flanged frames shall be secured in true position in the forms and held in alignment during placement of concrete in accordance with approved MANUFACTURERs drawings.
- D. Concrete surfaces shall be finished to provide smooth and uniform contact surfaces for installation of frames and stop logs.
- E. Stop logs shall be carefully aligned so that the stop logs are parallel to the guide bars or angles on the frame after installation.
- F. Coordinate stop log frame installation with installation of siphon box concrete protective coating system. Providing a totally sealed, corrosion-resistant system is required.
- G. After the frame has been installed, clean, lubricate, and otherwise service the frame and stop logs per MANUFACTURER's instructions.

3.02 SHOP TESTING

- A. Each frame and stop log shall be fully assembled and shop-inspected in the vertical position for proper seating.
- B. Stop logs shall be fully installed and removed from frame to ensure that it operates freely.

3.03 PAINTING AND COATINGS

- A. All machined iron surfaces including drilled and tapped holes shall be completed with a heavy coat of protective grease.

3.04 FIELD TESTING

- A. Operate installed frame and stop logs a minimum of three full cycles in the presence of the OWNER to demonstrate satisfactory operation. CONTRACTOR shall make any changes and/or adjustments necessary to ensure satisfactory operation of the frame and stop log system. All testing equipment required shall be provided by the CONTRACTOR.
- B. Perform leakage test in presence of the OWNER per the requirements of this Specification Section.

3.05 MANUFACTURER'S SERVICE

Provide the service of qualified, factory-trained representative of the MANUFACTURER to check and approve each part of the installation before it is placed in operation. He shall instruct the OWNER personnel in operation, care and maintenance of all frames, stop logs and appurtenances and supervise initial operation. Special tools, if required for normal operations and maintenance, shall be furnished with the equipment by the MANUFACTURER.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Description
 - 1. This item shall be for furnishing all design, submittals, labor, materials, tools, equipment and incidentals required to approve and construct the structures. The item applies to the following structures listed:
 - a. Siphon Inlet Structure - Sta. 102+93
 - b. Siphon Outlet Structure – Sta. 100+54

4.02 MEASUREMENT

- A. Measurement of the item "Stop Log and Frames" is measured by the dimensions provided in the plans drawings and materials stated herein or as indicated by OWNER and ENGINEER, and is incidental to the Bid Items identified by the following:
 - a. Siphon Inlet Structure - Sta. 102+93 measured by each
 - b. Siphon Outlet Structure – Sta. 100+54 measured by each

4.03 PAYMENT

- A. Payment shall constitute full compensation to the CONTRACTOR for furnishing all labor, equipment, tools, and materials, and for performing all operations required to furnish to the OWNER. Payment for this item shall be incidental to the following Bid Items:
 - a. Siphon Inlet Structure - Sta. 102+93
 - b. Siphon Outlet Structure – Sta. 100+54
- B. There shall be no separate pay item for this work

END OF SECTION

Supplement to Item No 511

Cutting and Replacing Pavement (Trench Repair)

This supplement shall modify Item No 511 Cutting and Replacing Pavement (Trench Repair).

511.4. - Construction:

Add the following:

E. When trench repairs are located within in limits of mill and overlay, perform pavement replacement in 2 phases. Initial asphalt replacement will consist of 12” or 15” of Type B material within limits of trench repair, as noted on plans and detail. Once all trench repairs are complete, top 2” or 3” of Type B material will be removed and replaced with 2” or 3” of Type D Material as part of mill and overlay. Finished pavement section will be a shown in Trench Restoration detail for asphalt pavement.

-End of Supplement-

Supplement to Item No 540

Temporary Erosion, Sedimentation and Water Pollution Prevention and Control

This supplement shall modify Item No 540 Temporary Erosion, Sedimentation and Water Pollution Prevention and Control

540.5

Delete 540.5 and 540.6 and replace with the following:

“MEASUREMENT AND PAYMENT: Contractor shall provide all labor, supervision, tools, equipment and materials necessary to implement and maintain the Storm Water Pollution Prevention Plan in accordance with plans and specifications.

Measurement shall be by Lump Sum. Payment for this item will be made at the contract lump sum price bid for Storm Water Pollution Prevention plan.

-End of Supplement-

SUPPLEMENT TO ITEM NO 848

SANITARY SEWERS

PART 1 GENERAL

1.01 SUMMARY

- A. This section is a supplement to Item 848 Sanitary Sewers of the SAWS Specifications for Water and Sewer Construction. For Fiberglass Reinforced Pipe and Fittings the requirements of this supplement will apply.

1.02 SCOPE OF WORK

- A. Furnish all labor, tools, materials, and equipment, and perform all work necessary for the installation of all fiberglass reinforced pipe and fittings.

1.03 DESCRIPTION OF SYSTEMS

- A. Fiberglass reinforced pipe and fittings specified herein shall be applicable for the following systems:
 - 1. Phase 1B
 - a. 36" and 33" dia. sanitary sewer.

1.04 RELATED WORK

- A. General Conditions, Article V., Section 5.12, Shop Drawings, Product Data and Samples.
- B. Division 3 - Concrete.

1.05 SUBMITTALS

- A. Submittals shall comply with General Conditions of the Contract, Article V, Section 5.12. Submittals shall include the following:
 - 1. Shop Drawings including piping layouts showing locations, elevation, station numbers (corresponding to ENGINEER's drawings), laying dimensions and types of fittings, joints, supports, flanges, anchors, and specials.
 - 2. Schedule of pipe lengths and class (including the length of individual pipes by class and diameter) for the entire job, method of manufacturing of pipe, joint details, fittings, and any specials.
 - 3. Provide test reports upon request, certifying that pipe has been tested in accordance with and exceeds minimum requirements of the following:
 - a. For pressure applications, ASTM D 3754 or AWWA C950.
 - b. For gravity flow applications, ASTM 3262, ASTM D 3754, or AWWA C950.

ASTM D2992 test results for reinforced thermosetting resin pipe may be used for reinforced plastic mortar pipe manufactured with equivalent reinforcement. Long-term ring-bending strain may be determined from testing per ASTM D 5365 using water, or ASTM D3681 using IN H₂SO₄, or using ASTM D2992 method B extrapolated to 50 years for resin systems with a proven history of performance for this project application.

- B. Shop Tests: Submit test reports certifying that pipe has been tested in accordance with and exceeds minimum requirements of the following:
 1. Pipes: For gravity flow applications, pipes shall be manufactured and tested in accordance with ASTM D3262. For pressure applications, pipe shall be manufactured and tested in accordance with ASTM D3754 and AWWA C950.
 2. Joints: Coupling Joints shall meet the requirements of ASTM D4161.
 3. Stiffness: Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 72 psi.
- C. Submit long term pipe deflection under calculation considering soil overburden and surcharge load specified in Paragraph 2.01.H.
- D. Submit MANUFACTURER's experience as specified in paragraph 1.06 of this Section.

1.06 REFERENCE STANDARDS

- A. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- B. ASTM D3262 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe
- C. ASTM D3567 - Deforming Dimensions of Reinforced Thermosetting Resin Pipe (RTRP) and fittings.
- D. ASTM D3681 - Strain Corrosion Testing for direct bury installations.
- E. ASTM D3754 - Specified for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) sewer and Industrial Pressure Pipe.
- F. ASTM D4161 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals
- G. ASTM F477 - Specification for Elastomeric Seals (gaskets) for Joining Plastic Pipe elevation, station number.
- H. AWWA C950 - Standard for Fiberglass Pressure Pipe
- I. AWWA M45 - Fiberglass Pipe Design

1.07 QUALITY ASSURANCE

- A. Product Manufacturer: Regardless of being named within this specification, manufacturer shall meet all of the requirements below in order to be considered for this project. Should proposed manufacturer be unable to meet all requirements below, CONTRACTOR shall be responsible for any additional costs associated with the use of an alternate manufacturer capable of meeting the following requirements:
 1. Manufacturer specializing in manufacturing quality FRP products with a minimum of 5 years experience manufacturing large diameter (36-inch or larger) FRP for use in wastewater conveyance.
 2. Manufacturer must have an operational facility with a current ISO 9001 Certification, located within the continental United States. Overseas shipment will not be allowed. All products must meet current ASTM standards.
- B. Manufacturer to provide permanent quality control department and laboratory facility capable of performing inspections and testing as required by Specifications. Material testing, inspection procedures, and manufacturing process are subject to inspection by

the OWNER's and/or ENGINEER's Representative. Perform manufacturer's tests and inspections required by referenced standards and these Specifications including the following: (Correct nonconforming conditions.)

1. Provide manufacturer's certificate of conformance to Specifications.
2. Manufacturer is to have current ISO 9001 certification in place prior to commencing product manufacture.

C. Scales, measuring devices, and calibration tools used in the manufacture of pipe shall be calibrated within the last 12 months. Each device used in pipe manufacturer shall be tagged recording the date of last calibration. Devices are subject to inspection by Project Engineer.

D. The quality of all materials, the process of manufacture, and the finished pipe shall be subject to inspection and approval by the OWNER's and/or ENGINEER's Representative. Such inspection may be made at the place of manufacture, on the work site after delivery, or at both places. The pipe shall be subject to rejection at any time due to failure to meet any of the specification requirements, although sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be immediately removed from the site.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Pipe delivery, storage, and handling shall be in accordance with Manufacturer's recommendations.

B. All pipe and appurtenances are subject to inspection by the Engineer. Material found to be defective due to manufacture or damage in shipment shall be rejected and removed from the job site.

C. All pipe, fittings, and accessories shall be loaded and unloaded by a means to prevent shock or damage. Under no circumstances shall such material be dropped.

D. Materials, if stored, shall be kept safe from damage. The interior of all pipe, fittings, and other appurtenances shall be kept free from dirt or foreign matter at all times.

E. Piping shall not be stacked higher than manufacturers recommendations according to size. The bottom tier of piping shall be kept off the ground on timbers, rails, or concrete.

F. Gaskets shall be stored in a cool location, out of direct sunlight and in accordance with the manufacturer's recommendations. Gaskets shall be used on a first-in, first-out basis.

G. Materials cracked, gouged, chipped, or otherwise damaged will not be accepted. Minor defects in the pipe coatings may be repaired at the site by a method approved by the Manufacturer of the pipe and the Engineer. Damaged pipe, fittings, and specials and accessories shall be repaired to the satisfaction of the Engineer or replaced.

PART 2 PRODUCTS

2.01 MATERIALS

A. Acceptable Manufacturers:

1. Hobas Pipe USA, Inc.

In all cases CONTRACTOR shall adhere to pipe manufacturer's limitations for installation.

- B. Resin Systems: The Manufacturer shall use only polyester resin systems with a proven history of performance in sewer systems. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.
- C. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.
- D. Silica Sand: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.
- E. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally affect the performance of the product nor impair visual inspection of finished products.
- F. Elastomeric Gaskets: Gaskets shall be supplied by approved gasket Manufacturers and be suitable for the service intended. Gaskets shall conform to the requirements of ASTM F 477. All gaskets of the same type and size shall be produced by one manufacturer.
- G. Internal Liner Resin:
 - 1. Wastewater Applications: Suitable for service as sewer pipe, and be highly resistant to exposure to sulfuric acid as produced by biological activity from hydrogen sulfide gases and meet or exceed requirements of ASTM D 3681.
- H. Pipe Design Criteria
 - 1. External Load Design Parameter:
 - a. Unit weight of Soil: 120 pcf.
 - b. Bedding constant (k) = 0.1.
 - c. Deflection log factor (DI) = 1.2.
 - d. Design to withstand most critical simultaneous 3 application of external loads, including construction loads, and internal pressures.
 - e. Live load - HS 20.
 - f. Maximum allowable long term deflection not to exceed 5% of original pipe diameter.
 - g. Initial deflection of pipe shall not exceed 3 percent of original diameter measured after completion of backfilling.
- I. Actual inside diameter for gravity sewers shall be in accordance with Table 3 of ASTM D3262, as applicable.
- J. Tee-Base Design Criteria
 - 1. Manhole tee-base shall be constructed of mitered sections of FRP sewer pipe connected with fiberglass reinforced laminations. Pipes used to construct the tee-base shall have the same stiffness as the adjacent line, defaulting to the greatest of the two adjoining lines. Tee-base shall match pipe diameter for neck opening. The tee-base shall meet the requirements of ASTM D3262. The pipe joints used for the tee-base shall meet the requirements of ASTM 4161. Tee-base shall be provided by pipe manufacturer.

2.02 FABRICATION

- A. Pipes: Manufacture pipe by the centrifugal casting or filament wound process to result in a dense, nonporous, corrosion-resistant, consistent composite structure.

- B. Joints: Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint water tightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed may utilize fiberglass, gasket-sealed closure couplings. Joints shall be sleeve coupling, bell and spigot coupling, or flush bell and spigot coupling and shall be compatible with the installation procedure. All joint components of the same type that are not manufactured with the pipe shall be produced by one manufacturer.
- C. Fittings: Elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed.

2.03 STIFFNESS CLASS

- A. Stiffness class of Fiberglass Reinforced Pipe shall satisfy design requirements, but shall not be less than SN 72, when used in direct bury operations.
- B. Design to withstand most critical simultaneous application of external loads, including construction loads, and internal pressures.
- C. Base on minimum of AASHTO HS-20 loading, AREA Cooper E-80 loads when under railroads and depths of bury as indicated. Design for AASHTO HS-20 and AREA Cooper E-80 loadings as recommended in AWWA M45.
- D. Calculate earth loads and thrusts for restrained (tied) joints based on AWWA M45,
- E. Groundwater Level: Assume equal to natural ground surface unless otherwise indicated on Drawings.

2.04 PRESSURE CLASS

- A. Pressure class of Fiberglass Reinforced Pipe shall not be less than PN-25 unless otherwise noted.

2.05 MARKINGS

- A. Pipe - Each length of pipe shall be marked in at least one location using large, easily legible, permanent letters indicating the nominal pipe size, manufacturer's name, and ASTM designation code.
- B. Gaskets - Markings shall include gasket manufacturer's name or symbol, gasket size and manufacturer's code to differentiate between high- and low-head gaskets.

2.06 DIMENSIONS

- A. Lengths: Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal +1 to 4 inches unless otherwise agreed.
- B. Wall Thickness: The minimum wall thickness shall be the stated design thickness.
- C. End Squareness: Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8".
- D. Roundness: The pipe shall be round within 0.1% of the outside diameter.
- E. Straightness: Pipes shall be straight within 1/16-inch over ten feet.

PART 3 EXECUTION

3.01 INSTALLATION OF DIRECT BURIED PIPE

- A. The bedding and burial of pipe and fittings shall be in accordance with the project plans and specifications and the Manufacturer's requirements.

3.02 INSTALLATION OF TUNNELED PIPE

- A. The installation of pipe and fittings shall be in accordance with the project plans and specifications and the Manufacturer's requirements.

3.03 LAYING FIBERGLASS REINFORCED PIPE AND FITTINGS

- A. Contractor shall be responsible for all interface and coordination with other contractors on site.
- B. The method of jointing the pipe shall be in strict accordance with the Supplier's instructions. All flange and coupling bolts shall be tightened in accordance with best practice identified in the governing standard or according to the Manufacturer's written recommendations.
- C. The Contractor shall regulate his equipment and construction operations such that the loading on the pipe does not exceed the loads for which the pipe is designed and manufactured.
- D. All pipe shall be sound and clean before laying. When laying is not in progress, including lunch time, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved in laying. The deflections at joints shall not exceed that recommended by the Manufacturers. Fittings, in addition to those shown on the Drawings, shall be provided, if required, in crossing utilities which may be encountered upon opening the trench.
- E. Connections to existing pipes shall be made using suitable joints and fittings for the conditions encountered. Each connection with an existing pipe shall be made at the time and under conditions which will least interfere with operation of existing system. Connections with buried existing flanges shall require removal of grout from the flanges. Remove concrete thrust blocking when encountered for connections to the existing pipes
- F. Facilities shall be provided for proper dewatering and for disposal of all water removed from the dewatered lines and excavations without damage to adjacent property.
- G. Existing gates and valves will leak when in the closed position. Contractor shall provide whatever means and equipment is necessary to control water during construction.

3.04 CLEANING

- A. At the conclusion of the Work, the Contractor shall thoroughly clean all of the new pipelines by flushing with water or other means to remove all dirt, stones, and pieces of wood or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the pipeline. If, after this cleaning, obstructions remain, they shall be removed.
- B. After the pipelines are cleaned and if the groundwater level is above the pipe, or following a heavy rain, examine the pipe for leaks. If defective pipes or joints are discovered at this time, they shall be repaired or replaced by the Contractor.

3.05 FIELD TESTS

- A. Testing of the piping shall be in accordance with SAWS Standard Specifications for Construction.

END OF SECTION

Supplement to Item No. 849

Air and Deflection Testing (Sanitary Sewers)

This supplement shall modify Item No. 849 Sanitary Sewer Pipe and Deflection Testing of the SAWS Specifications for Water and Sanitary Sewer Construction.

This section covers the testing and inspection of all gravity sewer pipe, pressure sewer pipe, and air jumper pipe furnished under SAWS Specification for Water and Sanitary Sewer Construction Item No. 848 Sanitary Sewers and Section 15113 HDPE PIPING.

1. Quality Assurance

- a. After the CONTRACTOR constructs and cleans the sewer the Owner or Owner's representative shall inspect all sanitary sewers, appurtenances, and work procedures prior to the final acceptance of the project.
- b. All sewers shall be visually inspected for conformance to line and grade.
- c. As required by the Owner, sewers shall be tested using methods outlined in SAWS' Item No. 849 Sanitary Sewer Pipe Air and Deflection Testing in addition to televising of the interior of the pipe.
- d. The test method or combination of test methods, to be used shall be approved by the Owner.

2. Test Failure and Remedy

- a. In the event of test failure on any test section, testing shall be continued until all leakage has been detected and corrected to meet the requirements. All repair work shall be subject to approval of the Engineer. Introduction of sealant substances by means of the test wall will not be permitted.
- b. Unsatisfactory repairs or test results may result in an order to remove and replace pipe as the Engineer considers necessary for test conformance. All repair and replacement work shall be at the Contractor's expense.

-End of Supplement-

Supplement to Item No 852

Sanitary Sewer Manholes

This supplement shall modify Item No 852 Sanitary Sewer Manholes.

852.1

Delete 852.1 and replace with the following:

“DESCRIPTION: This item shall govern the construction of standard sanitary sewer manholes complete in place and the materials therein, including manhole rings and covers. All material and construction work shall be in accordance with current Texas Commission on Environmental Quality (TCEQ) rules to include: Design Criteria for Sewage Systems (30 TCEQ § 217). All constructed manholes shall be watertight. Every manhole cover located in an identified 100-year floodplain, or in the Edwards Aquifer Recharge Zone, shall be watertight. Sewer manhole ring and cover castings shall meet the current requirements of AASHTO Designation M306-10.

Unless otherwise shown in the contract documents or approved by the Engineer, standard sanitary sewer manholes shall be constructed with influent and effluent piping less than or equal to 24 inches in diameter with precast reinforced concrete manhole sections. A standard sanitary sewer manhole shall be a single entrance cylindrical structure, having a minimum internal diameter of 4feet between the cone and base sections. The base of the structure shall include the load bearing portion beneath and exterior of the structure, invert channels and the fill or bench portions adjacent to the lower sewer pipes within the structure. The maximum vertical height of the diameter adjustment section or cone shall be 36 inches. Adjustment or throat rings may be used for final elevation adjustment of the manhole ring and cover. Concrete encasement of the manhole’s ring shall be as shown in the DD-852 Standard Drawing Series. Specifically, they shall attach the ring and cover to the diameter adjustment section or cone. Manholes which differ from the above description shall be governed by Item No. 850, "Sanitary Sewer Structures."

An external drop manhole shall be required, when sewer lines enter a manhole more than 24 inches above the manhole invert unless otherwise approved by Engineer.”

852.3.3

Delete 852.3.3 and replace with the following:

“3. Manhole Ring and Cover: The standard manhole ring and cover shall be ductile iron and manufactured to the dimensions shown herein. The ring and cover shall be hinged. Lifting slots cast into the covers shall be provided for lifting purposes. A watertight (bolt down) ring and cover must be used in areas of high infiltration potential, such as in the Edward’s Aquifer Recharge Zone, an identified 100-year floodplain, or as otherwise directed by the Engineer. The nominal cover diameter shall be 32 inches, with a 30 inch clear opening, as required by TCEQ. Rings shall have a minimum of four 1 inch holes/slots for anchoring purposes. Rings shall be a minimum of 4-1/2 inches in height, or as otherwise accepted by the Engineer. Slots for embedment/lightening are not allowed in ring flanges.

- a. Rings and Covers: Rings and covers shall have two hinges for added stability. The hinge shall have a drain to allow for proper debris and foreign object removal. The cover shall also include a single multi-tool lifting slot adjacent to the edge of the cover to facilitate opening/lifting/prying once it is unlocked. Covers shall be provided with a continuous vulcanized (one piece) EPDM gasket with a shore durometer of 70 ±5 permanently attached to the cover.
- b. Watertight Rings and Covers: Rings and covers shall be bolted to the ring instead of secured with the cam lock mechanism. No vent holes(s) shall be provided. A minimum of four ½ inch diameter, stainless steel, hex head bolts shall be provided for each cover. The 4 bolt holes in the covers shall be evenly spaced and provided with a minimum 1-½ inch diameter counter sink for the bolt heads. On the fastened and bolted position, the bolt heads shall not extend above the surface or the cover. Washers of a size and material as approved by the Engineer shall be provided for the bolts to insure air and water tightness.

The finished ring and cover shall have the bearing surfaces machined ground and sets of rings and covers shall be marked in such a way that they can be matched for assembly in the field. All covers shall have the words "SAN ANTONIO WATER SYSTEM Sanitary Sewer" cast thereon. Ring and cover shall have the approved foundry’s name, part number, country of origin preceded by “Made in” (example: MADE IN USA) in compliance with the country of origin law of 1984, and production date (example: mm/dd/yy) for tracking purposes. Each casting must be marked with DI and ASTM A536 or A536 80-55-06 to verify the materials used. Castings without proper markings shall be rejected.

-End of Supplement-

Supplement to Item No 856
Jacking, Boring or Tunneling Pipe

This supplement shall modify Item No 856 Jacking, Boring or Tunneling Pipe.

856.3. – MATERIALS :

Delete paragraph 2. And replace with the following:

2. Casing Pipe: Casing, if required, shall be as follows for water mains:
- a. RCP;
 - b. Steel.

-End of Supplement-

Supplement to Item No 862

Abandonment of Sanitary Sewer Mains and Manholes

This supplement shall modify Item No 862 Abandonment of Sanitary Sewer Mains and Manholes.

862.5. - Measurement:

Delete paragraph and replace with the following:

Measurement: Grouting of abandoned sewer lines shall be measured by liner foot.

-End of Supplement-

SUPPLEMENT TO SAWS ITEM 864 BYPASS PUMPING

The following information is supplemental to SAWS ITEM NO. 864.

864.1 DESCRIPTION: The work covered in this item is for the use of inflatable and mechanical pipe plugs. The use of inflatable / mechanical plugs in the water and sewer industry is the standard method to temporarily plug a pipe where permanent flow control devices are not available or are not operating as designed.

An inherent danger exists with all inflatable products. If any conditions with this equipment exist that may jeopardize the safety of workers or others, do not use it.

864.2 SUBMITTALS

For all projects requiring the use of pipe plugs on pipes the Contractor shall furnish a submittal containing manufacturer's product data, instructions, recommendations and a project Plug Use Plan (PUP). The PUP shall be submitted a minimum of two weeks prior to commencing any portion of the proposed scope of work.

The following shall be submitted with the PUP:

1. A cover letter containing the following information;
 - a. The project name and job number;
 - b. The name and address of the Contractor
 - c. Contact information of the Contractor's project manager, superintendent, foreman/supervisor, safety professional, etc.
 - d. Emergency (24/7) contact information for the staff responsible for operating and maintaining the plug. Include the name, phone number, email address and the person(s) onsite who is responsible for the project.
 - e. The name and contact information for the PUP preparer.

2. A Plug Plan
 - a. The plan shall show where on the project site the contractor intends to use pipe plugs, including:
 - b. manhole numbers;
 - c. the upstream and downstream pipe diameters and pipe materials;
 - d. pipe slopes;
 - e. pipe depth;
 - f. pipe flow direction;
 - g. known peak or surcharge flow data;
 - h. types of plugs to be used;
 - i. types of restraint used;
 - j. type of radio transmitting device.

3. Calculations
 - a. Provide calculations of the maximum anticipated head pressure on the plug and the resultant tensile force required to restrain the plug prior to plug inflation and during plug removal.
 - b. Provide calculations of the required inflation pressure of the plug.
 - c. Calculations shall be sealed and signed by a professional engineer licensed in the state of Texas in civil or mechanical engineering.
4. Plug selection
 - a. Detail the plug selection for each installation including given conditions, pipe size and anticipated pressure requirements. Include in this plan whether sleeves will be used.
5. Plug inspection:
 - a. Provide an inspection form detailing manufacturer's recommendations for plug inspection of plug condition before and after use; form to be signed by contractor staff responsible for plug installation prior to and after plug installation.
6. Monitoring plan
 - a. Provide a monitoring plan for observing the plug inflation pressure gauge and hoses. Monitoring shall be for 24-hours per day during the plug use duration.
 - b. Provide a written response plan for when the plug loses pressure.
 - c. Provide a plug retrieval plan.
7. Plug restraint details
 - a. Provide means and methods for anchoring, support and bracing appropriate for anticipated operating pressure conditions
 - b. Size restraint (cable or chain) based on calculated loads using a safety factor of 4.
 - c. Provide multiple tie-off locations for chain or wire cable restraint.
 - d. Rope of any kind is not an acceptable material for plug restraint.
8. Manufacturer's Literature
 - a. Provide manufacturer's literature on proper plug use and safety precautions, including available on-line training.

864.3 MATERIALS

1. Plugs
 - a. The Contractor shall provide all necessary equipment, plugs, hoses, gauges and necessary appurtenances to install the plug, maintain the plug during use and remove the plug at completion.

- b. All plugs must be in good condition, and shall not have visible damage such as cracks, holes, tears, cuts, punctures, abrasions, loose or damaged fittings, cracks in castings and excessive wear.
- c. All plugs 15-inches and larger shall have an air release valve for rupture protection.
- d. All plugs 24-inches in diameter and larger shall be equipped with a radio transmitter locating device that is activated by the plug losing air pressure. The locating transmitter device shall be effective to a depth of 65 feet, and have a battery life of 1,000 hours when operated in pulse mode after activation.
- e. All plugs 24-inches in diameter and larger shall have a protective sleeve.
- f. If the plug is damaged, do not use the plug and remove it from the job site.
- g. Contractor must be aware of the limitations associated with plugs.

864.4 **INSTALLATION**

1. Safety

- a. The Contractor shall be solely responsible for the safe and effective use of plugs, including the proper combination of inflatable/mechanical plugs to block the sewer flow at both the upstream and downstream ends of a sewer bypass.
- b. Inflatable plugs should be used only after receiving training as recommended by the manufacturer.
- c. An inherent danger exists with all inflatable products. If any conditions with this equipment exist that may jeopardize the safety of workers or others corrective actions should be taken prior to the equipment use.

2. Plugs

- a. Plugs must be selected and installed in accordance with the manufacturers recommendations.
- b. Plugs must also be selected and installed according to the size of the line to be plugged.
- c. Spare plugs – Provide spare plugs on-site ready to be installed in the event a plug fails or becomes dislodged.
- d. Plugs will be in good condition and reviewed by the Contractor for defects that might lead to failure prior to being installed. The Contractor shall sign the Plug Inspection form.
- e. Plugs must be removed from the system upon completion of the work.
- f. Testing – plugs shall be tested prior to use. The inflatable plug shall be placed inside of a structurally sound pipe or conduit and inflated to its operating pressure and monitored for 24 hours to observe it holds the required pressure. This testing shall be performed in accordance with the manufacturer's recommendations. Inflating a plug when it is not constrained or overinflating the plug creates a risk of being injured by pieces of the plug exploding if it fails.
- g. Damages – The Contractor will be responsible for damages due to plugs being left in place or dislodged, including but not limited to:

- i. Damages to SAWS infrastructure or private property.
- ii. Costs associated with sanitary sewer overflows including: regulatory fines; sewage and debris cleanup; debris disposal at an appropriate landfill; disinfection of all surfaces which have come in contact with the sewage.
- iii. Costs associated with locating and retrieving lost or dislodged plugs.

864.5 MEASUREMENT AND PAYMENT: Measurement of the work for pipe plugs shall be incidental to the work and will not have a separate pay item.

End of Supplement

Supplement to Item No 866

Sewer Main Television Inspection

This supplement shall modify Item No 866 Sewer Main Television Inspection.

866.8.2. – Measurement and Payment:

Delete section and replace with the following:

2. Category:
 - a. 8” through 15”
 - b. 18” through 24”
 - c. 27” through 36”
 - d. 42” through 48”

-End of Supplement-

DIVISION 1
SUMMARY OF WORK FOR APACHE CREEK TRAIL NORTH

SECTION 01010 - SUMMARY OF THE WORK PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish labor, materials, tools, appliances, services and facilities; perform work and services for accomplishment and completion of all work of construction indicated on drawings and described in these specifications, in accordance with all portions of Contract Documents, Change Orders issued thereto, and Building Code.
 - 1. Contractor cooperates with others employed separately by Owner for particular equipment installation or performing special work relating to this project, and shall protect all such installation or materials in accordance with General Conditions.
 - 2. Owner retains right at all times to deliver, place, and install materials as work progresses where there is no interference with Contractor. Such preliminary occupancy shall not be construed as acceptance of such portions.
- B. Scope
 - 1. This project consists of furnishing all labor, materials, services, equipment and appliances required with, or properly incidental to all construction detailed in these plans which shall include, but not be limited to utilities, light poles and new footings, signage, asphalt parking, concrete curbs, roofing, steel fabrication, steel erection, concrete retaining wall, stone work, concrete walks, concrete flat work, concrete foundations, concrete piers, adjustments to surface and subsurface storm drainage structures, trail amenities, site grading, turf planting, structural framing and signage.

1.2 PROJECT PROCEDURES

- A. Coordinate work of trades and schedule elements of work by procedures and methods to expedite completion of Work.
- B. In addition to any demolition specified and that specifically shown; cut, move or remove items as necessary to allow new work to proceed including items as follows:
 - 1. Repair or removal of hazardous or unsanitary conditions.
 - 2. Removal of abandoned items and items serving no useful purpose, such as but not limited to abandoned piping, conduit and wiring.
 - 3. Removal of unsuitable or extraneous materials such as abandoned slabs, foundations and debris.

1.3 REGULATORY REQUIREMENTS

- A. Perform work in accordance with:
 - 1. 2006 edition of the International Building / International Residential Codes (IBC/IRC) and the 2005 edition of the National Electric Code (NEC) effective September 1, 2008
 - 2. Federal, state, and local barrier-free access laws, codes, regulations and ordinances.

1.4 QUALITY CONTROL

- A. An independent testing laboratory will perform testing services.

DIVISION 1
SUMMARY OF WORK FOR APACHE CREEK TRAIL NORTH

- B. Testing Laboratory shall be approved by SAWS.
- C. Test reports will be sent directly to SAWS by the Testing Laboratory on the laboratory's standard form.
- D. All testing will be made in accordance with the latest method of ASTM for specific item of construction.
- F. Limits of Laboratory Authority:
 - 1. Laboratory may not release, revoke, alter or enlarge requirements of Contract Documents.
 - 2. Laboratory may not stop, approve, or accept any portion of Work.
 - 3. Laboratory may not assume any duties of Contractor.

1.7 PROTECTION OF LIVES AND HEALTH

- A. The Contractor shall comply with the U.S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (Public Law 91-596 and all subsequent amendments) and under Section 107 of the Contract Work Hours and Safety Standards Act (Public Law 91-54 and all subsequent amendments).
- B. The Contractor shall have a competent person or persons, as required under the Occupational Safety and Health Act, on the site to inspect the work and to supervise the conformance of the Contractor's operations with the regulations of the Act.
- C. This project is subject to all of the Safety and health Regulations (CFR 29, Part 1926 and all subsequent amendments) as promulgated by the E.S. Department of Labor on June 24, 1974 and CFR 29, Part 1910 and all subsequent amendments. General Industry Safety and Health Regulations Identified as Applicable to Construction. Contractors are urged to become familiar with the requirements of these regulations.

END OF SECTION

DIVISION 2
DEMOLITION – 02060
Page 1

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Demolition and removal of buildings, including removal of foundations.
2. Demolition and removal of structures.
3. Demolition and removal of site improvements.
4. Demolition and removal of capped and abandoned site utilities.

1.2 DEFINITIONS

A. Remove: Remove and legally dispose of items.

B. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human or animal life; affect other species of importance to humanity; or degrade the utility of the environment for aesthetic, cultural or historical purposes.

C. Inert Fill: A permitted facility that accepts inert waste such as asphalt and concrete exclusively for the purpose of disposal.

1. Inert Solids/Inert Waste: Non-liquid solid waste including, but not limited to, soil and concrete, that does not contain hazardous substances or soluble pollutants at concentrations in excess of water-quality standards established by a regional water board and does not contain significant quantities of decomposable solid waste.

D. Class III Landfill: A landfill that accepts non-hazardous materials such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations. A Class III landfill must have a solid waste facilities permit from the State of Texas.

E. Demolition Waste: Building materials and solid waste resulting from construction, remodeling, repair, cleanup, or demolition operations that are not hazardous. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, plastic pipe, and steel. The materials may include rock, soil, tree stumps, and other vegetative matter resulting from land clearing and landscaping for construction or land development projects.

F. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals and inorganic wastes.

G. Recycling: The process of sorting, cleansing, treating and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

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DEMOLITION – 02060
Page 2

- H. Reuse: The use, in the same or similar form as it was produced, of a material which might otherwise be discarded.
- I. Solid Waste: All putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes. "Solid waste" does not include hazardous waste, radioactive waste, or medical waste as defined or regulated by State law.

1.3 MATERIALS

- A. Demolished materials shall become the Contractor's property and shall be removed, recycled, or disposed from Project site in an appropriate and legal manner.

1.4 SUBMITTALS

- A. Submittals for Construction Document phase:

- 1. Qualification Data: For demolition firm.

- B. Submittals for Demolition phase:

- 1. Proposed dust-control measures.
 - 2. Proposed noise-control measures.
 - 3. Schedule of demolition activities indicating the following:
 - a. Detailed sequence of demolition and removal work, including start and end dates for each activity.
 - b. Dates for shutoff, capping, and continuation of utility services.
 - 4. If hazardous materials are encountered and disposed of, landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 - 5. Contractor's Waste Management and Plan:
 - a. Review Contract Documents and site conditions and estimate total Project C&D materials to be generated, names of landfills where Project C&D materials would normally be disposed of.
 - b. Prior to commencing the Work, Contractor's Waste Management and Recycling Plan must submit a procedures schedule.
 - c. Contractor's Waste Management Plan must be approved by SAWS prior to the Start of Work.
 - d. Contractor's Waste Management Plan will not otherwise relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.

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DEMOLITION – 02060
Page 3

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage a licensed demolition contractor and an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction. Obtain and pay for all permits required.
- C. Pre-demolition Conference: Conduct conference at Project site.
 - 1. Review the environmental goals of this Project with Contractors, subcontractors, and waste haulers.

1.06 PROJECT CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of Work.
- B. Storage or sale of removed items or materials on-site will not be permitted.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of demolition and recycling required.
- C. Survey condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.
 - 1. Retain a licensed and qualified civil or structural engineer to provide analysis, including calculations, necessary to ensure the safe execution of the demolition work.
- D. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

3.02 PREPARATION

- A. As part of the project scope, the Contractor shall prepare all, documents, and applications and shall obtain all government agency approvals and permits required for demolition activities.
- B. Conduct demolition operations and remove C&D materials to ensure minimum interference with roads, streets, walks, and other adjacent occupied and utilized facilities.

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DEMOLITION – 02060

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1. Do not close or obstruct streets, walks, or other adjacent occupied or utilized facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.
1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - a. Maintain temporary protection to people at exterior areas of the existing building where decorative medallion removal work is being done.
 2. Protect existing site improvements, appurtenances, and landscaping that are designated to remain in place.
- D. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of buildings to be demolished and adjacent buildings to remain.
1. Strengthen or add new supports when required during progress of demolition.

3.03 EXPLOSIVES

- A. Explosives: Use of explosives will not be permitted.

3.04 ENVIRONMENTAL CONTROLS

- A. Comply with federal, state and local regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment and noise pollution.
- B. Protection of Natural Resources: Preserve the natural resources within the project boundaries or restore to an equivalent condition.
1. Confine demolition activities to areas defined by public roads, easements, and work area limits indicated on the drawings.
 - a. Temporary Construction: Remove indications of temporary construction facilities, such as haul roads, work areas, structures, stockpiles or waste areas.
 2. Water Resources: Comply with applicable regulations concerning the direct or indirect discharge of pollutants to underground and natural surface waters.
 - a. Oily Substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water in such quantities as to affect normal use, aesthetics, or produce a measurable ecological impact on the area.
 - 1) Store and service construction equipment at areas designated for collection of oil wastes.

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DEMOLITION – 02060
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3. Dust Control, Air Pollution, and Odor Control: Prevent creation of dust, air pollution and odors.
- a. Use temporary enclosures and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.
 - b. Store volatile liquids, including fuels and solvents, in closed containers.
 - c. Properly maintain equipment to reduce gaseous pollutant emissions.

4. [Review this section to comply with local requirements] Noise Control: Perform demolition operations to minimize noise.
- a. Repetitive, high level impact noise will be permitted only between the hours of 8:00 a.m. and 6:00 p. m. Repetitive impact noise on the property shall not exceed the following dB limitations:

<u>Sound Level in dB</u>	<u>Time Duration of Impact Noise</u>
70	More than 12 minutes in any hour
80	More than 3 minutes in any hour

- b. Provide equipment, sound deadening devices, and take noise abatement measures that are necessary to comply with the requirements of this Contract.
- c. At least once every five successive working days while work is being performed above 55 dB noise level, measure sound level for noise exposure due to the demolition. Measure sound levels on the 'A' weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, measurements may be taken three to six feet in front of any building face. Submit the recorded information to the State noting any problems and the alternatives before mitigating actions.

5. DISPOSAL PRACTICES AND WASTE HAULING

- a. Legally transport and dispose of materials that cannot be delivered to a source-separated or mixed recycling facility to a transfer station or disposal facility that can legally accept the materials for the purpose of disposal.
- b. Use a permitted waste hauler or Contractor's trucking services and personnel.
- c. Become familiar with the conditions for acceptance of new construction, excavation and demolition materials at recycling facilities, prior to delivering materials.
- d. Deliver to facilities that can legally accept new construction, excavation and demolition materials for purpose of re-use, recycling, composting, or disposal.
- e. Do not burn, bury or otherwise dispose of rubbish and waste materials on project site.

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DEMOLITION – 02060
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3.05 DEMOLITION

- A. Building Demolition: Demolish buildings completely and remove from the site. Use methods required to complete Work within limitations of governing regulations and as follows:
 - 1. Locate demolition equipment throughout the building and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 2. Demolish concrete and masonry in sizes that will be suitable for acceptance at recycling or disposal facilities.
 - 3. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 4. Break up and remove concrete slabs on grade in small sizes, suitable for acceptance at recycling or disposal facilities, unless otherwise shown to remain.
 - 5. Remove all disconnected, abandoned utilities on site.

- B. Below-Grade Construction: Demolish foundation walls and other below-grade construction, as follows:
 - 1. Completely remove below-grade construction, including foundation walls and footings.
 - 2. Break up and completely remove below-grade concrete slabs, in small sizes, suitable for acceptance at recycling or disposal facilities.
 - 3. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations to street level with satisfactory soil materials.
 - 4. At existing swimming pool, completely remove below-grade construction, including foundation walls, footings and piping to three feet below proposed finish grade. Any remaining structures may be buried in place as per COSA - 400- Excavation, Trenching, and Backfilling.

- C. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

3.06 HANDLING OF DEMOLISHED MATERIALS

- A. General: Promptly re-use, salvage, recycle, or dispose of demolished materials. Do not allow demolished materials to accumulate or be stored on-site for more than 30 days.

- B. Burning: Do not burn demolished materials.

- C. Disposal: Transport demolished materials off SAWS property and legally reuse, salvage, recycle, or dispose of materials.

PART 4 - MEASUREMENT AND PAYMENT

- A. Payments made per square yard basis.

END OF SECTION 02060

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DIVISION 2
GRADING – 02210
Page 1

SECTION 02210 - GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. In accordance with pertinent provisions of this Section, excavate, backfill, compact, and grade the site to the elevations shown on the Drawings and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related work:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary conditions and Division 1 Specification Sections, apply to this Section.
 - a. Section 02160 - Embankment.
 - b. Section 02226 - Excavating, Backfilling and Compacting for Pavement.
 - c. Section 02223 - Structural Excavation
 - d. Section 02950 - Trees, Plants and Ground Covers

1.2 QUALITY ASSURANCE:

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the Landscape Architect.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01620.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Fill and backfill materials:
 - 1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 3" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 1-3/8" in their greatest dimension.
 - 2. Fill material is subject to the approval of the Landscape Architect, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular non-expansive soils, free from roots and other deleterious matter.

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GRADING – 02210

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3. Do not permit rocks having a dimension greater than 1/2" in the upper 12" of fill or embankment.
4. Cohesionless material used for structural backfill: Provide sand free from organic material and other foreign matter, and as approved by the Landscape Architect.

2.2 WEED KILLER

- A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this work by governmental agencies having jurisdiction.

2.3 TOPSOIL

- A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 1/2" in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter.
- B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.
- C. Existing topsoil may be stripped from the site and stockpiled on site prior to excavation or filling. This soil may then be used as topsoil and placed over areas of cut and fill..

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

- A. Comply with pertinent provisions of Section 01050.

3.3 PROCEDURES

- A. Utilities:
 1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to SAWS .
 2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
 3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to SAWS .
 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Landscape Architect and secure his instructions.

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5. Do not proceed with permanent relocation of utilities until written instructions are received from the Landscape Architect.

- B. Protection of persons and property:
 1. Barricade open holes and depressions occurring as part of this Work, and post warning lights on property adjacent to or with public access.
 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

- C. Dewatering:
 1. Remove all water, including rainwater, encountered during trench and substructure work to an approved location by pumps, drains, and other approved methods.
 2. Keep excavations and site construction area free from water.

- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

- E. Maintain access to adjacent areas at all times.

3.4 EXCAVATING

- A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades, and elevations indicated and specified herein.

- B. Satisfactory excavated materials:
 1. Transport to, and place in, fill or embankment areas within the limits of the Work.

- C. Unsatisfactory excavated materials:
 1. Excavate to a distance below grade as directed by the Landscape Architect, and replace with satisfactory materials.
 2. Include excavation of unsatisfactory materials, and replacement by satisfactory materials, as parts of the work of this Section.

- D. Surplus Materials:
 1. Dispose of unsatisfactory excavated materials, and surplus satisfactory excavated materials, away from the site at disposal areas arranged and paid for by the Contractor.

- E. Excavation of rock:
 1. Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the Work, and remove or excavate such material by means which will neither cause additional cost to SAWS nor endanger buildings or structures whether on or off the site.

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2. Do not use explosives without written permission from the Landscape Architect.
- F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.
- G. Ditches and gutters:
1. Cut accurately to the cross sections, grades, and elevations shown.
 2. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the work.
 3. Dispose of excavated materials as shown on the Drawings or directed by the Landscape Architect; except do not, in any case, deposit materials less than 3' -0" from the edge of a ditch.
- H. Unauthorized excavation:
1. Unauthorized excavation consists of removal of material beyond indicated subgrade elevations or dimensions without specific instruction from the Landscape Architect.
 2. Under footings, foundations, or retaining walls:
 - a. Fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.
 - b. When acceptable to the Landscape Architect, lean concrete fill may be used to bring bottom elevations to proper position.
 3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the Landscape Architect.
- I. Stability of excavations:
1. Slope sides of excavation to 1:3 or flatter, unless otherwise directed by the Landscape Architect.
 2. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
 3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- J. Shoring and bracing:
1. Provide materials for shoring and bracing as may be necessary for safety of personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.
 2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
 3. Carry shoring and bracing down as excavation progresses.

3.5 FILLING AND BACKFILLING

- A. Backfill excavations as promptly as progress of the Work permits, but not until:
1. Acceptance of construction below finish grade;
 2. Inspecting, testing, approving, and recording locations of underground utilities;
 3. Concrete formwork is removed;

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4. Shoring and bracing are removed, and voids have been backfilled with satisfactory materials;
 5. Trash and debris have been removed; and
 6. Horizontal bracing is in place on horizontally supported walls.
- B. Ground surface preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from the ground surface prior to placement of fills.
 2. Plow, strip, or break up surfaces steeper than one vertical to four horizontal, so that fill material will bond with existing surface.
 3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
 4. At exposed soils in areas to be paved, scarify to a minimum depth of 6", and recompact at a moisture content that will permit proper compaction as specified for fill.
- C. Placing and compacting:
1. Place backfill and fill materials in layers not more than 6" in loose depth.
 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
 3. Compact each layer to required percentage of maximum density for the area.
 4. Do not place backfill or fill material on surfaces that are muddy, frozen, or containing frost or ice.
 5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
 6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structures to approximately the same elevation in each lift.

3.6 GRADING

- A. General:
1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
 2. Smooth the finished surfaces within specific tolerance.
 3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
 4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'-0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.
- B. Grading outside building lines:
1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent ponding.
 2. Finish the surfaces to be free from irregular surface changes, and:

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GRADING – 02210

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- a. Shape the surface of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 ft above or below the required subgrade elevation.
- b. Shape the surface of areas scheduled to be under pavement to line, grade, and cross-section, with finished surface not more than 0.05 ft above or below the required subgrade elevation.

3.7 COMPACTING

- A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to THD test method TEX- 113E.
- B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place, and as approved by the Landscape Architect.
 1. Structures:
 - a. Compact the top 12" of subgrade, in 6" lifts, and each 6" layer of fill material or backfill material at 95% of maximum density.
 2. Lawn and unpaved areas:
 - a. Compact the top 12" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
 - b. Compact the upper 12" of filled areas, or natural soil exposed by excavating, at 85% of maximum density.
 3. Walks:
 - a. Compact the top 12" of subgrade, in 6" lifts, and each 6" layer of fill material or backfill material at 95% of maximum density.
 4. Pavements:
 - a. Compact the top 12" of subgrade, in 6" lifts, and each 6" layer of fill material or backfill material at 95% of maximum density.
- C. Moisture control:
 1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent compacting operations.
 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
 3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Landscape Architect.

3.8 FIELD QUALITY CONTROL

- A. Secure the Landscape Architect's inspection and approval of subgrades and fill layers before subsequent construction is permitted thereon.
- B. Provide at least the following tests to the approval of SAWS :
 1. At paved areas, at least one field density test for 5000 to 10,000 sq. ft of paved area, but not less than three tests;

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2. In each compacted fill layer, one field density test 5000 to 10,000 sq. ft of overlying paved area, but not less than three tests.
- C. If tests show the density to be more than 2 percent below the specified minimum, or the moisture content to be more than 3 percent above or below the optimum, provide additional compacting and testing under the provisions of Section 01410 of these Specifications.

3.9 MAINTENANCE

- A. Protection of newly graded areas:
1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
 2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

PART 4 - MEASUREMENT AND PAYMENT

- A. Payment will be made on a cubic yard basis.

END OF SECTION

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CONCRETE REMOVAL - 02212

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SECTION 02212 - CONCRETE REMOVAL

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The work covered by this section shall consist of breaking up, removing and satisfactorily disposing off - site of existing concrete located within the project area or as directed by the Engineer. Existing concrete not shown on the plans, located beneath the natural ground surface, not indicated by the Engineer or not obvious to the naked eye, but in conflict with the proposed structures, shall be covered under this item. Such materials will be removed, as needed.

1.2 CLASSIFICATION:

- A. Existing concrete to be removed under this item will be classified as follows:
 - 1. Sidewalks, Curbs, Drives, Retaining Walls and Misc. Footings and structures

PART 2 - PRODUCTS - Not Applicable.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS:

- A. The existing concrete shall be broken up, removed, and disposed of off- site by the Contractor.
- B. When only a portion of the existing concrete is to be removed, care shall be exercised to avoid damage to that portion to remain in place. The existing concrete shall be cut to neat lines shown on the plans or as established by the Engineer, by sawing with an appropriate type circular concrete saw to a minimum depth of one-half (1/2) inch. Any existing concrete, which is damaged or destroyed beyond the neat lines so established, shall be replaced at the Contractor's expense.
- C. Where reinforcement is encountered in the removed portions of the concrete, a minimum of one (1) foot shall be cleaned of all old concrete and left in place to tie into the new concrete construction.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project under demolition and the payments made under demolition for these requirements which will be paid per square yard.

END OF SECTION

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EXCAVATING, BACKFILLING AND COMPACTING FOR SITE– 02220
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SECTION 02220 - EXCAVATING, BACKFILLING, AND COMPACTING FOR SITE

PART 1 - GENERAL

1.1 SUMMARY

- A. Excavate, backfill, compact, and grade the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - a. Section 02110: Grading.
 - b. Section 02160: Embankment.
 - c. Section 02223: Structural Excavation
 - d. Section 02950: Trees, Plants and Ground Covers

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work of this Section in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the Landscape Architect.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01620.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Fill and backfill materials:
 - 1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2- 3/8" in their greatest dimension.
 - 2. Fill material is subject to the approval of the Landscape Architect, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non-expansive soils free from roots and other deleterious matter.
 - 3. Do not permit rocks having a dimension greater than 1/2" in the upper 12" of fill or embankment.

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EXCAVATING, BACKFILLING AND COMPACTING FOR SITE- 02220

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4. Cohesionless material used for structural backfill: Provide sand free from organic material and other foreign matter, and as approved by the Landscape Architect.
5. Where granular base is called for under building slabs, provide aggregate complying with requirements of Section 03301 of these Specifications.

2.2 WEED KILLER

- A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this Work by governmental agencies having jurisdiction.

2.3 TOPSOIL

- A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones larger than 1/2" in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter.
- B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Landscape Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

- A. Comply with pertinent provisions of Section 01050.

3.3 PROCEDURES

- A. Utilities:
 1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to SAWS .

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2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
 3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to SAWS .
 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Landscape Architect and secure his instructions.
 5. Do not proceed with permanent relocation of utilities until written instructions are received from the Landscape Architect.
- B. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.
- C. Dewatering:
1. Remove all water, including rainwater, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
 2. Keep excavations and site construction area free from water.
- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- E. Maintain access to adjacent areas at all times.
- 3.4 EXCAVATING
- A. Perform excavating of every type of material encountered within the limits or the Work to the lines, grades, and elevations indicated and specified herein.
- B. Satisfactory excavated materials:
1. Transport to, and place in, fill or embankment areas within the limits of the Work.
- C. Unsatisfactory excavated materials:
1. Excavate to a distance below grade as directed by the Landscape Architect, and replace with satisfactory materials.
 2. Include excavation of unsatisfactory materials, and replacement by satisfactory materials, as parts of the work of this Section.
- D. Surplus materials:
1. Dispose of unsatisfactory excavated material, and surplus satisfactory excavated material, away from the site at disposal areas arranged and paid for by the Contractor.

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- E. Excavation of rock:
 - 1. Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the Work, and remove or excavate such material by means which will neither cause additional cost to SAWS nor endanger buildings or structures whether on or off the site.
 - 2. Do not use explosives without written permission from the Landscape Architect.

- F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

- G. Borrow:
 - 1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor and approved by the Landscape Architect.

- H. Ditches and gutters:
 - 1. Cut accurately to the cross sections, grades, and elevations shown.
 - 2. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the Work.
 - 3. Dispose of excavated materials as shown on the Drawings or directed by the Landscape Architect; except do not, in any case, deposit materials less than 3'-0" from the edge of a ditch.

- I. Unauthorized excavation:
 - 1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Landscape Architect.
 - 2. Under footings, foundations, or retaining walls:
 - a. Fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.
 - b. When acceptable to the Landscape Architect, lean concrete fill may be used to bring the bottom elevation to proper position.
 - 3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the Landscape Architect.

- J. Stability of excavations:
 - 1. Slope sides of excavations to 1:3 or flatter, unless otherwise directed by the Landscape Architect.
 - 2. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
 - 3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

- K. Shoring and bracing:

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1. Provide materials for shoring and bracing as may be necessary for safety of personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.
 2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
 3. Carry shoring and bracing down as excavation progresses.
- L. Excavating for structures:
1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft, and extending a sufficient distance from footings and foundations to permit placing and moving concrete form work, installation of services, other construction required, and for inspection.
 2. In excavating for footings and foundations, take care not to disturb bottom of excavation:
 - a. Excavate by hand tools to final grade just before concrete is placed.
 - b. Trim bottoms to required lines and grades to leave solid base to receive concrete.
 3. Excavate for footings and foundations only after general site excavating, filling, and grading are complete.
- M. Excavating for pavements:
1. Cut surface under pavements to comply with cross sections, elevations, and grades.
- N. Cold weather protection:
1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.5 FILLING AND BACKFILLING

- A. General:
1. For each classification listed below, place acceptable soil material in layers to required subgrade elevations.
 2. In excavations:
 - a. Use satisfactory excavated or borrowed materials.
 3. Under asphalt pavements:
 - a. Use sub base materials.
 4. Under building slabs:
 - a. Use granular fill, if so called for on the Drawings, complying with aggregate acceptable under Section 03301 of these Specifications.
- B. Backfill excavations as promptly as progress of the work permit, but not until completion of the following.
1. Acceptance of construction below finish grade including, where applicable, damp proofing and waterproofing.
 2. Inspecting, testing, approving, and recording locations of underground utilities.
 3. Removing concrete formwork.
 4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.
 5. Removing trash and debris.
 6. Placement of horizontal bracing on horizontally supported walls.

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- C. Ground surface preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious matter from ground surface prior to placement of fills.
 2. Plow, strip, or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
 3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- D. Placing and compacting:
1. Place backfill and fill materials in layers not more than 6" in loose depth.
 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
 3. Compact each layer to required percentage of maximum density for area.
 4. Do not place backfill or fill material on surfaces that are muddy, frozen, or containing frost or ice.
 5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
 6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
 7. Where the construction includes basement or other underground walls having structural floors over them, do not backfill such walls until the structural floors are in place and have attained sufficient strength to support the walls.

3.6 GRADING

- A. General:
1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
 2. Smooth the finished surfaces within specified tolerance.
 3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
 4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'-0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.
- B. Grading outside building lines:
1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent ponding.
 2. Finish the surfaces to be free from irregular surface changes, and:
 - a. Shape the surface of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 ft above or below the required subgrade elevation.
 - b. Shape the surface of areas scheduled to be under pavement to line, grade, and cross-section, with finished surface not more than .05 ft above or below the required subgrade elevation.

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3.7 COMPACTING

- A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to THD test method TEX-13E.
- B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place, and as approved by the Landscape Architect.
 - 1. Structures:
 - a. Compact the top 12" of subgrade, in 6" lifts, and each 6" layer of fill material or backfill material at 95% of maximum density.
 - 2. Lawn and unpaved areas:
 - a. Compact the top 12" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
 - b. Compact the upper 12" of filled areas, or natural soil exposed by excavating, at 85% of maximum density.
 - 3. Walks:
 - a. Compact the top 12" of subgrade, in 6" lifts, and each 6" layer of fill material or backfill material at 95% of maximum density.
 - 4. Pavements:
 - a. Compact the top 12" of subgrade, in 6" lifts, and each 6" layer of fill material or backfill material at 95% of maximum density.
- C. Moisture control:
 - 1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
 - 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
 - 3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Landscape Architect.

3.8 FIELD QUALITY CONTROL

- A. Secure the Landscape Architect's inspection and approval of sub grades and fill layers before subsequent construction is permitted thereon.
- B. Provide at least the following tests to the approval of the Landscape Architect:
 - 1. At paved areas, at least one field density test for 5,000 to 10,000 sq. ft of paved area, but not less than three tests;
 - 2. In each compacted fill layer, one field density test 5,000 to 10,000 sq. ft of overlying paved area, but not less than three tests.

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- C. If tests show the density to be more than 2 percent below the specified minimum or the moisture content to be more than 3 percent above or below the optimum, provide additional compacting and testing under the provisions of Section 01410 of these Specifications.

3.9 MAINTENANCE

- A. Protection of newly graded areas:
 - 1. Protect newly graded areas from traffic and erosion and keep free from trash and weeds; rutted areas to the specified tolerances.
 - 2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

PART 4 - MEASUREMENT AND PAYMENT

- A. Payment will be on a cubic yard basis.

END OF SECTION

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TREE PROTECTION AND TRIMMING - 02231
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SECTION 02231 - TREE PROTECTION AND TRIMMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary conditions and Division 1 Specification Sections, apply to this Section.
 - 1. Section 02210: Grading.
 - 2. Section 02220: Excavating, Backfilling and Compacting for Site.
 - 3. Section 02223: Structural Excavation
 - 4. Section 02950: Trees, Plants and Ground Covers
 - 5. Section 01010: Summary of Work

1.2 SUMMARY

- A. This Section includes the protection and trimming of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent construction.

1.3 DEFINITIONS

- A. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Tree Pruning Schedule: Written schedule from certified arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
- C. Qualification Data: For tree service firm and certified arborist.
- D. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

1.5 QUALITY ASSURANCE

- A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of tree protection and trimming.
- B. Arborist Qualifications: An arborist certified by ISA or licensed in the jurisdiction where Project is located.

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TREE PROTECTION AND TRIMMING - 02231

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- C. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."
- D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 - 1. Before tree protection and trimming operations begin, meet with representatives of authorities having jurisdiction, SAWS, Landscape Architect, consultants, and other concerned entities to review tree protection and trimming procedures and responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch sieve and not more than 10 percent passing a 3/4-inch sieve.
- B. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and toxic and other nonsoil materials.
 - 1. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.
- C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.
- D. Chain-Link Fence: Metallic-coated steel chain-link fence fabric of 0.120-inch diameter wire; a minimum of 48 inches high; with 1.9-inch-diameter line posts; 2-3/8-inch-diameter terminal and corner posts; 1-5/8-inch-diameter top rail; and 0.177-inch-diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
- E. Orange Plastic Fence.
- F. Organic Mulch: Shredded hardwood, free of deleterious materials.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Temporary Fencing: Install temporary fencing around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete.
 - 1. Install chain-link fence or orange plastic fencing according to ASTM F 567 and manufacturer's written instructions.

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TREE PROTECTION AND TRIMMING - 02231

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- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Mulch areas [inside tree protection zones and within drip line of trees to remain and other areas indicated.
 - 1. Apply 4-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.
- D. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.
- E. Maintain tree protection zones free of weeds and trash.
- F. Do not allow fires within tree protection zones.

3.2 EXCAVATION

- A. Install shoring or other protective support systems to minimize sloping or benching of excavations.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
 - 1. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction.
 - 2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
- D. Where utility trenches are required within tree protection zones, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.
 - 1. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

3.3 REGRADING

- A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist, unless otherwise indicated.
 - 1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

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TREE PROTECTION AND TRIMMING - 02231

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- B. Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.
- C. Moderate Fill: Where existing grade is more than 6 inches but less than 12 below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:
 - 1. Carefully place drainage fill against tree trunk approximately 2 inches above elevation of finish grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within drip-line perimeter, place drainage fill up to 6 inches below elevation of grade.
 - 2. Place filter fabric with edges overlapping 6 inches minimum.
 - 3. Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

3.4 TREE PRUNING

- A. Prune trees to remain that are affected by temporary and permanent construction.
- B. Provide subsequent maintenance during Contract period as recommended by arborist.
- C. Pruning Standards: Prune trees according to ANSI A300
 - 1. Type of Pruning: Cleaning Raising
 - 2. Specialty Pruning: Restoration Palm.
- D. Cut branches with sharp pruning instruments; do not break or chop.
- E. Chip removed tree branches and spread over areas identified by Landscape Architect

3.5 TREE REPAIR AND REPLACEMENT

- A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
- B. Remove and replace trees indicated to remain that die or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of 6-inch caliper size and of a species selected by Architect when damaged trees more than 6 inches in caliper size, measured 12 above grade, are required to be replaced. Plant and maintain new trees as specified in Section 02950: Trees, Plants and Groundcover.
- C. Aerate surface soil, compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.6 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted.
- B. Disposal: Remove excess excavated material and displaced trees from SAWS property.

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TREE PROTECTION AND TRIMMING - 02231
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PART 4 - MEASUREMENT AND PAYMENT

- A. Payment will be made on a unit price basis based on the tree protection categories, Type I, Type IIA and Type IIB. Include any pruning work as part of each unit cost.

END OF SECTION

DIVISION 2
TREES, PLANTS AND GROUND COVER – 02950

Page 1

SECTION 02950 - TREES, PLANTS AND GROUND COVER

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide trees, plants, and ground cover as indicated on the Drawings, specified herein, and needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 328400: Irrigation
 - 3. Section 02970: Landscape Maintenance

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 35 calendar days after the Contractor has received SAWS Notice to Proceed, submit:
 - 1. Complete materials list of items proposed to be provided under this Section.
 - 2. Complete data on source, size, and quality.
 - 3. Sufficient data to demonstrate compliance with the specified requirements.
- C. Upon completion of the work of this Section, and as a condition of its acceptance, deliver to the Landscape Architect two copies of a Manual compiled in accordance with the provisions of Section 01730 of these Specifications.
- D. Certificates:
 - 1. Require certificates required by law to accompany shipments.
 - 2. Certifications and receipts for specified materials
 - 3. Upon completion of the installation, deliver certificates to the Landscape Architect.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Standards:
 - 1. Plants and planting material: Meet or exceed the specifications of Federal, State, and County laws requiring inspection for plant disease and insect control.
 - 2. Quality and size: Comply with current edition of "Horticultural Standards" for number one nursery stock as adopted by American Association of Nurserymen.
 - 3. All plants:
 - a. True to name, with one of each bundle or lot tagged with the name and size of the plants in accordance with standards of practice of

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American Association of Nurserymen.

- b. In all cases, botanical names take precedence over common names.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01620. The Landscape Architect will be notified when plant material is delivered to the site.
- B. All plant material will be inspected and approved by the Landscape Architect prior to installation.
- C. Immediately remove from the site plants, which are not true to name, and materials, which do not comply with the specified requirements, and promptly replace with plants and materials meeting the specified requirements.

PART 2 - PRODUCTS

2.1 FERTILIZER

- A. Provide commercial balanced 11-8-4 fertilizer delivered to the site in bags labeled with the manufacturer's guaranteed analysis.

2.2 SOIL AMENDMENT

- A. Approved products:
 - 1. Garden-Ville PremiumCompost "Alamo-Gro" or approved equal.

2.3 MULCH

- A. Approved products:
 - 1. Garden-Ville Native Mulch or approved equal.

2.4 HYDROMULCH

- A. Provide Conwed Weyerhaeuser, or Texas Fiber Company hydromulch. All mulch will be manufactured from hardwoods only and will be refined specifically for lawn hydromulch applications.
 - 1. Soil Stabilizer:
 - a. "Terra Tack" 1 or approved equal.

2.5 TREE STAKES

- A. Stake trees as indicated on the Drawings.

2.6 GRASS SEED

- A. General: Provide grass seed which is:

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1. All seed must meet the requirements of the Texas seed law including the labeling requirements for showing pure live seed (pls=purity x germination), name and type of seed.
2. Seed furnished shall be of the previous season crop and the date of analysis shown on each bag shall be within nine months of the time of use on the project.
3. Seed shall be furnished and delivered in separate bags or containers. A sample of seed shall be furnished for analysis and testing when directed by the landscape architect.

Name	Min. Percent Germination	Max. Percent remarks Weed Seed
Sahara Bermudagrass (cynodon dactylon)	80	0.50 primed

2.7 PLANT MATERIALS

- A. Provide the plant materials shown on the schedule in the Drawings.

2.8 SOIL

- A. Topsoil
 1. Additional topsoil needed to complete the work shall be furnished by the contractor from an approved source.
 2. Topsoil shall be natural, friable, granular soil, which contains organic matter.
 3. Topsoil shall be free of subsoil, brush, weeds, nut grass, stones, roots, stumps or other objectionable material.
 4. Samples of soil shall be submitted for testing and approval by the Landscape Architect prior to placement.

2.9 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Landscape Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Finish grading will be performed under Section 02220.
- C. Turf areas:
 1. Incorporate 1 cubic yards of compost per 1000 square feet of turf areas. Compost to be spread and incorporated into the soil by the contractor
 2. Fine grade to match plans within a tolerance of 0.10 foot.

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3. Finished grade of topsoil shall be 1" below top of walks and curbs.

D. Planting beds:

1. Incorporate 2 cubic yards of compost per 1000 square feet of planting bed. Compost to be spread and incorporated into the soil by the contractor
2. Compact each layer by thorough saturation with water to prevent future settlement.

3.2 PLANTING TREES AND SHRUBS

A. General:

1. Plant nursery stock immediately upon delivery to the site and approval by the Landscape Architect
2. Regularly water nursery stock in containers, and place them in a cool area protected from sun and drying winds.

B. Excavating:

1. For shrubs in one-gal containers, dig a hole 12" in diameter and 12" deep.
2. For shrubs and trees in five gal containers, dig a hole 20" in diameter and 18" deep.
3. For trees in 15 gal containers, dig a hole 30" in diameter and 30" deep.
4. All holes more than 12" deep, probe by hand to determine if mechanical auger will hit any in-place utilities.

C. Planting:

1. Fill holes with backfill mixture consisting of three parts soil taken from the hole and one part specified soil amendment, by volume.
2. Fill to proper height to receive the plant, and thoroughly tamp the mixture before setting the plant.
3. Set plant in upright position in the center of the hole, and compact the backfill mixture around the ball or roots.
4. Thoroughly water each plant when the hole is 2/3 full.
5. After watering, tamp the soil in place until the surface of the backfill is level with the surrounding area and the crown of the plant is at the finished grade of the surrounding area.
6. Build up a temporary watering basin around the base of each tree and shrub, unless otherwise directed by the Landscape Architect, except no basins around trees and shrubs in turf area or in raised planter beds.

D. Apply the specified mulch to a depth of 4" and spread evenly over the entire area of each tree soil basin and over the entire planting bead area for shrubs.

3.3 PLANTING GROUND COVER

A. Rake planting areas smooth and free from soil lumps, rocks, sticks, and other deleterious material.

B. Planting:

1. Space the ground cover plants evenly as indicated on the Drawings, staggering the spaces around shrubs and trees as well as in the open areas.
2. Plant only in soil that is moist but friable, never wet or soggy.

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3. Apply the specified mulch to a depth of 4" and spread evenly over the entire planting bead area for ground cover.
4. In case of planting in the open on hot days, shorten the time between planting and watering.

3.4 TURF GRASS

A. Preparation:

1. Grade seed beds, thoroughly removing ridges and depressions, and making areas smooth, continuous, firm planes that ensure proper drainage.
2. Remove soil lumps, rocks, sticks, and other deleterious material.

B. Hydroseeding:

1. Hydromulch seed immediately upon completion of the fine grading
2. Seed at the rate of two lbs. per 1000 sq. ft. for Sahara Bermuda grass
3. Apply hydromulch material at a rate of 50 lbs. per 1000 sq. ft.
4. Apply soil stabilizer at a rate of 1 lb. per 1000 sq. ft.
5. Contractor will be required to certify the application at the rates stated above in a written submittal to the Landscape architect that includes dated receipts for the materials listed above.

C. Fertilizing:

1. Apply the specified fertilizer at the rate of 10 lbs per 1000 square feet.
2. Fertilizer may not be applied with hydromulch.
3. Apply fertilizer 14 calendar days after seed germination.

D. Protect turf areas from vehicular traffic and vandalism.

1. No heavy equipment shall be moved over the planted lawn area unless the soil is again prepared, graded, leveled, and replanted.
2. It will be the responsibility of this Contractor to protect all turf grass areas from damage. Any damages shall be repaired or replaced at no cost to SAWS .

E. Establishment:

1. Regardless of unseasonable climatic conditions or other adverse conditions affecting planting operations and the growth of the turf grass, it shall be the sole responsibility of the Contractor to establish a uniform stand of turf grass as herein specified. When adverse conditions such as drought, cold weather, high winds, excessive precipitation, or other factors prevail to such an extent that satisfactory results are unlikely, the Landscape Architect may, at his own discretion, stop any phase of the work until conditions change to favor the establishment of turf grass.
2. Maintenance shall begin immediately after each portion of grass area is planted. All planted areas will be protected and maintained by watering, weed and litter control, and replanting as necessary after initial planting and for as long as necessary to establish a uniform stand with complete coverage of the specified grass.

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- F. Uniform stand of turf grass:
 - 1. A uniform stand with complete coverage of the specified grass shall be defined as not less than 100 % of the planted area shall be covered with the specified turf grass.
 - 2. Thirty (30) days following planting, the Landscape Architect will inspect the planted areas to verify establishment as described above.
 - 3. Contractor will be required to replant and/or maintain any areas of grass that are unacceptable to the Landscape Architect until they meet the standards above. Partial projects will not be accepted.

- G. Sod:
 - 1. Areas to be having sod are indicated on the plan.
 - 2. Lay sod in running bond pattern.
 - 3. Lay without gaps or openings between slabs.
 - 4. Lay parallel to slopes.
 - 5. Roll in two directions and thoroughly wet.
 - 6. Large open areas are to be laid with 42” wide roll sod.
 - 7. Pallet sod is only to be used in small confined areas.
 - 8. All sod shall be Bermuda TIFF 419.

3.5 STAKING

- A. Stake trees as indicated on the drawings.
- B. Do not plant until staked locations have been approved by the landscape architect.

3.6 INSPECTION

- A. In addition to normal progress observations, schedule and conduct the following formal inspections, giving the Landscape Architect at least 24 hours advance notice of readiness for inspection:
 - 1. Inspection of plants in containers prior to planting.
 - 2. Inspection of plant locations, to verify compliance with the Drawings.
 - 3. inspection after completion of planting:
 - a. Schedule this inspection sufficiently in advance, and in cooperation with the Landscape Architect, so final inspection may be conducted within 24 hours after completion of planting.
 - 4. Final inspection at completion of the project provided that previous deficiencies have been corrected.

3.7 MAINTENANCE

- A. Maintain planting, starting with the planting operations and continuing until the project is accepted by SAWS or forty-five (45) days, whichever is shorter.
- B. Work included:
 - 1. Watering, weeding, cultivating, spraying, mowing and pruning necessary to keep the plant materials in a healthy growing condition and to keep the planted areas neat and attractive throughout the maintenance period.

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2. Turf will be mowed on a seven day cycle.
 3. Appropriate herbicides shall be applied as necessary as previously specified.
 4. Provide equipment and means for proper application of water to those planted areas not equipped with an irrigation system.
 5. Protect planted areas against damage, including erosion and trespassing, by providing and maintaining proper safeguards.
- C. Erosion Control:
1. Throughout the project and the maintenance period for turf grass, it is the Contractor's responsibility to maintain the topsoil in place at specified grades. Topsoil, turf grass and plant losses due to erosion will be replaced by the Contractor until establishment and acceptance are achieved.
- D. Replacements:
1. At the end of the maintenance period, all plant material shall be in a healthy growing condition.
 2. During the maintenance period, should the appearance of any plant indicate weakness and probability of dying immediately replace that plant with a new and healthy plant of the same type and size without additional cost to SAWS .
- E. Extension of maintenance period:
1. The entire project will continue to be replanted and maintained by the Contractor until complete coverage and acceptance are achieved over one hundred (100%) percent of the area at which time the final inspection will be made.

PART 4 - MEASUREMENT AND PAYMENT

- A. Seeding will be paid on a per acre basis for seeding and per pallet basis for solid sod.

END OF SECTION

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SECTION 02970 - LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 SUMMARY

- A. Maintain irrigation system and installed plant materials as specified herein during construction until acceptance by SAWS .
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02810: Irrigation system.
 - 3. Section 02950: Trees, shrubs, and ground cover.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Submit the following in sufficient time to enable its orderly review and return prior to scheduled commencement of other work of this Section:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's recommended procedures which, when approved by the Landscape Architect, will become the basis for accepting or rejecting actual procedures used on the Work.
- C. Each 30 calendar days during progress of the work of this Section, submit a report to the Landscape Architect (with a copy to the person so designated by SAWS) listing all herbicides, insecticides, and disease control chemicals used.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01620.

PART 2 - PRODUCTS

2.1 HERBICIDES

- A. Provide the following, or equals approved in advance by the Landscape Architect:
 - 1. Pre-emergent herbicide: "Ronstar" manufactured by the Chipman Division of Rhodia, Inc.

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2. Post-emergent herbicide: Any herbicide which does not leave a stain or residue and which is approved in advance by the Landscape Architect.

2.2 PEST CONTROL

- A. Provide the following, or equals approved in advance by the Landscape Architect:
 1. Insect control: A chemical insecticide to control insects, as approved by the Landscape Architect.
 2. Other pest control: Products to control snails, rodents, and other pests and diseases, as approved in advance by the Landscape Architect.

2.3 FERTILIZERS

- A. Provide the following, or equals approved in advance by the Landscape Architect:
 1. Soils suitability and fertility analysis report: Comply with soils report recommendation for fertilization type and schedule, as approved in advance by the Landscape Architect.
 2. Palm tree fertilizer:
 - a. Root growth stimulant: Vitamin B-1 manufactured by Cal-Liquid, Cooke, or Ortho;
 - b. Fertilizer: 20-10-5 commercial fertilizer.
 3. All other fertilizer: balanced 11-8-4 fertilizer

2.4 WATER

- A. Use only water, which is fresh and

potable. PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PLANT INSTALLATION PERIOD

- A. The plant installation period is hereby defined as starting with commencement of planting operations and continuing until inspection by the Landscape Architect.
- B. Where trees, shrubs, ground covers and turf are dead or show evidence of dieback or disease, promptly replace with new, vigorous, and healthy trees at no additional cost to SAWS .

3.3 MAINTENANCE

PERIOD A. General:

1. The plant maintenance period is hereby defined as starting at completion of the plant installation period and will continue to the final acceptance date of the entire

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project.

2. It is anticipated that SAWS may occupy or perform associated work during the plant maintenance period.
3. Provide a level of maintenance that presents a pleasing and desirable appearance at all times.

B. Erosion Control:

1. Throughout the project and the maintenance period for turf grass, it is the Contractor's responsibility to maintain the topsoil in place at specified grades. Topsoil, turf grass and plant losses due to erosion will be replaced by the Contractor until establishment and acceptance are achieved.

C. Replacements:

1. At the end of the maintenance period, all plant material shall be in a healthy growing condition.
2. During the maintenance period, should the appearance of any plant indicate weakness and probability of dying immediately replace that plant with a new and healthy plant of the same type and size without additional cost to SAWS .
3. Replacements required because of vandalism or other causes beyond control of the Contractor are not part of the Contract.

D. Tree maintenance:

1. Remove damaged branches back to point of growth, treating cuts over 2" in diameter with an approved tree wound dressing.
2. Restake and support trees as necessary, placing stakes and ties so that no chaffing or girdling of bark will occur.
3. Prune trees as directed by the Landscape Architect.
4. Replace diseased, damaged and dying trees with replacement trees as originally specified

E. Shrub and Ground Cover Maintenance:

1. Remove damaged branches back to point of growth.
2. Prune shrubs and ground covers to maintain the natural character and shape of the specific species of plant
3. Replace diseased, damaged and dying plants with replacement plants as originally specified

F. Palm tree maintenance:

1. General:
 - a. Maintain and guarantee all installed new palms.
 - b. Provide required water management, pruning, fertilizing, pest control, and disease control.
 - c. Prune to maintain a neat appearance as approved by the Landscape Architect. Prune in accordance with a schedule approved by the Landscape Architect.
2. Irrigation:
 - a. Apply water in sufficient amount at each irrigation to wet the soil to a depth of six to eight feet.
 - b. Schedule the frequency and amount of irrigation to maintain moisture depending upon soil type and time of year.
 - c. Monitor the soil moisture until experience gained is sufficient to be used in

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- irrigating.
- d. Monitor installed tensiometers not less than once each week, logging the results and irrigating accordingly.
 - e. Do not permit palms to be overwatered or underwatered at any time during the establishment and maintenance periods.
3. Fertilizing:
- a. Do not fertilize palm trees at time of planting.
 - b. Four months after planting, apply 20-10-5 at the rate of 1/2 lb per tree, cultivating or injecting into the soil below the turf.
 - c. Apply fertilizer only between March and August, and then in two or more applications. Should this period not coincide with the maintenance period, provides SAWS maintenance personnel the amount of fertilizer required for this application, with clear instructions regarding its application.
 - d. Nitrogen:
 - 1) Apply inorganic nitrogen to palm trees at the rate of four to six lbs of inorganic nitrogen per palm per year;
 - 2) Apply the nitrogen to the surface, followed by a normal watering period to take the nitrogen into the soil, or apply the nitrogen deep by injection;
 - 3) In lawn areas, apply in such a manner that the water takes the nitrogen beyond the grass roots to prevent the grass from competing for the nitrogen;
 - 4) Coordinate method of application and schedule for application with SAWS maintenance personnel.
4. Pruning:
- a. Pruning of the palms is for cosmetic purposes and to prevent fruit drop on the walkways.
 - b. Annual pruning (in the period from June 1 to August 30) is for removal of both flower stalks and unsightly fronds.
 - 1) If the annual pruning coincides with the plant establishment period or plant maintenance period, perform the pruning as part of the work of this Section.
 - 2) Remove all flower stalks along with the dead fronds.
 - 3) Remove green fronds to the extent that such removal does not detract from the aesthetic appearance as approved by the Landscape Architect.
 - 4) Do not remove more than one third of the green fronds at one time.
 - 5) Perform pruning with reciprocal saw (not chain saw).
 - 6) Before pruning commences, and after pruning each tree but before pruning the next tree, sterilize the saw blades by immersing the saw blades in a solution of 50% liquid household laundry bleach and 50% water for five minutes.
 - c. Coordinate pruning activities with SAWS maintenance personnel.

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- G. Turf maintenance:
1. Mowing:
 - a. Mow all turf areas on a seven day cycle.
 - b. Neatly edge the borders, trimming turf around planters and around sprinkler heads as needed to provide maximum water coverage.
 - c. Commence mowing turf when the grass has reached a height of 2", and maintain a grass height of 2" for the first two mowing. All subsequent mowing will be at a height of 1" until acceptance by SAWS .
 - d. Maintain turf as well established, uniform, smooth in texture, and free from bare spots and weeds to the approval of the Landscape Architect.
 2. Apply herbicide as required to eliminate 100% of all grass species other than the specified Bermuda Grass and all broadleaf weeds.
 3. Apply 11-8-4 fertilizer at the rate of six to ten lbs per 1,000 sq. ft on a monthly basis beginning approximately 14 calendar days after seed germination.
 4. Arify turf areas 60 days after seed germination.
- H. Irrigation system maintenance:
1. Maintain the complete irrigation system in an operable and appropriate manner.
 2. Repair and adjust all sprinkler heads to maintain the proper coverage, including adjusting heads to proper height.
 3. Water will be applied at a minimum rate of 1.50" per week. Adjusts water application to compensate for changes in weather. The contractor will be responsible for damages occurring due to under watering.
 4. Make replacements with new material identical to the original.
 5. Replace all damaged or inoperative equipment within one watering period.
 6. Operationally check all systems at least once each week.
 7. This system will be part of the City of Boerne's central irrigation control system. The contractor must coordinate operation of the controller with city staff.
- I. Extension of maintenance period:
1. The entire project will continue to be replanted and maintained by the Contractor until complete coverage and acceptance are achieved over one hundred (100%) percent of the area at which time the final inspection will be made.
- J. Replacements:
1. At the end of the maintenance period, all plant material shall be in a healthy growing condition.
 2. During the maintenance period, should the appearance of any plant indicate weakness and probability of dying immediately replace that plant with a new and healthy plant of the same type and size without additional cost to SAWS .
- K. General maintenance:
1. Prune and trim all vegetation, new and previously existing, to prevent overhanging sidewalks at less than 7"0" in height, at roadways less than 14"0" in height, and adjacent to roadway intersections, in a manner providing adequate sight distance for vehicles entering the intersection.
 2. Conduct all operations so as to provide maximum safety for the public.

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3. Remove leaves, paper, weeds, and debris from landscaped areas, and dispose of in a legal manner off-site.
4. Clean sidewalks, roadways, and other. Areas affected by operations under this Section. 5. Specialty type maintenance operations:
 - a. Specialty type maintenance operations are defined as:
 - 1) Fertilization
 - 2) Pre-emergent applications of herbicides and insecticides
 - 3) Turf aerification
 - 4) Preventive application of turf fungicide
5. Emergency communications:
 - a. Maintain an office for the duration project and provide the office with telephone service during normal working hours.
 - b. If a telephone answering service is utilized, provide the answering service with capability of contacting the Contractor's personnel by radio or pager.
 - c. Provide the Landscape Architect and SAWS maintenance personnel with an emergency telephone number for contact outside normal working hours.
6. Using a licensed pest control applicator, apply herbicide only when the air is still to prevent herbicide drift onto adjacent property and non-target planting.
7. Control rodents, snails, and other pests and diseases as required.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project under trees, plants and ground cover and shall be considered as full compensation for these requirements

END OF SECTION

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SECTION 03100 - CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide formwork in accordance with provisions of this Section for cast-in-place concrete shown on the Drawings or required by other Sections of these Specifications.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02520 – Portland Cement Concrete Paving and Building Pads
 - 3. Section 03301 – Concrete
 - 4. Section 02226 – Excavating, Backfill and Compacting for Pavement
 - 5. Section 03200 - Concrete reinforcement
 - 6. Section 02225 – Excavating, Backfill and Compacting for Utilities

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 35 calendar days after the Contractor has received SAWS Notice to Proceed, submit manufacturers' data and installation instructions for proprietary materials including form coatings, ties, and accessories, and manufactured form systems if used.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Design of formwork is the Contractor's responsibility.
- C. Standards: In addition to complying with pertinent regulations of governmental agencies having jurisdiction, comply with pertinent provisions of ACI 347.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01620.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Except for metal forms, use new materials. Materials may be re-used during progress of the Work, provided they are completely cleaned and reconditioned, recoated for each use, and capable of producing formwork of the required quality.

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- B. For footings and foundations, use Douglas Fir boards or planks secured to wood or steel stakes, substantially constructed to shades indicated and to support the required loads.
- C. For studs, walls, and supports, use Standard grade or better Douglas Fir, dimensions as required to support the loads but not less than 2" x 4".
- D. Wall forms:
 - 1. Exposed concrete surfaces:
 - a. Use 3/4" minimum thickness Douglas Fir plywood, grade B/B, class I or II, exterior sanded both sides, complying with PS-1.
 - b. Seal edges and coat both faces with colorless coating which will not affect application of applied finishes.
 - 2. Unexposed concrete surfaces:
 - a. Use 1" x 6" shiplap Douglas Fir boards, surfaced one side and two edges, or 3/4" minimum thickness Douglas Fir plywood, grade B/B plyform class I or II, sanded both sides, mill-oiled.
- E. Column forms, if required:
 - 1. For square or rectangular columns, use 2" thick Douglas Fir planks or joists, surfaced one side and two edges, or use metal forms.
 - 2. For round columns, use metal forms or patented paper tube forms approved by the LANDSCAPE ARCHITECT.
 - 3. Construct column forms with tight joints and securely clamped together with steel clamps.

2.2 FORM TIES

- A. Hold inner and outer forms for vertical concrete together with combination steel ties and spreaders approved by the LANDSCAPE ARCHITECT.
 - 1. Space ties symmetrically in tiers and rows, each tier plumb from top to bottom and each row level.
 - 2. At horizontal pour lines, locate ties not more than 6" below the pour lines. Tighten after concrete has set and before the next pour is made.
 - 3. For exposed concrete surfaces, provide form ties of removable type with she-bolts equipped with permanent plugs and a system approved by the LANDSCAPE ARCHITECT for fixing the plugs in place.

2.3 DESIGN OF FORMWORK

- A. General:
 - 1. Design, erect, support, brace, and maintain formwork so it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure.
 - 2. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
 - 3. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
 - 4. Design forms and formwork to include assumed values of live load, dead load, weight of moving equipment operated on the formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures,

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stresses, lateral stability, and other factors pertinent to safety of the structure during construction.

5. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges, jacks, or a combination thereof.
6. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
7. Support form materials by structural members spaced sufficiently close to prevent objectionable deflection.
8. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within the allowable tolerances.
9. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints, and provide backup material at joints as required to prevent leakage and prevent fins.
10. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.

2.4 EARTH FORMS

- A. Side forms for footings may be omitted, and concrete may be placed directly against excavation, only when requested by the Contractor and approved by the LANDSCAPE ARCHITECT.
- B. When omission of forms is accepted, provide additional concrete 1" on each side of the minimum design profiles and dimensions shown on the Drawings.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FORM CONSTRUCTION

- A. General:
 1. Construct forms complying with ACI 347 to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished structure.
 2. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features as required.
- B. Fabrication:
 1. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
 2. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
 3. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

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4. Provide top forms for inclined surfaces where so directed by the LANDSCAPE ARCHITECT.
- C. Forms for exposed concrete:
1. Drill forms to suit ties being used, and to prevent leakage of cement paste around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
 2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back the joints with extra studs or girts to maintain true square intersections.
 3. Use extra studs, walls, and bracing to prevent objectionable bowing of forms between studs, and to avoid bowed appearance in concrete. Do not use narrow strips of form material, which will produce bow.
- D. Corner treatment:
1. Unless shown otherwise, form chamfers with 3/4"x3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edges.
 2. Extend terminal edges to required limit, and miter the chamfer strips at changes in direction.
- E. Locate control joints as indicated on the Drawings and, where required but not shown on the Drawings, as approved by the LANDSCAPE ARCHITECT.
- F. Provisions for other trades:
1. Provide openings in concrete formwork to accommodate work of other trades.
 2. Verify size and location of openings, recesses, and chases with the trade requiring such items.
 3. Accurately place and securely support items to be built into the concrete.

3.3 FORM COATINGS

- A. Coat form contact surfaces with form coating compound before reinforcement is placed.
1. Do not allow excess form coating material to accumulate in the forms or to come in contact with surfaces which will bond to fresh concrete.
 2. Apply the form coating material in strict accordance with its manufacturer's recommendations.

3.4 REMOVAL OF FORMS

- A. General:
1. Do not disturb or remove forms until the concrete has hardened sufficiently to permit form removal with complete safety.
 2. Do not remove shoring until the member has acquired sufficient strength to support its own weight, the load upon it, and the added load of construction.
 3. Do not strip floor slabs in less than two days.
 4. Do not strip vertical concrete in less than seven days.
- B. Finished surfaces:
1. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged, and that corners are true, sharp, and unbroken.
 2. Release sleeve nuts or clamps, and pull the form ties neatly.

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3. Do not permit steel spreaders, form ties, or other metal to project from, or be visible on, any concrete surface except where so shown on the Drawings.
4. Solidly pack form tie holes, rod holes, and similar holes in the concrete. For packing, use the cement grout specified in Section 03300 of these Specifications, flushing the holes with water before packing, screeding off flush, and grinding to match adjacent surfaces.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project under and the payments made under concrete work and shall be considered as full compensation for these requirements

END OF SECTION

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REINFORCED UNIT MASONRY – 04230
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SECTION 04230 - REINFORCED UNIT MASONRY

PART 1 – GENERAL

1.1 SUMMARY

- A. Provide reinforced unit masonry where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 35 calendar days after the Contractor has received SAWS Notice to Proceed, submit sufficient technical data to prove compliance with the specified requirements.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Mock-ups:
 - 1. At an area on the site where approved by the Landscape Architect, provide mock-up masonry panels as follows:
 - a. Make each mock-up panel approximately 4'-0" high and 6'-0" long.
 - b. Provide one mock-up panel for each combination of masonry unit, bond pattern, mortar color, and joint type used in the Work.
 - c. The mock-up panels may be part of the Work, and may be incorporated into the finished Work when so approved by the Landscape Architect.
 - d. Revise as necessary and secure the Landscape Architect's approval.
 - 2. If the mock-up panels are not permitted to be part of the finished Work, completely demolish and remove them from the job site upon completion and acceptance of the other work of this Section.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01620.
- B. Store masonry units above ground on level platforms which allow air circulation under the stacked units.
- C. Cover and protect against wetting prior to use.

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REINFORCED UNIT MASONRY – 04230

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PART 2 – PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Provide lightweight hollow load-bearing concrete masonry units complying with ASTM C90, grade N, type I, in color "natural gray," and in dimensions as indicated on the Drawings.
 - 1. Where dimensions are not indicated on the Drawings, provide units having nominal face dimensions of 16" long by 8" high by the depth shown or otherwise required.
 - 2. provide accessory shapes as indicated or otherwise required.

2.2 BRICK MASONRY UNITS

- A. Where brick masonry is indicated on the Drawings, provide H.C. Muddox Company face brick as distributed by Western Brick and Tile Company, 1905 Fremont Avenue, South Pasadena, California 91030 (213) 254-6728, and having the following attributes:
 - 1. Dimensions: 3-1/2" x 3-1/2" x 7-1/2;;
 - 2. Type: Comply with ASTM C216, type FBS, grade SW; 3. Color: #1535.
- B. If prefab masonry panel system is utilized, provide two-cell bricks; if standard construction is utilized, provide the manufacturer's standard cored pattern.

2.3 REINFORCEMENT AND ACCESSORIES

- A. Comply with the following as minimums:
 - 1. Bars: ASTM A615, grade 40, unless otherwise shown on the Drawings, using deformed bars for number 3 and larger.
- B. Fabricate reinforcement in accordance with recommendations contained in CRSI "Manual of Standard Practices."

2.4 MORTAR

- A. Ingredients:
 - 1. Portland cement: Comply with ASTM C150, type I.
 - 2. Lime:
 - a. Provide hydrated lime complying with ASTM C207, or quicklime complying with ASTM C5.
 - b. When quicklime is used, slake and then screen through a 16 mesh sieve. After slaking and screening, but before using, store and protect for not less than ten days.
 - 3. Aggregate: Provide clean, sharp, well graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter, and complying with ASTM C144.
 - 4. Admixtures: Do not use admixtures unless specifically approved in advance by the Landscape Architect.
 - 5. Water: Provide water free from deleterious amounts of acids, alkalis, and organic materials.
- B. Mixing:
 - 1. Provide mortar type "M" or type "S" as designated on the Drawings or otherwise directed by the Landscape Architect, and in accordance with ASTM C270.

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2. Proportions:
 - a. For type "M" mortar, provide one part portland cement to 1/4 part hydrated lime and 3-3/4 parts sand by volume.
 - b. For type "S" mortar, provide one part portland cement to 1/2 part hydrated lime and 4-1/2 parts sand by volume.
3. Mechanically mix in a batch mixer for not less than three minutes, using only sufficient water to produce a mortar which is spreadable and of a workable consistency.
4. Retemper mortar with water as required to maintain high plasticity.
 - a. On mortar boards, retemper only by adding water within a basin formed with mortar, and by working the mortar into the water.
 - b. Discard and do not use mortar which is unused after 1-1/2 hours following initial mixing.

2.5 GROUT

- A. Ingredients:
 1. Portland cement: Comply with ASTM C150, type I.
 2. Aggregate: Provide clean, sharp, well graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter.
 3. Admixtures: Do not use admixtures unless specifically approved in advance by the Landscape Architect.
 4. Water: Provide water free from injurious amounts of acids, alkalis, and organic materials.
- B. Mixing:
 1. Provide "fine grout" or "coarse grout" as designated on the Drawings or otherwise directed by the Landscape Architect, and in accordance with ASTM C476.
 2. When the minimum grout compressive strength is required to be more than 2000 psi, provide laboratory design mix prepared as required for design mixes of concrete under Section 03300 of these Specifications.
 3. Proportions:
 - a. For "fine grout," provide one part portland cement to 2-1/4 parts minimum to 3 parts maximum of damp loose sand, with sufficient water to achieve fluid consistency.
 - b. For "coarse grout," provide one part portland cement to 3 parts maximum of damp loose sand to two parts coarse aggregate, with sufficient water to achieve fluid consistency.
 4. "Fluid consistency" is interpreted as meaning as fluid as possible for pouring promptly in place without segregation.
- C. Use "fine grout" where called for on the Drawings, where the grout space is less than 3" in its least dimension, and where otherwise directed by the Landscape Architect or required by governmental agencies having jurisdiction.

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REINFORCED UNIT MASONRY – 04230
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PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 ENVIRONMENTAL CONDITIONS

A. Do not place masonry units when air temperature is below 40 degrees F.
B. Protect masonry construction from direct exposure to wind and sun when erected in ambient air temperature of 99 degrees F in the shade, with relative humidity less than 50%.

3.3 INSTALLATION

A. General:

1. Do not commence installation of the work of this Section until horizontal and vertical alignment of foundation is within 1" of plumb and the lines shown on the Drawings.
2. Lay only dry masonry units.
3. Use masonry SAWS to cut and fit masonry units.
4. Set units plumb, true to line, and with level courses accurately spaced.
5. Clean the top surface of foundation free from dirt, debris, and laitance, and expose the aggregate prior to start of installing first course.
6. Accurately fit the units to plumbing, ducts, openings, and other interfaces, neatly patching all holes.
7. Keep the walls continually clean, preventing grout and mortar stains. If grout does run over, clean immediately.
8. Install corrugated metal tie straps at 18" on center.

B. Unless otherwise shown on the Drawings, provide running bond with vertical joints located at center of masonry units in the alternate course below.

C. Do not use chipped or broken units. If such units are discovered in the finished wall, the Landscape Architect may require their immediate removal and replacement with new units at no additional cost to SAWS .

D. Laying up:

1. Place units in mortar with full shoved bed and head joints.
2. Align vertical cells of hollow units to maintain a clear and unobstructed system of flues.
3. Hold racking to an absolute minimum.
4. Provide cleanouts at the bottom of each cell of hollow units for removing mortar droppings. Do not close the cleanouts until they have been inspected and approved by the Landscape Architect.

E. Reinforcement:

1. Provide reinforcement as shown on the Drawings, fully embedded in grout and not in mortar or mortar joints.
2. Provide required metal accessories to ensure adequate alignment of steel during grout filling operations.

F. Tooling:

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REINFORCED UNIT MASONRY – 04230

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1. Tool joints to a dense, smooth surface.
2. Unless otherwise shown on the Drawings, provide joints of "concave" pattern throughout.

3.4 GROUTING

- A. Perform grouting in strict accordance with the provisions of the governing building code.
 1. Solidly fill vertical cells containing reinforcement.
 2. Consolidate grout at time of pour by puddling with a mechanical vibrator, filling all cells of the masonry, and then reconsolidating later by puddling before the plasticity is lost.

3.5 CLEANING

- A. Inspection and adjustment:
 1. Upon completion of the work of this Section, make a thorough inspection of installed masonry and verify that units have been installed in accordance with the provisions of this Section.
 2. Make necessary adjustments.
- B. Clean surfaces of masonry as required for proper application of the specified finishes.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project under and the payments made under stone veneer and stone wall work and shall be considered as full compensation for these requirements

END OF SECTION

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STONE MASONRY – 04400

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PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall furnish all tools, equipment, materials, and supplies and shall perform all labor required to complete the work as indicated on the Drawings and specified herein, including the following:
 - 1. Installation of reinforcing steel for masonry except dowels in concrete.
 - 2. Corrugated wall ties.
- B. This Section covers all stone masonry work where shown on the drawings and as specified herein, including all labor and materials necessary for a complete installation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section [03200] Reinforcement Steel
- B. Section [03300] [03310] Cast-in-Place Concrete
- C. Section [09900] Painting

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Comply with the applicable reference specifications as specified in the GENERAL REQUIREMENTS.
- B. Comply with the current provisions of the following Codes and Standards:

1. Commercial Standards:

ASTM A 153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 144	Standard Specification for Aggregate for Masonry Mortar
ASTM C 150	Standard Specification for Portland Cement
ASTM C 207	Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C 404	Standard Specification for Aggregates for Masonry Grout

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1.4 CONTRACTOR SUBMITTALS

- A. Submittals shall be made in accordance with the GENERAL REQUIREMENTS.
- B. The following submittals and specific information shall be provided to the ARCHITECT for approval, prior to start of contracted Masonry Work.
 - 1. Complete materials list of all items proposed to be furnished and installed.
 - 2. Samples: Submit two (2) samples of stone units to be used for the project, for review, before starting work. Finished work shall conform to the samples.
 - 3. Sample Panels: Erect sample panel of each kind of work, approximately 4' high and 4' long, to specification requirements, and one tier thick on suitable foundation and in protected location on job site where designated by the ARCHITECT. Erect panels for review by ARCHITECT. If not satisfactory, rebuild sample panels.
 - 4. Manufacturer's specifications and other data required to identify the quality of all proposed accessory and setting materials.
 - 5. Shop drawings showing proposed arrangement and dimensions of all panels, methods of anchoring, proposed treatment of joints, locations, layout and details of expansion joints, composition and colors of sealant, and such similar data as is necessary to judge the suitability of the proposed installation and to properly coordinate the preparation and construction of the support system. Shop drawings for grout mix, anchor, tie and reinforcement details for stone work attachments shall be prepared by a California licensed civil engineer with structural calculations.

1.5 QUALITY ASSURANCE

- A. Quality of accessories shall be as recommended by the manufacturer subject to acceptance by the ARCHITECT.
- B. Qualifications of Installers: Throughout the progress of the work of this Section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this Section.

In actual installation of the work of this Section, use adequate numbers of skilled workmen to ensure installation in strict accordance with the design and the reviewed recommendations of the materials suppliers.

Check as-built dimensions of the supporting structure at the site by accurate field measurements before final submittal of shop and layout drawings. Coordinate schedule with construction progress to avoid delay of work.

- C. Sample Panels:

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Completed stone work shall conform to approved sample panels. Sample panels to be removed from the job-site upon completion of Contracted Stone Work or when so directed by the ARCHITECT prior to acceptance of work of this Section.

1.6 PRODUCT HANDLING

- A. Protection: Protect materials before, during, and after installation. Protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary for the acceptance of the ARCHITECT and at no additional cost to the CITY.
- C. Delivery and Storage:
 - 1. Stone units and auxiliary materials shall be delivered and stored in original, unopened packages bearing manufacturers' labels indicating brand names, and kept off the ground on platforms or palettes that will allow air to circulate under stone units. Store all mortar and grout materials under cover in a cool, dry location in strict accordance with the manufacturer's instructions.
 - 2. Handle stone units in a manner to protect units against wetting and damage. Damaged or stained units will be rejected.

PART 2 -- PRODUCTS

2.1 STONE UNITS

Stone units shall be random cut Texas Limestone, or an approved equal.

2.2 PORTLAND CEMENT

Portland cement shall comply with ASTM C150, Type I or II low alkali, with total amount of sodium or potassium oxide in the cement not to exceed 0.6% when the aggregates contain opalescent silica or is reactive to alkalies. Comply with the latest International Building Code requirements. "Masonry" cement will not be acceptable. Portland cement for integrally colored mortar shall be selected from Contractor provided samples and approved by the ARCHITECT.

2.3 AGGREGATE

- A. Sand for mortar shall be as per ASTM C144, except that not less than 4 percent or more than 10 percent shall pass the No. 100 sieve.
- B. Aggregate for grout shall comply with ASTM C404.

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2.4 LIME AND LIME PUTTY

- A. Hydrated lime for masonry purposes shall conform to the requirements of the latest City of Los Angeles Building Code.
- B. Lime putty shall be made from Type S hydrated lime and shall conform to ASTM C207. Putty made from Type S shall have a plasticity figure of not less than 200 when tested commencing within 30 minutes after mixing with water.
- C. The CONTRACTOR shall furnish Manufacturer=s Certification identifying the lime and stating that the lime complies with these requirements.

2.5 WATER

Water shall be from a source used for domestic purposes free from injurious amounts of acids, alkalis, oil and organic matter.

2.6 MORTAR

- A. Mortar shall conform to the latest International Building Code.
- B. Mortar shall consist of a mixture of cementitious materials and aggregate to which sufficient water and approved additives, if any, have been added to achieve a workable, plastic consistency.
- C. Mortar shall be proportioned in accordance with the latest International Building Code. Mortar shall attain a minimum compressive strength of 1,500 psi in 28 days.
- D. Mix mortar by placing one-half of water and aggregate in a power operated mixer, then add cement, lime, admixture (when approved), and the remainder of aggregate and water. Mix mortar mechanically for not less than three minutes after all ingredients have been placed in the mixer.
- E. All mortar incorporated in this project shall be tested in accordance with the latest Building Code.
- F. Mortar Color shall be made pigments (ground) as manufactured by [Frank D. Davis Co.], non-fading, alkali proof and of colors to match stone color or as selected by the ARCHITECT from samples of colors submitted by the manufacturer.
- G. When approved for use, mortar admixture shall be [Hydrophobe 31, manufactured by W.R. Grace and Company]; [Sika Red Label, manufactured by Sika Chemical Corporation]; [Omicron Mortar proofing, Master Builders Corporation]; or an approved equal. Quantity of admixture per mortar batch shall be in accordance with manufacturer's recommendations and as approved by the ARCHITECT.

2.7 GROUT

- A. Grout shall conform to the latest International Building Code.
- B. Grout shall consist of a mixture of cementitious materials and aggregate to which water has been

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added such that the mixture will flow without segregation of its constituents.

- C. Grout shall have a minimum compressive strength of 2,000 pounds per square inch.
- D. Water content of grout shall be adjusted to provide proper workability and to enable the proposed placement under existing field conditions, without segregation. Slump to range between 8 and 10 inches. Field adjustment of water content shall be approved by the INSPECTOR.
- E. Grout mixture shall be proportioned in accordance with the latest City of Los Angeles Building Code and approved by the ARCHITECT.
- F. Mix grout by placing one-half of water and aggregate in a power operated mixer, then add cement, lime, admixture, and the remainder of aggregate and water. Mix grout mechanically for not less than three minutes after all ingredients have been placed in the mixer.
- G. Grout admixture shall be [Sika Grout Aid, Type II, manufactured by Sika Chemical Corporation]; [Grout Aid GA-II, manufactured by concrete Emulsions]; or an approved equal. Antifreeze liquid, chloride salts or other such substances shall not be used in the grout. Air-entraining substances shall not be used in grout unless tests are conducted to determine compliance with the latest International Building Code.

2.8 REINFORCEMENT

Reinforcement shall be billet steel conforming to ASTM A615, Grade 60, per sizes and spacings shown on Drawings. Provide galvanized steel pipe sleeves for use at expansion joints where indicated on the Drawings.

2.9 ANCHORS AND TIES

Anchors and Ties shall be zinc-coated steel conforming to ASTM A153. Corrugated or crimped ties to be no less than 7/8" wide and no less than 16 gauge (0.0598") zinc-coated sheet steel and no less than 6" long.

PART 3 -- EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

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3.2 INSTALLATION

- A. General: Install stone work true to line and dimensions shown on the Contract Drawings. Conform to the latest City of Los Angeles Building Code for general requirements.
- B. Laying Stone: Lay up stone in full bed of mortar and with joints solidly filled with mortar and shove into place. If necessary to move or shift unit already laid, remove setting mortar, clean and apply only fresh mortar for final placement. Coursing and mortar joints must be as directed. Stone must be laid in a design approved by the ARCHITECT.
- C. Employ extreme care to prevent grout or mortar from staining face of masonry to be left exposed. If grout or mortar does contact exposed face of masonry, remove immediately or replace masonry.
- D. Protect adjoining work from droppings of mortar or grout.
- E. Where fresh masonry joins masonry that is partially or completely set, clean exposed surface of set masonry with wire brush and lightly wetted so as to obtain best possible bond with new work.
- F. Grouting: Grout from inside face of masonry. Fill wall cavities with grout. Puddle grout with piece of wood to flow into interstices and to fully encase reinforcing steel. Use of trowel for puddling is prohibited. Stop grout 1-1/2" below top, if work is stopped for one hour or longer.
- G. Retempering and Time Limit for Mortar and Grout: Maintain mortar in a plastic state and grout in a fluid state until used. Retemper on mortar boards by adding water within basin formed with mortar and work mortar. Do not retemper or use mortar which has become harsh and nonplastic. When mortar has been maintained plastic, and grout fluid, use up to no more than one hour after original mixing.
- H. Jointing: random with smeared mortar. Solidly fill joints between units and between units and other materials. Fill holes made by line pins in exposed work. Strike joints flush and tool to a smooth, concave, hard surface or as directed by the ARCHITECT.
- I. Reinforcing: Accurately set and place reinforcing steel, except dowels in concrete, in strict conformance with Drawings and notes thereon. Secure vertical steel firmly in place by means of frames or other suitable devices. Horizontal steel may be placed as work progresses. Forms to be at least 1/4" clear in spaces containing reinforcing.

3.3 CLEANING AND PROTECTION

- A.. Cleaning During Construction: As work progresses immediately remove all mortar and grout droppings and other foreign matter from installed work using a (non-metallic) fiber brush and water to prevent adhesion of mortar and grout to stone surfaces and to leave surfaces clean. Use minimum amount of water to prevent added efflorescence from forming on the surfaces.
- B. Cleaning After Installation: Upon completion of stone installation, clean all exposed surfaces with a 10% solution of commercial muriatic acid, removing all stains with fiber brushes and the washing with clean water. In the event ordinary cleaning is not adequate, use other methods such as sandblasting or chipping, as approved by the ENGINEER and at no additional cost to the CITY.

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- C. Protection: Adequately protect each four-foot lift or completed masonry work with visqueen or other approved material to maintain completed work, clean as work progresses above previous lift.
- D. All exposed masonry surfaces shall receive the following finishes, as prescribed by the manufacturer in other Sections of these Specifications:
 - 1. Above Grade Waterproofing Sealer Treatment specified in Section [07181]
 - 2. Anti-Graffiti Coating specified in Section [09860]
 - 3. Painting specified in Section [09900].

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project under and the payments made under stone veneer and stone wall work and shall be considered as full compensation for these requirements

END OF SECTION

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STONE VENEER AND STONE WALLS – 04450
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SECTION 04450 - STONE VENEER AND STONE WALLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide natural stone veneer and stone walls where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 35 calendar days after the Contractor has received the "SAWS", "SARA" or "City of San Antonio's" Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Samples of the proposed stone, showing color range, color variation, and textures.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Mock-ups:
 - 1. At a location on the site where directed by the Landscape Architect, construct a sample panel approximately 4'-0" high and 6'-0" long.
 - 2. Provide one panel for each combination of stone, mortar color, and pattern of installation.
 - 3. Revise as necessary to secure the Landscape Architect's approval.
 - 4. The mock-up panels, when so approved by the Landscape Architect, may become part of the Work and may be incorporated into the finished work of this Section.
 - 5. The approved mock-up panels will be used as datum for comparison with work actually provided under this Section, and for acceptance or rejection of such work.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Section 01620.

PART 2 - PRODUCTS

2.1 STONE

- A. Provide a 6" X 8" X 16" chop block San Saba Sandstone to match stone in Cassiano Park and finish as detailed on the plans. Color as approved by the Landscape Architect.

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- B. Caps and trim are to be of the same stone but "smooth faced and cut" as noted on drawings.

2.2 OTHER MATERIALS

- A. Portland Cement: Comply with ASTM C150, type II, low alkali.
- B. Sand: Comply with ASTM C144, with not less than 5% passing the No. 100 sieve
- C. Hydrated Lime: Comply with ASTM C207, type S, unless otherwise specifically approved by the Landscape Architect.
- D. Water: Clean, potable, and free from organic materials.
- E. Dovetail anchor slots for Stone Veneer:
 - 1. Provide standard dovetail anchor slots and ties manufactured by Burke Concrete Accessories, Concrete Ties, or equal products approved in advance by the Landscape Architect.
 - a. Use 22 gage galvanized steel for spacing at 24" on centers;
 - b. Use 16 gage corrugated galvanized steel anchor ties, mated to slots, and with 3/16" raised spur for retaining wire.
 - 2. Wire: Comply with ASTM A82, 9 gage, galvanized.
- F. Ladder reinforcing:
 - 1. Provide 9gage galvanized masonry reinforcement ladders with 9gage cross bracing between each stone course.
 - 2. Provide two 9 gage galvanized "Z" ties between stone courses at every other vertical joint per course and at all vertical wall joints.
 - 3. Wire: Comply with ASTM A82, 9 gage, galvanized
- G. Provide other materials, nor specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Landscape Architect.
- H. Provide mosaic tile and glass tile and buttons to match the installation of the benches at Elmendorf Lake Park. Work is to be provided by an artisan.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Coordinate with other trades as required to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

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B. Type S Mortar

1. Mix to the Property Specifications of ASTM C 270:
 - a. Compressive Strength: 1800 psi, minimum, at 28 days for laboratory mixed mortar with a flow of 110 plus/minus 5 percent.
 - b. Water Retention: 75 percent, minimum.
 - c. Air Content: Maximum 18%
 - d. Aggregate Ratio: No less than 2.25 and no more than 3.5 times the sum of the separate volumes of cementitious materials.

C. Verify that dovetail anchor slots, if required, are installed in a manner to provide not less than the support shown on the Drawings, and in such a manner as to permit proper installation of ties, wires, mortar, and stone.

D. Stone Veneer

1. Lay stone with not less than 1" or more than 1 1/2" of the specified mortar between stone and the backing wall, and in accordance with the approved mock-up.
 - a. Cut, trim, fit, and balance the stone so it is at rest in its final position before mortar or grout is applied.
 - b. When dovetail anchors are used, place anchor ties in the anchor slots at not more than 12" on centers.
 - c. Loop the horizontal joint reinforcement wire through the supporting anchors:
 - 1) Provide loops having legs not less than 15" long, so bent that each leg will lay in the mortar joint.
 - 2) Bend the last 2" of each wire leg at right angle.
 - 3) Conceal all wire within the mortar.
 - d. Unless specifically otherwise approved by the Landscape Architect, do not install stone in thickness exceeding 7" from the backing wall to the outside face of the stone.

E. Stone Wall

1. Exterior walls
 - a. Lay stone with not less than 1" or more than 1 1/2" of the specified mortar between stone and the backing wall, and in accordance with the approved mock-up.
 - b. Cut, trim, fit, and balance the stone so it is at rest in its final position before mortar or grout is applied.
 - c. Provide 9 gage galvanized masonry reinforcement ladders with 9 gage cross bracing between each stone course.
 - d. Provide two 9 gage galvanized "Z" ties between stone courses at every other vertical joint per course.
 - e. Weave stone at corners of exterior walls and provide two 9 gage galvanized "L" ties between stone courses at every other horizontal joint per course
 - f. Wire: Comply with ASTM A82, 9 gage, galvanized
 - g. Conceal all wire within the mortar.

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2. Interior walls
 - a. Lay stone with not less than 3/4" or more than 1" of the specified mortar between stone and the backing wall, and in accordance with the approved mock-up.
 - b. Cut, trim, fit, and balance the stone so it is at rest in its final position before mortar or grout is applied.
 - c. Provide 9gage galvanized masonry reinforcement ladders with 9gage cross bracing between each stone course.
 - d. Provide two 9 gage galvanized "Z" ties between stone courses at every other vertical joint per course
 - e. Install two 9 gage galv. "L" wire ties per course at all interior wall "T" joints.
 - f. Wire: Comply with ASTM A82, 9 gage, galvanized
 - g. Conceal all wire within the mortar.

F. Stone Wrapped Columns

1. Fill cavity between metal support column and stone veneer with mortar and secure veneer to metal column with corrugated metal ties. No rubble will be allowed in cavity.

3.3 CLEANING

- A. Use clear water and clean brushes or cloths, and remove all mortar stains as the work progresses.
- B. Upon completion of the stone installation, clean all exposed surfaces with a 10% solution of commercial muriatic acid, removing all stains with fiber brushes, and then washing with clear water.
- C. In the event ordinary cleaning is not adequate, use other methods such as sandblasting or chipping, as approved by the Landscape Architect, and at no additional cost to SAWS .

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project under and the payments made under stone veneer and stone wall work and shall be considered as full compensation for these requirements.

END OF SECTION

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SECTION 04720 - CAST STONE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

- 1. Cast stone trim including the following:

- a. Surrounds.
- b. Coping.
- c. Wall caps.
- d. Belt courses.
- e. Water tables.
- f. Column covers.
- g. Medallions.

- B. Related Sections include the following:

- 1. Division 4 Section "Reinforced Unit Masonry - Section 04230"
- 2. Division 4 Section "Stone Masonry - Section 04400" for installing cast stone units in unit masonry.

1.3 DEFINITIONS

- A. Cast Stone: Architectural precast concrete building units intended to simulate natural cut stone.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for cast stone units.

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- B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
 - 1. Include building elevations showing layout of units and locations of joints and anchors.
 - C. Samples for Initial Selection: For colored mortar.
 - D. Samples for Verification:
 - 1. For each color and texture of cast stone required, 10 inches square in size.
 - 2. For colored mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 - E. Full-Size Samples: For each type of cast stone unit required.
 - 1. Make available for Architect's review at Project site
 - 2. Make Samples from materials to be used for units used on Project.
 - 3. Approved Samples may be installed in the Work.
 - F. Qualification Data: For manufacturer.
 - 1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.
 - G. Quality-Control Plan: Manufacturer's written quality-control plan that includes all elements of the Cast Stone Institute's "Quality Control Procedures Required for Plant Inspection."
 - 1. Provide copies of documentation showing compliance with quality-control plan as requested by Architect.
 - H. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364.
 - 1. Provide test reports based on testing within previous two years.
- 1.5 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, with sufficient production capacity to manufacture required units.

- B. Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- C. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. 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 mockup of typical wall area as shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery of cast stone to minimize the need for on-site storage and to avoid delaying the Work.
- B. Pack, handle, and ship cast stone units in suitable packs or pallets.
 - 1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
 - 2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
- C. Store installation materials on elevated platforms, under cover, and in a dry location.
- D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.7 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but not less than 7 days after completing cleaning.

- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
 - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CAST STONE MATERIALS

- A. General: Comply with ASTM C 1364 and the following:
- B. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures and colors as needed to produce required cast stone colors.
- D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation as needed to produce required textures and colors as needed to produce required cast stone colors.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
- F. Admixtures: Do not use admixtures unless specified or approved in writing by Architect.

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1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
 2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
 3. Air-Entraining Admixture: ASTM C 260 Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 4. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.
 5. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.
- G. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast stone material.
1. Epoxy Coating: ASTM A 775/A 775M.
 2. Galvanized Coating: ASTM A 767/A 767M.
- H. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304 or steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M.

2.3 CAST STONE UNITS

- A. Provide cast stone units complying with ASTM C 1364 using the vibrant dry tamp or wet-cast method.
1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364
- B. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
1. Slope exposed horizontal surfaces 1:12, unless otherwise indicated.
 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 3. Provide drips on projecting elements, unless otherwise indicated.
- C. Fabrication Tolerances:
1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch
 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.

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3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch , whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

D. Cure units by one of the following methods:

1. Cure units with steam in enclosed curing room at temperature of 105 deg F or above and 95 to 100 percent relative humidity for 6 hours. Cure units with dense fog and water spray in enclosed warm curing room at 95 to 100 percent relative humidity for 24 hours.
2. Cure units to comply with one of the following:
 - a. Not less than 5 days at mean daily temperature of 70 deg F or above.
 - b. Not less than 6 days at mean daily temperature of 60 deg F or above.
 - c. Not less than 7 days at mean daily temperature of 50 deg F or above.
 - d. Not less than 8 days at mean daily temperature of 45 deg F or above.

E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

F. Colors and Textures: As selected by Architect from manufacturer's full range.

G. Color and Texture: Provide units with fine-grained texture and buff color resembling Indiana limestone.

H. Color and Texture: Provide units with fine texture and red-brown color resembling brownstone on adjacent buildings.

2.4 MORTAR MATERIALS

- A. Provide mortar materials that comply with Division 4 Section "Unit Masonry Assemblies."
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
- E. Masonry Cement: ASTM C 91.

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- F. Mortar Cement: ASTM C 1329.
- G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
- H. Colored Cement Product: Packaged blend made from masonry cement and mortar pigments, all complying with specified requirements and containing no other ingredients.
 - 1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 - 2. Pigments shall not exceed 10 percent of Portland cement by weight.
 - 3. Pigments shall not exceed 5 percent of masonry cement by weight.
- I. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- J. Water: Potable.

2.5 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.
- B. Anchors: Type and size indicated, fabricated from steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M.
- C. Dowels: Round stainless-steel bars complying with ASTM A 276, Type 304, and 1/2-inch diameter.
- D. Dowels: Round steel bars complying with ASTM A 36/A 36M or ASTM A 615/A 615M, 1/2-inch diameter, and hot-dip galvanized to comply with ASTM A 123/A 123M.
- E. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces;

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expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.6 MORTAR MIXES

- A. Comply with requirements in Division 4 Section "Unit Masonry Assemblies" for mortar mixes.
- B. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar.
 - 2. Limit cementitious materials in mortar to Portland cement and lime.
- C. Comply with ASTM C 270, Proportion Specification.
 - 1. For setting mortar, use Type [S] [N].
 - 2. For pointing mortar, use Type [N] [O].
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - 1. Mix to match Architect's sample.

2.7 SOURCE QUALITY CONTROL

- A. Employ an independent testing agency to sample and test cast stone units according to ASTM C 1364.
 - 1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 SETTING CAST STONE IN MORTAR

- A. Install cast stone units to comply with requirements in Division 4 Section "Unit Masonry Assemblies."
- B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
- C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
- D. Set units in full bed of mortar with full head joints, unless otherwise indicated.
 - 1. If not indicated, set units with joints 1/4 to 3/8 inch wide.
 - 2. Build anchors and ties into mortar joints as units are set.
 - 3. Fill dowel holes and anchor slots with mortar.
 - 4. Fill collar joints solid as units are set.
 - 5. Build concealed flashing into mortar joints as units are set.
 - 6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
 - 7. Keep joints at shelf angles open to receive sealant.
- E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
- G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- H. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated. Keep joints free of mortar and other rigid materials.
 - 1. Form open joint of width indicated, but not less than 3/8 inch .
- I. Prepare joints indicated to receive sealant and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."
 - 1. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 - 2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.
- B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.
- C. Fill anchor holes with sealant.
 - 1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
- D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.
- E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.
 - 1. Form open joint of width indicated, but not less than 3/8 inch.
- F. Prepare joints and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."
 - 1. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

3.4 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

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- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except due to warpage of units within tolerances specified.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
 - 1. Remove mortar fins and smears before tooling joints.
 - 2. Remove excess sealant immediately, including spills, smears, and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
 - 3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20.
 - 6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project under and the payments made under stone veneer and stone wall work and shall be considered as full compensation for these requirements.

END OF SECTION

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SECTION 05118 - STEEL & WELDING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish steel indicated on the Drawings, specified herein, and/or needed for proper completion of the Work.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 30 calendar days after the Contractor has received SAWS Notice to Proceed, submit manufacturers' data and installation instructions for proprietary materials including form coatings, ties, and accessories, and manufactured form systems if used.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedures."

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Rolled steel plates and bars: Comply with ASTM A 36.
- B. Steel pipe: Comply with ASTM A53, type E or S, grade B and, where applicable, API-5L, grade B.
- C. Steel tube: Comply with ASTM A501.
- D. Anchor bolts: Comply with ASTM A307, non-headed type with heavy hexagonal nuts unless otherwise indicated.
- E. Unfinished threaded fasteners:
 - 1. Comply with ASTM A307, grade A, regular low carbon steel bolts and nuts.
 - 2. Provide either hexagonal or square heads and nuts; except use only hexagonal units for exposed connections.

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- F. High strength threaded fasteners: Provide heavy hexagonal structural bolts, heavy hexagonal nuts, and hardened washers, all from quenched and tempered medium carbon steel complying with ASTM A 325.
- G. Primer: Use "10-99 Tnemec Primer," "Rustoleum No. 5769 Primer," or equal, approved in advance by the Architect.
- H. Electrodes for welding Comply with AWS Code, using AWS A5.1 or A5.5 E70XX electrodes.

2.2 FABRICATION

- A. Connections:
 - 1. Provide bolts and washers of types and sizes required for completion of field erection.
 - 2. Welded construction: Comply with AWS Code for procedures, appearance, and quality of welds, and methods used in correcting welded work.
 - 3. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
- B. Holes for other work:
 - 1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on the approved Shop Drawings.
 - 2. Provide threaded nuts welded to framing, and other specialty items as shown, to receive other work.
 - 3. Cut, drill, or punch holes perpendicular to metal surfaces.
 - 4. Do not flame cut holes or enlarge holes by burning.
 - 5. Drill holes in bearing plates.

2.3 SHOP PAINTING

- A. General:
 - 1. Shop paint steel work, except those members or portions of members to be embedded in concrete or mortar.
 - 2. Paint embedded steel which is partially exposed on the exposed portions, and the initial 2" of embedded areas only.
 - 3. Do not paint surfaces which are to be welded or high-strength bolted with friction type connections.
 - 4. Apply two coats of paint to surfaces which are inaccessible after assembly or erection. Change color of the second coat to distinguish it from the first.
- B. Surface preparation:
 - 1. After inspection and before shipping, clean steelwork to be painted.
 - 2. Remove loose rust, loose mill scale, and spatter, slag, and flux deposits.
 - 3. Clean steel in accordance with Steel Structures Painting Council SP-3, "Power Tool Cleaning."

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- C. Painting:
 - 1. Immediately after surface preparation, apply structural steel primer paint in accordance with the manufacturer's recommendations and at a rate to provide a uniform dry film thickness.
 - 2. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Comply with AISC specifications and "Code of Standard Practice," except as may be modified herein.
- B. Anchor bolts:
 - 1. Provide anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
 - 2. Provide templates and other devices necessary for pre-setting bolts and anchors to accurate locations.
- C. Bases and bearing plates: Shop weld to columns and members attached to concrete.
- D. Splicing:
 - 1. Splice members only where indicated unless, with the Engineer's approval.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and the payments made under lump sum shall be considered as full compensation for these requirements

END OF SECTION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Deck support angles.
3. Shop welded shear studs
4. Fabrication and installation inspection and testing.
5. Grouting under base plates and bearing plates.

B. Related Sections:

1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
3. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
4. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and other metal items not defined as structural steel.
5. Section 055100 "Metal Stairs."
6. Section 099113 "Exterior Painting for surface-preparation and priming requirements.
7. Section 133419 "Metal Building Systems" for structural steel.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
2. Welded built-up members with plates thicker than 2 inches (50 mm).
3. Column base plates thicker than 2 inches (50 mm).

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1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Use ASD; data are given at service-load level.
- B. Moment Connections: Type FR, fully restrained.
- C. Construction: Moment frame and braced frame combination.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings and erection drawings shall not be made by using reproductions of Contract Drawings.
- C. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 - 5. Identify demand critical welds.
- D. Structural steel members for which Shop Drawings have not been reviewed shall not be fabricated. Engineer's review shall cover general locations, spacings and details of design. Omission from Shop Drawings of any materials required by the Contract Documents shall not relieve the Contractor of the responsibility of furnishing and installing such materials, even though such shop drawings may have been reviewed and returned.
- E. Retain subparagraph below if fabricator is responsible for selecting or completing details of structural-steel connections required to withstand specific design loads. Retain option for jurisdictions that require deferred connection design to be signed and sealed by a specialty structural engineer. Professional engineer qualifications are specified in Section 014000 "Quality Requirements."

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and fabricator.

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- B. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Connection Calculations: Contractor shall design all connections not specifically detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Texas. Submit design calculations for the connections designed prior to or with the steel Shop Drawings. Shop Drawings containing connections for which calculations have not been received shall be returned unchecked as an incomplete submittal. Calculations shall be retained for the Engineer' file and will not be approved or returned.
 - 1. Connections shall be designed in accordance with the requirements specified in the Structural Drawings and Specifications.
 - 2. Beam connections: Submit a complete calculation for each different beam connection used and detailed on the Shop Drawings. Conditions which are similar may be grouped together so as to utilize a single connection design.
 - 3. Submit complete connection calculations for wind brace connections, truss connections, moment connections, and other connections where specified on the Contract Drawings. Each calculation shall identify the location or locations for which the connection applies, the member mark(s) from the Contract Documents, the piece mark(s) from the Shop Drawings, the member size, the design loadings, and the end of the member to which the connection applies.
- D. Welding certificates.
- E. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- F. Mill test reports for structural steel, including chemical and physical properties.
- G. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
 - 5. Shop primers.
 - 6. Nonshrink grout.
- H. Source quality-control reports.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
 - 1. Company specializing in performing the work of this section with a minimum of 5 years documented experience.

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- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.
 - 1. Company specializing in performing the work of this section with a minimum of 10 years documented experience.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Pre-installation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.9 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

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PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Material for W-Shapes, Channels, Angles, Plates and Bars, Cold-Formed Hollow Structural Sections, and Steel Pipe: As specified in the Structural General Notes.
- C. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolt or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
- C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- D. Anchor Rods: ASTM F 1554, Grade 36, unless noted otherwise.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 5. Finish: Plain.
- E. Threaded Rods: ASTM A 36/A 36M.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 - 2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 3. Finish: Plain.

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2.3 PRIMER

- A. Primer: Comply with Division 09 painting sections.
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

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- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

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- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.
 - 3. Galvanize all exposed structural steel members and plates with the exception of painted members.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: SAWS will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

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1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated. Any member having a splice not shown and detailed on the approved Shop Drawings will be rejected.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened, unless noted otherwise.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs], back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: SAWS will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.

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- b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
- 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" Section 099123 "Interior Painting."

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Payments made under the lump sum shall be considered as full compensation for these requirements.

END OF SECTION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes architecturally exposed structural-steel framing.
 - 1. Requirements in Section 051200 "Structural Steel Framing" also apply to AESS framing.
- B. Related Sections:
 - 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Section 051200 "Structural Steel Framing" for additional requirements applicable to AESS.
 - 3. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
 - 4. Section 055100 "Metal Stairs."
 - 5. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" and Section 099600 "High-Performance Coatings" for surface preparation and priming requirements.

1.3 DEFINITIONS

- A. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
- B. Category 1 AESS: AESS that is within 96 inches vertically and 36 inches horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.
- C. Category 2 AESS: AESS that is within 20 feet vertically and horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.
- D. Category 3 AESS: AESS that is not defined as Category 1 or Category 2 or that is designated as "Category 3 architecturally exposed structural steel" or "AESS-3" in the Contract Documents.

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1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Include embedment drawings.
 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 5. Indicate exposed surfaces and edges and surface preparation being used.
 6. Indicate special tolerances and erection requirements.
- B. Samples: Submit samples of AESS to set quality standards for exposed welds for Category 1 AESS.
1. Two steel plates, 3/8 by 8 by 4 inches with long edges joined by a groove weld and with weld ground smooth.
 2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.
 3. Round steel tube or pipe, minimum 8 inches in diameter, with end of another round steel tube or pipe, approximately 4 inches in diameter, welded to its side at a 45-degree angle with a continuous fillet weld and with weld ground smooth and blended.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer/fabricator.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- B. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1, P2, P3, or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.
1. Build mockup of typical portion of AESS as shown on Drawings.
 2. Coordinate finish painting requirements with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

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

E. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 BOLTS, CONNECTORS, AND ANCHORS

- A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 1. Finish: Plain
- B. Corrosion-Resisting (Weathering Steel), Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 3, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

2.2 PRIMER

- A. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

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- B. Primer: SSPC-Paint 25, Type I, or Type II zinc oxide, alkyd, linseed oil primer.
- C. Primer: SSPC-Paint 25 BCS, Type I, or Type II zinc oxide, alkyd, linseed oil primer.
- D. Primer: SSPC-Paint 23, latex primer.
- E. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- F. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- G. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.
- H. Shop Primer for Galvanized Steel: Water-based galvanized metal primer complying with MPI#134.

2.3 FABRICATION

- A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
- B. In addition to special care used to handle and fabricate AESS, comply with the following:
 - 1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 - 2. Grind sheared, punched, and flame-cut edges of Category 1 AESS to remove burrs and provide smooth surfaces and edges.
 - 3. Fabricate Category 1 AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
 - 4. Fabricate Category 1 and Category 2 AESS with exposed surfaces free of seams to maximum extent possible.
 - 5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 - 6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 - 7. Fabricate Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 - 8. Fabricate Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
 - 9. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for Category 1 AESS.
- C. Curved Members: Fabricate indicated members to curved shape by rolling to final shape in fabrication shop.
 - 1. Distortion of webs, stems, outstanding flanges, and legs of angles shall not be visible from a distance of 20 feet under any lighting conditions.
 - 2. Tolerances for walls of hollow steel sections after rolling shall be approximately 1/2 inch.

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- D. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for Category 1 AESS.
- E. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- F. Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.4 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
 - 2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
 - 3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where Category 1 AESS is exposed to weather.
 - 4. Provide continuous welds of uniform size and profile where Category 1 AESS is welded.
 - 5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch for Category 1 and Category 2 AESS.
 - 6. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
 - 7. At locations where welding on the far side of an exposed connection of Category 1 and Category 2 AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
 - 8. Make fillet welds for Category 1 and Category 2 AESS oversize and grind to uniform profile with smooth face and transition.

2.5 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
 3. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.6 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials.
 5. Galvanized surfaces.
- B. Surface Preparation for Nongalvanized Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
 3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
 4. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
 5. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
 8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
 9. SSPC-SP 8, "Pickling."
- C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel erector present, elevations of concrete-bearing and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.
 - 2. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 - 1. Erect Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 - 2. Erect Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
- B. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.

2. Orient bolt heads in same direction for each connection and to maximum extent possible in same direction for similar connections.
- B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
 2. Remove erection bolts in Category 1 and Category 2 AESS, fill holes, and grind smooth.
 3. Fill weld access holes in Category 1 and Category 2 AESS and grind smooth.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: SAWS will engage a qualified independent testing and inspecting agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency will not be responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

- A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- D. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Payments made under the lump sum shall be considered as full compensation for these requirements.

END OF SECTION

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PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Miscellaneous steel framing and supports.
 - 2. Prefabricated building columns.
 - 3. Shelf angles.
 - 4. Loose bearing and leveling plates.
 - 5. Steel weld plates and angles.
 - 6. Loose steel lintels.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Prefabricated building columns.
 - 2. Metal nosings and treads.
 - 3. Grout.
- B. Shop Drawings: Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Templates: For anchors and bolts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
 - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

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2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.
- B. Ferrous Metals:
 - 1. Steel Plates, Shapes, and Bars: ASTM A 36.
 - 2. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.
 - 3. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
 - 4. Steel Tubing: ASTM A 500, cold-formed steel tubing.
 - 5. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

2.3 FASTENERS

- A. General: Type **304 or 316** stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Cast-in-Place Anchors in Concrete: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI #79.
- B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
 - 1. Products:
 - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
 - b. Carboline Company; Carbozinc 621.
 - c. ICI Devoe Coatings; Catha-Coat 313.
 - d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
 - e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
 - f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
 - g. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- C. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for regalvanizing welds in steel.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

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- E. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.5 FABRICATION

- A. General: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
 - 1. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
 - 2. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.
 - 3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
 - 4. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
 - 5. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 24 inches o.c.
- B. Miscellaneous Framing and Supports: Provide steel framing and supports not specified in other Sections as needed to complete the Work. Fabricate units from steel shapes, plates, and bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Fabricate steel girders for wood frame construction from continuous steel shapes. Where wood nailers are attached to girders with bolts or lag screws, drill holes at 24 inches o.c.
 - 2. Fabricate steel pipe columns for supporting wood frame construction with steel baseplates and top plates welded to pipe with fillet welds the same size as pipe wall thickness.
- C. Prefabricated Building Columns: Assemblies of load-bearing structural-steel members protected by insulating concrete fireproofing encased in an outer non-load-bearing steel shell and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for ratings indicated, based on testing according to ASTM E 119.
- D. Loose Steel Lintels: Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
 - 1. Lintels in Exterior Walls:
- E. Shelf Angles: Fabricate shelf angles of sizes indicated and for attachment to framing. Fabricate with horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c.
 - 1. Shelf Angles in Exterior Walls: **Prime with zinc-rich primer.**
 - 2. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

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- F. Loose Bearing and Leveling Plates: Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts.
- G. Miscellaneous Steel Trim: Fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Exterior Miscellaneous Steel Trim: **Galvanize**

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 COORDINATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.3 INSTALLATION

- A. General:
 - 1. Set work accurately into position, plumb, level, true, and free from rack.
 - 2. Anchor firmly into position.
 - 3. Where field welding is required, comply with AWS recommended procedures of manual-shielded metal-arc welding for appearance and quality of weld and for methods to be used in correcting welding work.
 - 4. Grind exposed welds smooth, and touch up shop prime coats.
 - 5. Do not cut, weld, or abrade surfaces which have been hot-dip galvanized after fabrication and which are intended for bolted or screwed field connections.
- B. Immediately after erection, clean the field welds, bolted connections, and abraded areas of shop priming. Paint the exposed areas with same material used for shop priming.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Payments made under the lump sum shall be considered as full compensation for these requirements

END OF SECTION

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SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Framing with dimension lumber.
2. Framing with timber.
3. Framing with engineered wood products.
4. Rooftop equipment bases and support curbs.
5. Wood blocking, cants, and nailers.
6. Wood furring and grounds.
7. Wood sleepers.
8. Utility shelving.
9. Plywood backing panels.

- B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 2 Section "Termite Control" for site application of borate treatment to wood framing.
3. Division 6 Section "Heavy Timber Construction."
4. Division 6 Section "Sheathing."
5. Division 6 Section "Metal-Plate-Connected Wood Trusses."

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Timber: Lumber of 5 inches nominal or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 2. NLGA: National Lumber Grades Authority.

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3. RIS: Redwood Inspection Service.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.
- C. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

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PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPAC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC31 with inorganic boron (SBX).
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat items indicated on Drawings, and the following:

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1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness.
- B. Interior Partitions: No. 3 grade of any species.
- C. Exterior and Load-Bearing Walls: No.3 grade and any of the following species:
 1. Southern pine; SPIB.
 2. Mixed southern pine; SPIB.
 3. Douglas fir-south; WWPA.
 4. Douglas fir-larch (north); NLGA.
- D. Ceiling Joists (Non-Load-Bearing): No. 3 grade of any species.
- E. Joists, Rafters, and Other Framing Not Listed Above: Select Structural grade and any of the following species:
 1. Southern pine; SPIB.
 2. Douglas fir-south; WWPA.
- F. Exposed Framing to Receive a Stained Finish: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 1. Species and Grade: As indicated above for load-bearing construction of same type.
 2. Species and Grade: Southern pine, Select Structural grade; SPIB.
 3. Species and Grade: Douglas fir-south; Select Structural grade; WWPA.
 4. Species and Grade: Western cedars, Select Structural grade; WCLIB, or WWPA.

2.4 TIMBER FRAMING

- A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:
 1. Species and Grade: Douglas fir-south; Select Structural grade; NLGA, WCLIB, or WWPA.

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2. Maximum Moisture Content: 20 percent.
3. Additional Restriction: Free of heart centers.

2.5 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Boise Cascade Corporation.
 - b. Finnforest USA.
 - c. Georgia-Pacific.
 - d. Louisiana-Pacific Corporation.
 - e. Pacific Woodtech Corporation.
 - f. Roseburg Forest Products Co.
 - g. Weldwood of Canada Limited; Subsidiary of International Paper Corporation.
 - h. Weyerhaeuser Company.
3. Extreme Fiber Stress in Bending, Edgewise: reference structural drawings and the latest version of the International Building Code.
4. Modulus of Elasticity, Edgewise: reference structural drawings and the latest version of the International Building Code.

B. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- depth members.
3. Modulus of Elasticity, Edgewise: 2,200,000 psi

2.6 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

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1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
 7. Utility shelving.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber with 19 percent maximum moisture content of any species.
- C. For exposed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 2. Mixed southern pine, No. [1] grade; SPIB.
 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine, No. 3 grade; SPIB.
 2. Northern species, No. 3 Common grade; NLGA.
 3. Western woods, Standard or No. 3 Common grade; WCLIB or WWPA.
- E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.8 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

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1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.
- H. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- I. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 1. Use for interior locations where stainless steel is not indicated.
- J. Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.
 1. Thickness: 0.050 inch
- K. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
 1. Strap Width: 1-1/2
 2. Thickness: 0.050
- L. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.
- M. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

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1. Width: 3/4 inch
 2. Thickness: 0.050 inch
 3. Length: As indicated.
- N. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.
- O. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.
- P. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base. As indicated on structural drawings.
- Q. Wall Bracing: As indicated on structural drawings

2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports, unless otherwise indicated.

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- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

- F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 84 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 84 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

- H. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.

- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
 - 4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
 - 5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 - 6. Table R602.3 (1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

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- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - 2. Use finishing nails, unless otherwise indicated. Countersink nail heads and fill holes with wood filler at all exposed wood brackets

3.2 WOOD, GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring vertically at 24 inches o.c.
- C. Furring to Receive Gypsum Board and wood decking: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction, unless otherwise indicated.
 - 1. For exterior walls, provide 2-by-6-inch nominal- size wood studs spaced 16 inches o.c., unless otherwise indicated.

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2. For interior partitions and walls, provide 2-by-4-inch nominal- size wood studs spaced 24 inches o.c., unless otherwise indicated.
 3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, and anything greater than 72" reference structural drawings.
 2. Retain subparagraph above or below if applicable. Revise if single-jamb studs are acceptable.
 3. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated on structural drawings.

3.5 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:
1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.
- C. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.
- D. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.
- E. Lap members framing from opposite sides of beams, girders, or partitions not less than 8 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- F. Provide solid blocking between joists under jamb studs for openings.

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- G. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 - 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- H. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.
 - 1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- size lumber, double-crossed and nailed at both ends to joists.
 - 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.6 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 - 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.7 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

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- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and the payments made and shall be considered as full compensation for these requirements

END OF SECTION

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PART 1 - GENERAL

1.01 DESCRIPTION

A. General:

1. Furnish all labor, material, tools, equipment and services for all preformed roofing as indicated, in accord with provisions of Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
4. See Division 1 for General Requirements.

B. Related work specified elsewhere:

1. Flashing and sheet metal: Section 07600.

1.02 QUALITY ASSURANCE

A. Applicable Standards:

1. SMACNA: "Architectural Sheet Metal Manual", Sheet Metal and Air Conditioning Contractors National Association, Inc.
2. LGSI: "Light Gage Structural Institute"
3. AISC: "Steel Construction Manual", American Institute of Steel Construction.
4. AISI: "Cold Form Steel Design Manual", American Iron and Steel Institute (1996 Edition).
5. UL580: "Tests for Uplift Resistance of Roof Assembles", Underwriters Laboratories, Inc.
6. ASTM E 1592-95: "Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference", American Society for Testing and Materials
7. UL2218: Class 4 Impact Resistance Rating
8. Dade County (Florida) Acceptance Report Number 01-0221.02. (Craftsman SB Only)
9. ASTM E 283-84: "Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen", American Society for Testing and Materials. Contact MBCI for the proper combination of panel gauge, clip type, clip spacing and substructure to achieve a UL-90 rated system.
10. ASTM E 331-83: "Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference", American Society for Testing and Materials. ASTM A 792-83-AZ50 (Painted) & ASTM A792-83-AZ55 (Bare Galvalume Plus®): "Specifications for Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot Dip Process, General Requirements (Galvalume®)", American Society for Testing and Materials

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11. ASTM E 408-71: Standard Test Method for Total Normal Emittance of Surfaces Using Inspection- Meter Techniques. (Energy Star for Roof Products).
12. ASTM E 903-96 Standard Test Method for Solar Absorptance, Using Integrating Spheres. (Energy Star for Roof Products)

B. Manufacturer's Qualifications:

1. Manufacturer has a minimum of five years experience in manufacturing metal roof systems of this nature. Panels specified in this section shall be produced in a factory environment (not with a portable roll former with fixed-base roll forming equipment) and in line leveling assuring the highest level of quality control. A letter from the manufacturer certifying compliance will accompany the product material submittals.

C. Installation Contractor's Qualifications:

1. Installation contractor shall be an approved installer, certified by the manufacturer before the beginning of installation of the metal roof system, specifically for MBCI's Craftsman™ metal roof system, Certification by manufacturer must include the following:
 - a. Maintain \$250,000 minimum general liability insurance coverage.
 - b. Maintain statutory limits of worker's compensation coverage as mandated by law.
 - c. Have no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.
 - d. Has not filed for protection from creditors under any state or federal insolvency or debtor relief statutes or codes.
 - e. Project foreman is the person having received certification by the manufacturer specific training in the proper installation of the selected metal roof system and will be present to supervise whenever material is being installed. Specific certified installer program shall include the following:
 - f. The instructor must have a minimum of 10 years' experience in the application of metal roof systems.
 - g. A formal syllabus for the classroom and hands-on training.
 - h. Classroom instruction with review and thorough understanding of the specific product's technical manual.
 - i. Hands-on mock-up instruction with a review and thorough understanding of the specific product's details.
 - j. The installation contractor must pass a written and oral exam.
 - k. Provide five references from five different architects or building S A W S s for projects that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.
 - l. Provide certification letter that installation contractor has a minimum of three years of metal product installation experience immediately preceding the date upon which work is to commence.

D. Pre-Installation Conference:

1. Prior to installation of roofing system, conduct a pre-installation conference at the project site.
2. Attendance: S A W S , Architect, Contractor, Project Superintendent, and Certified Installer
3. Agenda:
 - a. Roofing details and agenda
 - b. Critical work sequencing and review of phasing plan
 - c. Inspection sequencing

1.03 SYSTEM PERFORMANCE REQUIREMENTS

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A. Performance

Testing:

1. Metal roof system must be tested in accordance with Underwriters Laboratories, Inc. (UL) Test Method 580 “Tests for Uplift Resistance of Roof Assemblies”.
2. Metal roof system must be installed in accordance with UL Construction Method 280 or 310 (Small Batten) . See the current UL Roofing Materials and Systems Directory for requirements of each Construction Method.
3. Panel clip spacing will not exceed spacing specified in the UL Construction Method and must be designed to meet requirements of specified building codes and design loads.
4. Metal roof system must be tested in accordance with ASTM E 1592-95 for negative loading. Determine panel bending and clip-to-panel strength by testing in accordance with ASTM E 1592-95 procedures. Capacity for gauge, span or loading other than those tested may be determined by interpolating between test values only.
5. Small Batten Metal roof system must be tested in accordance with ASTM E 283-84 “Standard Test Method for Air Infiltration” with a uniform static air pressure differential of 4 psf. The resulting air infiltration leakage rate will be a minimum of 16.5" Small Batten (0.035 cfm/sq ft.).
6. Small Batten Metal roof system must be tested in accordance with ASTM E 331-83 “Standard Test Method for Water Penetration” with a uniform static air pressure differential of 4 psf. The resulting water penetration rate will be no uncontrollable water leakage when five gallons of water per hour is sprayed per square foot of roof area (five gallons per hour equates to 8 inches of rainfall per hour).
7. Metal Roof Panels shall be high reflectance and high emittance in accordance with Energy Star . Initial Reflectance (Galvalume Only) shall be at least 0.68 when tested with ASTM E- 903. The three year aged reflectance shall be at least 0.57, when tested in accordance with ASTM E-1918 (Measured As Solar Reflectivity, Not Visible Reflectance).

1.04 DESIGN REQUIREMENTS

A. Roof Design

Loads:

1. Design criteria shall be in accordance with the most current version of the IBC or an applicable l or local building code.
2. Dead Loads
 - a. The dead load shall be the weight of the SSMR system. Collateral loads, such as sprinklers, mechanical and electrical systems, and ceilings shall not be attached to the panels.
3. Live Loads
 - a. The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 20 psf.
4. Roof Snow Loads
 - a. The design roof snow loads shall be as shown on the contract drawings.
5. Wind Loads
 - a. The design wind uplift pressure for the roof system shall be as shown on the contract drawings. The design uplift force for each connection assembly shall be that pressure given for the area under consideration, multiplied by the tributary load area of the connection assembly. The safety factor listed below shall be applied to the design force and compared against the ultimate capacity. Prying shall be considered when calculating fastener design loads.

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- x Single fastener in each connection: 3.00
- x Two or more fasteners in each connection: 2.25
- x

6. Thermal Loads

- a. Roof panels shall be free to move in response to the expansion and contraction forces resulting from a total temperature range of 135 degrees F during the life of the structure.

B. Framing Members Supporting the SSMR System

- 1. Any additions/revisions to framing members supporting the SSMR system to accommodate the manufacturer/fabricator's design shall be the Contractor's responsibility and shall be submitted for review and approval. Maximum deflection under applied live load, snow or wind load shall not exceed $L/180$, of the span length.

1.05 SUBMITTALS

A. Shop Drawings:

- 1. Submit complete shop drawings and erection details, approved by the metal roofing manufacturer, to the architect for review. Do not proceed with manufacture of roofing materials prior to review of shop drawings and field verification of all dimensions. Do not use drawings prepared by the architect for shop or erection drawings.
- 2. Shop drawings show methods of erection, roof and wall panel layout, sections and details, anticipated loads, flashings, sealants, interfaces with all materials not supplied and proposed identification of component parts and their finishes.

B. Performance Tests:

- 1. Submit certified test results by a recognized testing laboratory or manufacturer's lab (witnessed by a professional engineer) in accordance with specified test methods for each panel system.

C. Calculations:

- 1. Submit engineering calculations defining all cladding loads for all roof areas based on design criteria listed in Para 1.04 Design Requirements, allowable clip loads and required number of fasteners to secure the panel clips to the designated substructure.
- 2. Compute uplift loads on clip fasteners with full recognition of prying forces and eccentric clip loading.
- 3. Calculate holding strength of fasteners in accordance with submitted test data provided by the fastener manufacturer based on length of embedment and properties of materials.
- 4. Submit thermal calculations and details of floating clip, flashing attachments, and accessories certifying the free movement in response to the expansion/ contraction forces resulting from a total temperature differential of 110 degrees F.

D. Samples:

- 1. Submit samples and color chips for all proposed finishes.
 - a. Submit one 8-inch long sample of panel, including clips.
 - b. Submit two 3 inches x 5 inch color chip samples in color selected by the architect.

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E. Warranties:

Metal roof system manufacturer shall submit a specimen copy of the warranty upon final acceptance of the project. Provide one of the following warranties.

1. Finish:

- a. Covering bare metal against rupture, structural failure and perforation due to normal atmospheric corrosion exposure for a period of 20 years.
- b. Covering panel finish against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading for a period of twenty 20 years.

2. Weathertightness:

- a. Metal roof system manufacturer shall submit a specimen copy of manufacturer's Weathertightness Warranty, including evidence of application for warranty and manufacturer's acceptance of the applicator and warranty conditions.
- b. Standard Warranty

A. Test Reports:

1. Submit Test Reports showing that metal panels have been tested in accordance with the Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference of ASTM E 1592-95.
2. Submit Test Reports showing that metal panels meet the air infiltration requirements of ASTM E 283-84 "Standard Test Method for Air Infiltration" with a uniform static air pressure differential of 4 psf. The resulting air infiltration leakage rate will be a minimum 16.5" Small -0.035 cfm/sq ft
3. Submit Test Reports showing that metal panels meet the water penetration requirements of ASTM E 331-83 "Standard Test Method for Water Penetration" with a uniform static air pressure differential of 4 psf. The resulting water penetration rate will be no uncontrollable water leakage when five gallons of water per hour is sprayed per square foot of roof area (five gallons per hour equates to 8 inches of rainfall per hour.)

B. Metal Roof System Fabrication Certification:

1. Submit a letter from the metal roof system manufacturer certifying the Craftsman™ panels have been produced in a factory environment (not job site roll formed) with fixed-base roll forming equipment and in line leveling.

C. Certified Installers Qualifications:

1. Submit certificate from manufacturer certifying that installer of the metal roof system has met all of the criteria outlined in "1.02 C. Installer's qualifications" and is an authorized installer certified by the manufacturer.
2. Submit the formal syllabus for the classroom and hands-on training.
3. Submit five references from five different architects or building SAWS for projects that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver metal roof system to job site properly packaged to provide protection against transportation damage.

B. Handling:

1. Exercise extreme care in unloading, storing and erecting metal roof system to prevent bending, warping,

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twisting and surface damage.

C. Storage:

1. Store bundled sheets off the ground sufficiently high enough to allow air circulation beneath bundle and to prevent rising water from entering bundle. Slightly elevate one end of bundle. Prevent rain from entering bundle by covering with tarpaulin, making provision for air circulation between draped edges of tarpaulin and the ground. Prolonged Storage of sheets in a bundle is not recommended. If conditions do not permit immediate erection, extra care should be taken to protect sheets from staining or watermarks.

1.07 WEATHERTIGHTNESS
WARRANTY

A. The Contractor shall provide to SAWS , a Standard warranty signed by the roofing manufacturer of the Craftsman High Batten Standing Seam Roof System as outlined below:

B. Single Source Warranty: Single Source Warranties require a certified installer on site at all times.

1. For a period of, fifteen (15), years from the date of substantial completion, the roofing manufacturer WARRANTS to the Building to SAWS : to furnish roof panels, flashing and related items used to fasten the roof panels and flashing including roof jack and curb attachments to the roof structure, will not allow intrusion of water from the exterior of the roofing manufacturer's Roof System into the building envelope when exposed to ordinary weather conditions and ordinary wear and usage. The Date of substantial completion is the date that is certified by the Architect, SAWS Representative, when the roofing manufacturer's Roofing System is completed and accepted by or on behalf of SAWS .
2. Manufacturer's Field Service
 - a. Dur i n g installation, provide for two on-site inspections of roof application by qualified technical representative of the manufacturer.
 - b. Upo n completion of installation, provide final inspection by a technical representative of roofing manufacturer to confirm that roofing system has been installed in accordance with manufacturer's requirements.
3. The roofing manufacturer shall have the SOLE AND EXCLUSIVE obligation for all warranty work commencing on the date of substantial completion and under all circumstances terminates on the [# insert appropriate number of years] year anniversary of the date certified as Substantial Completion of the roofing manufacturer's Roof System. During the period in which the roofing manufacturer has any warranty obligation, the roofing manufacturer shall take appropriate actions necessary to cause the non-performing portions of the Roof System to perform their proper functions.
4. Roofing Manufacturer's Liability:

The total liability of the roofing manufacturer under Single Source warranty is (# choose one), Single Source I, limited solely to two (2) times the cost of the roofing manufacturer's Roof System as invoiced to the roofing manufacturer's customer. Single Source II, limited solely to four (4) times the cost of the roofing manufacturer's Roof System as invoiced to the roofing manufacturer's customer. Single Source III, a no dollar limit of the manufacturers Roof System as invoiced to the roofing manufacturer's customer.

C. Standard Warranty:

1. For a period of [#choose one: twenty (20), fifteen (15), ten (10), or five (5)] years from the date of substantial completion, the roofing manufacturer WARRANTS to the Building SAWS (" SAWS ") that the roofing manufacturer's furnished roof panels, flashing, and related items used to fasten the roof panels

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and flashing to the roof structure ("Roof System") will not allow intrusion of water from the exterior of the roofing manufacturer's Roof System into the building envelope, when exposed to ordinary weather conditions and ordinary wear and usage. The Date of substantial completion is the date that is certified by the Architect, SAWS Representative, when the roofing manufacturer's Roofing System is completed and accepted by or on behalf of SAWS .

2. The Roofing Installer shall have the sole and exclusive obligation for all warranty work commencing on the date of substantial completion up to and until the roof system has performed leak free for (24) consecutive months. The sole and exclusive obligation for all warranty work commencing on the date the roof has been leak free for (24) consecutive months and under all circumstances terminates on the [# insert # of years] anniversary of the date certified as substantial completion of the roofing manufacturers roof system.
3. Roofing Manufacturer's Liability:
The total liability of the roofing manufacturer under Standard warranty is (# choose one): Standard I, Limited solely to \$.20 sq. ft. of the actual roof area Standard II, limited solely to the Invoice Amount for the roof system (panels, fasteners, trim and accessories) to its customer. (No structural material, freight or taxes included) Standard III, a no dollar limit of the manufacturers Roof System as invoiced to the roofing manufacturers customer. Standard III requires a certified installer on the job site at all times.

PART 2 - PRODUCTS

[# Craftsman™ architectural standing seam metal roof system; minimum slope of 3:12]

2.01 MATERIALS

Metal roof system profile: A. Metal roof system profile: A.

1. 1 inch high x $\frac{3}{8}$ -inch wide battens (Small Batten-SB) x [# choose one: 12 inch, 16½ inch] wide panels.
 2. 2 inch high x 2-inch wide battens (Large Batten-LB) x [# choose one: 12 inch, 16½ inch] wide panels.
 3. 2 inch high x 3/8-inch wide battens (High Batten-HB) x [# choose one: 12 inch, 16½ inch] wide panels.
- B. Metal roof system style:
1. Snap on batten with factory applied mastic. (# Small Batten or High Batten only)
 2. Concealed fastener.
- C. Gauge:
1. (22 gauge) (UL-90 rated-Underwriters Laboratories)
- D. Substrate:
1. Galvalume sheet steel, 0.5-ounces/square foot, minimum yield 50,000 PSI.
- E. Clip:
- [# choose one]
1. One piece clip with factory applied mastic, 1 inch high by 1 inch wide by 2 inches long with one guide hole in the bottom to accommodate a clip fastener (Small Batten).
 2. One piece clip, 2 inches high by 1-5/16 inch wide by 2 inches long with guide holes in the bottom to

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accommodate a clip fastener (Large Batten).

3. One piece clip with factory applied mastic, 2 inches high by 1 inch wide by 2 inches long with a guide hole in the bottom to accommodate a clip fastener (High Batten).

F. Texture:

1. Smooth

G. Finish:

1. Bare Galvalume Plus (20 year warranty).

H. Color:

1. Selected from metal roof system manufacturers standard offering.

I. Acceptable manufacturer:

1. MBCI - Houston, TX - (281) 445-8555.

J. Other manufacturers desiring approval, comply with Section 630. Acceptable Curb and Equipment Support units:

1. LM Curbs - Longview, TX.

L. Prefabricated Roof Jacks:

1. SFS- INTECH - Wyomissing, PA.
2. ITW Buildex - Itasca, IL.

M. Rooftop Walkways:

1. LM Curbs - Longview, TX.

2.02 MISCELLANEOUS
MATERIALS

A. Fasteners:

1. All self-tapping/self-drilling fasteners, bolts, nuts, self-locking rivets and other suitable fasteners shall be designed to withstand specified design loads.
2. Use long life fasteners for all interior and exterior metal roof system applications.
3. Provide fasteners with a factory applied coating in a color to match metal roof system application.
4. Provide neoprene washers under heads of exposed fasteners.
5. Locate and space all exposed fasteners in a true vertical and horizontal alignment. Use proper torque settings to obtain controlled uniform compression for a positive seal without rupturing the neoprene washer.

B. Accessories:

1. Provide all components required per the metal roof system manufacturer's approved shop drawings for a complete metal roof system to include panels, panel clips, trim/flashing, fascias, ridge, closures, sealants, fillers and any other required items.

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- a. All outside closures will be fabricated from Galvalume Plus® or Painted Galvalume sheet steel of the same gauge, finish and color as the panels.
- b. All tape seal is to be a pressure sensitive, 100 percent solids, and polyisobutylene compound sealing tape with a release paper backing. Provide permanently elastic, non-sagging, non-toxic, non-staining tape seal approved by the metal roof system manufacturer.
- c. All joint sealant is to be a one-part elastomeric polyurethane sealant approved by the metal roof system manufacturer.

2.03 FABRICATION

- A. Material shall be in-line leveled prior to roll forming the panel profile.
- B. Where possible, roll form panels in continuous lengths, full length of detailed runs.
- C. Standard panel length shall be no more than 40 feet long for 22 gauge and 24 gauge. (For longer length availability, contact manufacturer).
- D. Fabricate trim/flashing and accessories to detailed profiles.
- E. Fabricate trim/flashing from same material as panel.

2.04 PREFABRICATED CURBS AND EQUIPMENT SUPPORTS

- A. Comply with loading and strength requirements as indicated where units support work of other trades. Coordinate dimensions of curbs and supports with equipment supplier/manufacturer.
- B. Fabricate curbs of structural quality aluminum (Min. .080 in. thickness for mechanical gear up to 1000 lbs; .125 in. thickness for mechanical gear between 1000 lbs. and 2000 lbs.; use a two curb system per the manufacturer above 2000 lbs.), factory primed and prepared for painting with mitered and welded corner joints. Provide integral cap cells and water diverter crickets. The upper flange of the curb must be a minimum of 18" above the water diverter. (This allows 12" of free area after the panel is lapped over the flange on the high side.) Curbs shall be designed to install under metal roof system on the high side and over metal roof system on the low side.
- C. Minimum height of prefabricated curb will be 8 inches above the finished metal roof system.
- D. Curbs shall be constructed to match the slope of the roof and provide a level top surface for mounting equipment.
- E. Curb flanges must be constructed to match the configuration of the metal roof panels and extend to a panel rib on each side. Minimum distance between curb wall and panel rib is 6".
- F. Curb manufacturer will provide their own curb structural support system that can be installed between the purlins that will allow proper thermal movement of the curb with the roofing system.
- G. Submit roof curb manufacturer's shop drawings to metal roof system manufacturer for review prior to fabrication (refer to metal roof system manufacturer's standard installation details). Metal roof system manufacturer will review roof curb manufacturer's shop drawings for compatibility with metal roof system.

2.05 PREFABRICATED ROOF JACKS

- A. Pipe flashings shall be a one piece [# choose one: EPDM (ethylene propylene diene monomer) molded rubber boot having a serviceable temperature range of -65°F to 212°F (for standard applications) or silicone molded rubber boot having a serviceable temperature range of -100°F to 437°F (for high temperature applications)] and shall be resistant to ozone and ultraviolet rays. Units shall have an aluminum flanged base ring. Do not install pipe flashings through any panel seams - install ONLY in the flat portion of the panel.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examination:
 - 1. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.
 - 2. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions. This specifically includes verifying that secondary structural members and/or decking are installed to meet UL and building code requirements. Coordinate with metal roof system manufacturer to insure that reduced clip spacings at eave, rake, ridge and corner areas are accommodated.
- B. Discrepancies:
 - 1. In event of discrepancy, notify the architect (SAWS).
 - 2. Do not proceed with installation until discrepancies have been resolved.

3.02 INSTALLATION

- A. Install metal roof system so that it is weathertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
- B. Install metal roof system in accordance with manufacturer's instructions and shop drawings.
- C. Provide concealed anchors at all panel attachment locations.
- D. Install panels plumb, level and straight with seams and ribs parallel, conforming to design as indicated.

3.03 ROOF CURB INSTALLATION

- A. Comply with metal roof system manufacturer's shop drawings, instructions and recommendations for installation of roof curbs. Refer to metal roof system manufacturer's standard installation details. Anchor curbs securely in place with provisions for thermal and structural movement.

3.04 CLEANING, PROTECTION

- A. Dispose of excess materials and remove debris from site.

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- B. Clean work in accordance with manufacturer's recommendations.
- C. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the architect (SAWS), any work that becomes damaged prior to final acceptance.
- D. Touch up minor scratches and abrasions with touch up paint supplied by the metal roof system manufacturer.
- E. Do not allow panels or trim to come in contact with dissimilar metals such as copper, lead or graphite. Water run-off from these materials is also prohibited. This specifically includes condensate from roof top units. A/C units.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and shall be considered as full compensation for these requirements

END OF SECTION

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SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following sheet metal flashing and trim:

1. Manufactured through-wall flashing.
2. Manufactured reglets.
3. Formed roof drainage system.
4. Formed low-slope roof flashing and trim.
5. Formed steep-slope roof flashing and trim.
6. Formed wall flashing and trim.
7. Formed equipment support flashing.
8. Formed overhead-piping safety pans.

- B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for installing reglets.
2. Division 4 Section "Unit Masonry Assemblies" for installing through-wall flashing, reglets, and other sheet metal flashing and trim.
3. Division 5 Section "Architectural Joint Systems" for manufactured sheet metal expansion-joint covers.
4. Division 6 Section "[Rough Carpentry] [Miscellaneous Carpentry]" for wood nailers, curbs, and blocking.
5. Division 7 Section "<Insert Section title for roof shingles, shakes, or tiles>" for installing sheet metal flashing and trim integral with roofing.
6. Division 7 Section "Metal Roof Panels" for factory-formed metal roof panels and flashing and trim not part of sheet metal flashing and trim.
7. Division 7 Section "Metal Wall Panels" for factory-formed metal wall panels and flashing and trim not part of sheet metal flashing and trim.
8. Division 7 Section "<Insert Section title for type of membrane roofing system>" for installing sheet metal flashing and trim integral with roofing membrane.
9. Division 7 Section "Sheet Metal Roofing" for custom-formed sheet metal roofing and flashing and trim not part sheet metal flashing and trim.
10. Division 7 Section "Manufactured Roof Specialties" for manufactured roof specialties not part of sheet metal flashing and trim.
11. Division 7 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

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12. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Fabricate and install [roof edge flashing] [and] [copings] capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
1. Wind Zone 1: For velocity pressures of 10 to 20 lbf/sq. ft. (0.48 to 0.96 kPa): 40-lbf/sq. ft. (1.92-kPa) perimeter uplift force, 60-lbf/sq. ft. (2.87-kPa) corner uplift force, and 20-lbf/sq. ft. (0.96-kPa) outward force.
 2. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44 kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-lbf/sq. ft. (1.44-kPa) outward force.
 3. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft. (1.48 to 2.15 kPa): 90-lbf/sq. ft. (4.31-kPa) perimeter uplift force, 120-lbf/sq. ft. (5.74-kPa) corner uplift force, and 45-lbf/sq. ft. (2.15-kPa) outward force.
 4. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft. (2.20 to 4.98 kPa): 208-lbf/sq. ft. (9.96-kPa) perimeter uplift force, 312-lbf/sq. ft. (14.94-kPa) corner uplift force, and 104-lbf/sq. ft. (4.98-kPa) outward force.
- C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
1. Identify material, thickness, weight, and finish for each item and location in Project.

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2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
 4. Details of expansion-joint covers, including showing direction of expansion and contraction.
- C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Sheet Metal Flashing: 12 inches (300 mm) long. Include fasteners, [cleats,] [clips,] closures, and other attachments.
 2. Trim: 12 inches (300 mm) long. Include fasteners and other exposed accessories.
 3. Accessories: Full-size Sample.

1.5 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
1. Copper Standard: Comply with CDA's "Copper in Architecture Handbook."
- B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical roof eave[, including built-in gutter] [fascia] [fascia trim] [apron flashing], approximately 48 inches (1200 mm) long, including supporting construction cleats, seams, attachments[, underlayment,] and accessories.
 2. Approval of mockups is for other material and construction qualities specifically approved by Architect in writing.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
1. Meet with SAWS , Architect, insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
 2. Review methods and procedures related to sheet metal flashing and trim.

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3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Products: Subject to compliance with requirements, provide one of the products specified.
 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METALS

- A. Copper Sheet: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet.
- B. Lead-Coated Copper Sheet: ASTM B 101, Temper H00 and H01, cold-rolled copper sheet, of weight (thickness) indicated below, coated both sides with lead weighing not less than 12 lb/100

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sq. ft. (0.59 kg/sq. m) nor more than 15 lb/100 sq. ft. (0.73 kg/sq. m) of copper sheet (total weight of lead applied equally to both sides).

- C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
1. Mill Finish: [One-side] [Standard one-side] [Standard two-sides] bright.
 2. Alclad Finish: Metallurgically bonded surfacing to both sides, forming a composite aluminum sheet with reflective luster.
 3. Factory Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil (0.005 mm).
 4. Siliconized-Polyester Coating: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
 - a. Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
 5. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA [2604] [2605].
 - b. Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil (0.038 mm); complying with AAMA 2605.
 - 1) Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
 6. Anodized Finish: Apply the following coil-anodized finish:
 - a. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
 - b. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

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- c. Class II, Color Anodic Finish: AA-M12C22A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
 - d. Class I, Color Anodic Finish: AA-M12C22A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - 1) Color: [Light bronze] [Medium bronze] [Dark bronze] [Black].
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- 1. Finish: No. [2D (dull, cold rolled)] [2B (bright, reflective)] [3 (reflective, polished directional satin)] [4 (fine reflective, polished directional satin)].
- E. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed stainless-steel sheet, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
- 1. Product: Subject to compliance with requirements, provide "TCS II" by Follansbee Steel.
- F. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality [, mill phosphatized for field painting].
- G. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality [with manufacturer's standard clear acrylic coating both sides].
- H. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
- 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
 - 3. Exposed Finishes: Apply the following coil coating:
 - a. Factory Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil (0.005 mm).
 - b. Siliconized-Polyester Coating: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
 - 1) Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].

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- c. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA [2604] [2605], except as modified below:
 - a) Humidity Resistance: [1000] [2000] hours. b) Salt-Spray Resistance: [1000] [2000] hours.
 - 2) Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil (0.038 mm); complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
 - a) Humidity Resistance: [1000] [2000] hours. b) Salt-Spray Resistance: [1000] [2000] hours.
 - 3) Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].

I. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.

J. Zinc Sheet: Electrolytic, 99 percent pure zinc alloyed with 1 percent titanium and copper.

1. Finish: [Bright rolled] [Preweathered].

2.3 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.

B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

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- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Nails for Copper Sheet: Copper, hardware bronze, or Series 300 stainless steel, 0.109 inch (2.8 mm) minimum and not less than 7/8 inch (22 mm) long, barbed with large head.
 - 2. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 3. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 4. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
 - 5. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- C. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- D. Solder for Lead-Coated Copper: ASTM B 32, Grade Sn60, 60 percent tin and 40 percent lead.
- E. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- F. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.
- G. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- H. Solder for Zinc: ASTM B 32, 60 percent lead and 40 percent tin with low antimony, as recommended by manufacturer.
- I. Burning Rod for Lead: Same composition as lead sheet.
- J. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- K. Elastomeric Sealant: ASTM C 920, elastomeric [polyurethane] [polysulfide] [silicone] polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- L. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- M. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- N. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- O. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

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2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch (75-mm) intervals along length of flashing to provide an integral mortar bond. [Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing.]
1. Copper: 10 oz. (0.34 mm thick) minimum for fully concealed flashing; 16 oz. (0.55 mm thick) elsewhere.
 - a. Products:
 - 1) Advanced Building Products Inc.; Cop-R-Loc Interlocking Flashing.
 - 2) Cheney Flashing Company, Inc.; Cheney Flashing (Dovetail).
 - 3) Cheney Flashing Company, Inc.; Cheney Flashing (Sawtooth).
 - 4) Dur-O-Wal, Dayton Superior Corporation; Polytite Copper Flashing.
 - 5) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
 - 6) Sandell Manufacturing Company, Inc.; Three-Way Saw Tooth Flashing.
 - 7) York Manufacturing, Inc.; Cop-R-Loc Interlocking Flashing.
 2. Stainless Steel: 0.0156 inch (0.4 mm) thick.
 - a. Products:
 - 1) Cheney Flashing Company, Inc.; Cheney Flashing (Dovetail).
 - 2) Cheney Flashing Company, Inc.; Cheney Flashing (Sawtooth).
 - 3) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
 - B. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated[with factory-mitered and -welded corners and junctions].
 1. Manufacturers:
 - a. Cheney Flashing Company, Inc.
 - b. Fry Reglet Corporation.
 - c. Heckmann Building Products Inc.
 - d. Hickman, W. P. Company.
 - e. Keystone Flashing Company, Inc.
 - f. Sandell Manufacturing Company, Inc.
 2. Material: [Stainless steel, 0.0187 inch (0.5 mm) thick] [Copper, 16 oz./sq. ft. (0.55 mm thick)] [Lead-coated copper, 17.2 oz./sq. ft. (0.60 mm thick)] [Aluminum, 0.024 inch (0.6 mm) thick] [Galvanized steel, 0.0217 inch (0.55 mm) thick].

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3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
7. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
8. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with [elastomeric] [butyl] sealant concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual"[and FMG Loss Prevention Data Sheet 1-49] for application but not less than thickness of metal being secured.

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2.7 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers,[gutter bead reinforcing bars,] and gutter accessories from same metal as gutters.
1. Gutter Style: [A] [B] [C] [D] [E] [F] [G] [H] [I] [J].
 2. Expansion Joints: [Lap type] [Butt type] [Built in].
 3. Accessories: [Continuous removable leaf screen with sheet metal frame and hardware cloth screen] [Bronze wire ball downspout strainer] [Wire ball downspout strainer] [Valley baffles].
 4. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following material:
 - a. Copper: [16 oz./sq. ft. (0.55 mm thick)].
 - b. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)] .
 - c. Aluminum: [0.0320 inch (0.8 mm)] thick.
 - d. Stainless Steel: [0.0156 inch (0.4 mm)] thick.
 - e. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] thick.
 - f. Galvanized Steel: [0.0217 inch (0.55 mm)] thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] thick.
 - h. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] thick.
 - i. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] thick.
 5. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following material:
 - a. Copper: [16 oz./sq. ft. (0.55 mm thick)].
 - b. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)] .
 - c. Aluminum: [0.040 inch (1.0 mm)] thick.
 - d. Stainless Steel: [0.0187 inch (0.5 mm)] thick.
 - e. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] thick.
 - f. Galvanized Steel: [0.0276 inch (0.7 mm)] thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm)] thick.
 - h. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] thick.
 - i. Zinc: [0.040 inch (1.0 mm)] [0.050 inch (1.2 mm)] thick.
 6. Gutters with Girth 21 to 25 Inches (530 to 640 mm): Fabricate from the following material:

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- a. Copper: [20 oz./sq. ft. (0.7 mm thick)].
 - b. Lead-Coated Copper: [21.2 oz./sq. ft. (0.75 mm thick)].
 - c. Aluminum: [0.050 inch (1.2 mm)] thick.
 - d. Stainless Steel: [0.0250 inch (0.65 mm)] thick.
 - e. Zinc-Tin Alloy-Coated Stainless Steel: [0.0250 inch (0.65 mm)] thick.
 - f. Galvanized Steel: [0.0336 inch (0.85 mm)] thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: [0.0336 inch (0.85 mm)] < thick.
 - h. Prepainted, Metallic-Coated Steel: [0.0336 inch (0.85 mm)] thick.
 - i. Zinc: [0.050 inch (1.2 mm)] thick.
7. Gutters with Girth 26 to 30 Inches (660 to 760 mm): Fabricate from the following material:
- a. Copper: [24 oz./sq. ft. (0.82 mm thick)].
 - b. Lead-Coated Copper: [25 oz./sq. ft. (0.87 mm thick)].
 - c. Aluminum: [0.063 inch (1.6 mm)] thick.
 - d. Stainless Steel: [0.0312 inch (0.8 mm)] thick.
Galvanized Steel: [0.040 inch (1.0 mm)] thick.
 - f. Prepainted, Metallic-Coated Steel: [0.040 inch (1.0 mm)] thick.
8. Gutters with Girth 31 to 35 Inches (790 to 890 mm): Fabricate from the following material:
- a. Copper: [24 oz./sq. ft. (0.82 mm thick)].
 - b. Lead-Coated Copper: [25 oz./sq. ft. (0.87 mm thick)].
 - c. Stainless Steel: [0.0375 inch (0.95 mm)] thick.
Galvanized Steel: [0.0516 inch (1.3 mm)] thick.
 - e. Prepainted, Metallic-Coated Steel: [0.0516 inch (1.3 mm)] thick.
- B. Built-in Gutters: Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Fabricate expansion joints and accessories from same metal as gutters, unless otherwise indicated.
1. Fabricate gutters with built-in expansion joints[and gutter-end expansion joints at walls].
 2. Accessories: [Continuous removable leaf screen with sheet metal frame and hardware cloth screen] [Bronze wire ball downspout strainer] [Wire ball downspout strainer].
 3. Fabricate built-in gutters from the following material:
 - a. Copper: [16 oz./sq. ft. (0.55 mm thick)].
 - b. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)].
 - c. Stainless Steel: [0.0156 inch (0.4 mm)] thick.

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- d. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)]thick.
 - e. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm) thick.
- C. Downspouts: Fabricate [round] [rectangular] [open-face] downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
- 1. Manufactured Hanger Style:
 - 2. Fabricate downspouts from the following material:
 - a. Copper: [16 oz./sq. ft. (0.55 mm thick).
 - b. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)
 - c. Aluminum: [0.024 inch (0.6 mm) thick.
 - d. Stainless Steel: [0.0156 inch (0.4 mm) thick.
 - e. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm) thick.
 - f. Galvanized Steel: [0.0217 inch (0.55 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)]thick.
 - h. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)]thick.
 - i. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm) thick.
- D. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
- 1. Fabricate parapet scuppers from the following material:
 - a. Copper: [16 oz./sq. ft. (0.55 mm thick).
 - b. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)
 - c. Aluminum: [0.0320 inch (0.8 mm) thick.
 - d. Stainless Steel: [0.0187 inch (0.5 mm) thick.
 - e. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)]thick.
 - f. Galvanized Steel: [0.0276 inch (0.7 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm)]thick.
 - h. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm) thick.
 - i. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm) thick.
- E. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes[, exterior flange trim] [, and] [built-in overflows].
- 1. Fabricate conductor heads from the following material:

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- a. Copper: [16 oz./sq. ft. (0.55 mm thick).
- b. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick).
- c. Aluminum: [0.0320 inch (0.8 mm) thick.
- d. Stainless Steel: [0.0156 inch (0.4 mm) thick.
- e. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)thick.
- f. Galvanized Steel: [0.0276 inch (0.7 mm) thick.
- g. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm) thick.
- h. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)thick.
- i. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm) thick.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Furnish with 6-inch- (150-mm-) wide joint cover plates.
 - 1. Joint Style: [Lap, 4 inches (100 mm) wide] [Butt, with 12-inch- (300-mm-) wide concealed backup plate] [Butt, with 6-inch- (150-mm-) wide exposed cover plates] [Butt, with 12-inch- (300-mm-) wide concealed backup plate and 6-inch- (150-mm-) wide exposed cover plates].
 - 2. Fabricate with scuppers spaced 10 feet (3 m) <Insert spacing> apart, of dimensions required with 4-inch- (100-mm-) wide flanges and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 - 3. Fabricate scuppers from the following material:
 - a. Copper: [20 oz./sq. ft. (0.7 mm thick).
 - b. Lead-Coated Copper: [21.2 oz./sq. ft. (0.75 mm thick).
 - c. Aluminum: [0.050 inch (1.2 mm)thick.
 - d. Stainless Steel: [0.0187 inch (0.5 mm) thick.
 - e. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)thick.
 - f. Galvanized Steel: [0.0276 inch (0.7 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm) thick.
 - h. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)thick.
 - i. Zinc: [0.050 inch (1.2 mm)] [0.060 inch (1.5 mm) thick.
- B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and[drill elongated holes for fasteners on] interior leg. Miter corners, seal, and solder or weld watertight.

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1. Joint Style: [Butt, with 12-inch- (300-mm-) wide concealed backup plate] [Butt, with 6-inch- (150-mm-) wide exposed cover plates] [Butt, with 12-inch- (300-mm-) wide concealed backup plate and 6-inch- (150-mm-) wide exposed cover plates].
2. Fabricate copings from the following material:
 - a. Copper: [24 oz./sq. ft. (0.82 mm thick).
 - b. Lead-Coated Copper: [25 oz./sq. ft. (0.87 mm thick).
 - c. Aluminum: [0.050 inch (1.2 mm) thick.
 - d. Stainless Steel: [0.0250 inch (0.65 mm)thick.
 - e. Zinc-Tin Alloy-Coated Stainless Steel: [0.0250 inch (0.65 mm) thick.
 - f. Galvanized Steel: [0.0396 inch (1.0 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: [0.0396 inch (1.0 mm)thick.
 - h. Prepainted, Metallic-Coated Steel: [0.0396 inch (1.0 mm)thick.
 - i. Zinc: [0.050 inch (1.2 mm)] [0.060 inch (1.5 mm)thick.

C. [Roof] [and] [Roof to Wall Transition] [Roof to Sheet Metal Roof Edging Transition] Expansion-Joint Cover: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick).
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick).
3. Aluminum: [0.050 inch (1.2 mm) thick.
4. Stainless Steel: [0.0250 inch (0.65 mm) thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.0250 inch (0.65 mm)thick.
6. Galvanized Steel: [0.0336 inch (0.85 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0336 inch (0.85 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0336 inch (0.85 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick. D. Base

Flashing: Fabricate from the following material:

1. Copper: [20 oz./sq. ft. (0.7 mm thick)..
2. Lead-Coated Copper: [21.2 oz./sq. ft. (0.75 mm thick)..
3. Aluminum: [0.040 inch (1.0 mm)] ,thick.
4. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
6. Galvanized Steel: [0.0276 inch (0.7 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick. E.

Counterflashing: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.0320 inch (0.8 mm)] ,thick.

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4. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
6. Galvanized Steel: [0.0217 inch (0.55 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

F. Flashing Receivers: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.0320 inch (0.8 mm)] ,thick.
4. Stainless Steel: [0.0156 inch (0.4 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] ,thick.
6. Galvanized Steel: [0.0217 inch (0.55 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

G. Roof-Penetration Flashing: Fabricate from the following material:

1. Lead: [4.0 lb/sq. ft. (1.6 mm thick).., hard tempered.
2. Copper: [16 oz./sq. ft. (0.55 mm thick)..
3. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
4. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
6. Galvanized Steel: [0.0276 inch (0.7 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick. H. Splash

Pans: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.040 inch (1.0 mm)] ,thick.
4. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
6. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

I. Roof-Drain Flashing: Fabricate from the following material:

1. Lead: [4.0 lb/sq. ft. (1.6 mm thick).., hard tempered.
2. Copper: [13.2 oz./sq. ft. (0.45 mm thick)..
3. Lead-Coated Copper: [12 oz./sq. ft. (0.4 mm thick)..
4. Stainless Steel: [0.0156 inch (0.4 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] ,thick.

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2.9 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.0320 inch (0.8 mm)] ,thick.
4. Stainless Steel: [0.0156 inch (0.4 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] ,thick.
6. Galvanized Steel: [0.0217 inch (0.55 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

B. Valley Flashing: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
5. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
6. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick. C. Drip Edges:

Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.0320 inch (0.8 mm)] ,thick.
4. Stainless Steel: [0.0156 inch (0.4 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] ,thick.
6. Galvanized Steel: [0.0217 inch (0.55 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick. D. Eave, Rake[,

Ridge, and Hip] Flashing: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.0320 inch (0.8 mm)] ,thick.
4. Stainless Steel: [0.0156 inch (0.4 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] ,thick.
6. Galvanized Steel: [0.0217 inch (0.55 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

E. Base Flashing: Fabricate from the following material:

1. Copper: [20 oz./sq. ft. (0.7 mm thick)..

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2. Lead-Coated Copper: [21.2 oz./sq. ft. (0.75 mm thick)..
3. Aluminum: [0.040 inch (1.0 mm)] ,thick.
4. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
6. Galvanized Steel: [0.0276 inch (0.7 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

Counterflashing: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.0320 inch (0.8 mm)] ,thick.
4. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
6. Galvanized Steel: [0.0217 inch (0.55 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick. G. Flashing

Receivers: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.0320 inch (0.8 mm)] ,thick.
4. Stainless Steel: [0.0156 inch (0.4 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] ,thick.
6. Galvanized Steel: [0.0217 inch (0.55 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick. H. Roof-

Penetration Flashing: Fabricate from the following material:

1. Lead: [4.0 lb/sq. ft. (1.6 mm thick).., hard tempered.
2. Copper: [16 oz./sq. ft. (0.55 mm thick)..
3. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
4. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
6. Galvanized Steel: [0.0276 inch (0.7 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

2.10 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12 foot (3.6 m) long, sections, under copings, at shelf angles, and where

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indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings. Form with 2-inch- (50-mm-) high end dams. Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Stainless Steel: [0.0156 inch (0.4 mm)] ,thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] ,thick.
5. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

B. Openings Flashing in Frame Construction: Fabricate head, sill,[jamb,] and similar flashings to extend [4 inches (100 mm)] <Insert extension> beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high end dams. Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.0320 inch (0.8 mm)] ,thick.
4. Stainless Steel: [0.0156 inch (0.4 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.015 inch (0.4 mm)] ,thick.
6. Galvanized Steel: [0.0217 inch (0.55 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0217 inch (0.55 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick. C. Wall

Expansion-Joint Cover: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Aluminum: [0.040 inch (1.0 mm)] ,thick.
4. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
5. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
6. Galvanized Steel: [0.0276 inch (0.7 mm)] ,thick.
7. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
8. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
9. Zinc: [0.031 inch (0.80 mm)] [0.040 inch (1.0 mm)] ,thick.

2.11 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following material:

1. Copper: [16 oz./sq. ft. (0.55 mm thick)..
2. Lead-Coated Copper: [17.2 oz./sq. ft. (0.60 mm thick)..
3. Stainless Steel: [0.0187 inch (0.5 mm)] ,thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [0.018 inch (0.5 mm)] ,thick.
5. Galvanized Steel: [0.0276 inch (0.7 mm)] ,thick.
6. Aluminum-Zinc Alloy-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.
7. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] ,thick. B. Overhead-

Piping Safety Pans: Fabricate from the following material:

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1. Copper: [24 oz./sq. ft. (0.82 mm thick)..
2. Lead-Coated Copper: [25 oz./sq. ft. (0.87 mm thick)..
3. Stainless Steel: [0.0250 inch (0.65 mm)] ,thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [0.0250 inch (0.65 mm)] <Insert thickness> thick.
5. Galvanized Steel: [0.0396 inch (1.0 mm)] ,thick.
6. Prepainted, Metallic-Coated Steel: [0.0276 inch (0.7 mm)] ,thick.

2.12 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

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1. Coat side of [uncoated aluminum] [stainless-steel] [and] [lead] sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and [elastomeric] [butyl] sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
1. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with [elastomeric] [butyl] sealant concealed within joints.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
 2. Aluminum: Use aluminum or stainless-steel fasteners.
 3. Copper: Use copper, hardware bronze, or stainless-steel fasteners.
 4. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with elastomeric sealant as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Prein edges of sheets to be soldered to a width of 1-1/2 inches (38 mm) except where pretinned surface would show in finished Work.

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1. Do not solder [prepainted, metallic-coated steel] [and] [aluminum] sheet.
2. Pretinning is not required for [lead-coated copper] [zinc-tin alloy-coated stainless steel] [and] [lead].
3. Stainless-Steel Soldering: Pretin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
4. Copper Soldering: Tin uncoated copper surfaces at edges of sheets using solder recommended for copper work.
5. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.
6. Lead-Coated Copper Soldering: Wire brush edges of sheets before soldering.
7. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with [elastomeric] [butyl] sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored [gutter brackets] [straps] spaced not more than 36 inches (900 mm) apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Fasten gutter spacers to front and back of gutter.
 2. Loosely lock straps to front gutter bead and anchor to roof deck.
 3. Anchor and loosely lock back edge of gutter to continuous [cleat] [eave or apron flashing].
 4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches (600 mm) apart.
 5. Anchor gutter with spikes and ferrules spaced not more than [24 inches (600 mm)] [30 inches (750 mm)] apart.
 6. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.24 m) apart. Install expansion joint caps.
 7. Install continuous gutter screens on gutters with noncorrosive fasteners, [removable] [hinged to swing open] for cleaning gutters.
- C. Built-in Gutters: Join sections with riveted and soldered or lapped joints sealed with [elastomeric] [butyl] sealant. Provide for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.
1. Install felt underlayment layer in built-in gutter trough and extend to drip edge at eaves and under felt underlayment on roof sheathing. Lap sides a minimum of 2 inches (50 mm) over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end

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- laps between succeeding courses at least 72 inches (1830 mm). Fasten with roofing nails. Install slip sheet over felt underlayment.
2. Anchor and loosely lock back edge of gutter to continuous [cleat] [eave or apron flashing].
 3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches (600 mm) apart.
 4. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.24 m) apart. Install expansion joint caps.
- D. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.
1. Provide elbows at base of downspout to direct water away from building.
 2. Connect downspouts to underground drainage system indicated.
- E. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
 2. Loosely lock front edge of scupper with conductor head.
 3. Seal or solder exterior wall scupper flanges into back of conductor head.
- F. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch (25 mm) below [scupper] [gutter] discharge.
- G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches (100 mm) in direction of water flow.
- H. Splash Pans: Install where downspouts discharge on low-sloped roofs. Set in [asphalt roofing cement] [elastomeric sealant] [butyl sealant] compatible with roofing membrane.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements[, sheet metal manufacturer's written installation instructions,] and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at [24-inch (600-mm)] [16-inch (400-mm)] <Insert spacing> centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.

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1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at [24-inch (600-mm)] [16-inch (400-mm)] <Insert spacing> centers.
 2. Anchor interior leg of coping with screw fasteners and washers at [24-inch (600-mm)] [20-inch (500-mm)] [18-inch (450-mm)] <Insert spacing> centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for [elastomeric] [butyl] sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with [elastomeric] [butyl] sealant.
1. Secure in a waterproof manner by means of [snap-in installation and sealant or lead wedges and sealant] [interlocking folded seam or blind rivets and sealant] [anchor and washer at 36-inch (900-mm) centers].
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 2. Seal with [elastomeric] [butyl] sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of [manufactured] [formed] through-wall flashing is specified in Division 4 Section "[Unit Masonry Assemblies] [Stone Veneer Assemblies]."
- C. Reglets: Installation of reglets is specified in Division [3 Section "Cast-in-Place Concrete] [4 Section "Unit Masonry Assemblies]."
- D. Openings Flashing in Frame Construction: Install continuous head, sill,[jamb,] and similar flashings to extend [4 inches (100 mm)] <Insert extension> beyond wall openings.

3.6 MISCELLANEOUS FLASHING INSTALLATION

- A. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.

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- B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with [elastomeric] [butyl] sealant to equipment support member.

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and shall be considered as full compensation for these requirements

END OF SECTION 07620

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SEALANTS AND CAULKING-07920

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SECTION 07920 - SEALANTS AND CAULKING

PART 1 - GENERAL

1.1 SUMMARY

- A. Throughout the work, seal and caulk joints where shown on the drawings and elsewhere as required to provide a positive barrier against passage of moisture and passage of air.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of General Conditions, Division 1.
- B. Product data: Within 45 calendar days after the Contractor has received SAWS Notification to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.
- C. Samples: Upon request of the Engineer, submit Samples of each sealant, each backing materials, each primer, and each bond breaker proposed to be used.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01620
- B. Do not retain at the job site material which has exceeded the shelf life recommended by its manufacturer.

PART 2 - PRODUCTS

2.1 SEALANTS

- A. Provide the following sealants, or equals approved in advance by the Engineer, where called for on the Drawings or otherwise required for a complete and proper installation.
 - 1. Sealant Type A:

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- a. Self-leveling, complying with ASTM C920-79, grade P, class 25
 - b. Acceptable products:
 - 1) "Vulkem 45, one-part;"
 - 2) "Vulkem 245, two-part;"
 - 2. Sealant Type B:
 - a. Non-sag, complying with ASTM C920-79, type S, grade NS, class 25, use NT, M, A, and 0
 - b. Acceptable products:
 - 1) "Vulkem 116, one-part;"
 - 2) "Vulkem 921, one-part;"
 - 3. Sealant Type C:
 - a. Non-sag, complying with ASTM C920-79, type S, grade NS, class 25, use NT, T, M, A, and 0
 - b. Acceptable products:
 - 1) "Vulkem 227, two-part;"
 - 2) "Vulkem 922, two-part;"
 - 4. Sealant Type D:
 - a. Silicone (vertical surfaces only), complying with Fed Spec TT-S-01543A, class A, low modulus;
 - b. Acceptable products:
 - 1) "Dow Corning 790 Sanitary Sealant"
 - 5. Sealant Type E:
 - a. Acrylic latex, complying with ASTM C834-76
 - b. Acceptable products:
 - 1) "Pecora AC 20"
- B. For other services, provide products especially formulated for the proposed use and approved in advance by the Engineer.
- C. Colors:
- 1. Colors for each sealant installation will be selected by the Engineer from standard colors normally available from the specified manufacturer.
 - 2. Should such standard color not be available from an approved substitute manufacturer except at additional charge, provide such colors at no additional cost to SAWS .
 - 3. In concealed installations, and in partially or fully exposed installations where so approved by the Engineer, use standard gray or black sealant.

2.2 PRIMERS

- A. Use only those primers which have been tested for durability on the surfaces to be sealed and are specifically recommended for this installation by the manufacturer of the sealant used.

2.3 BACKUP MATERIALS

- A. Use only those backup materials which are non-absorbent, non-staining, and specifically recommended for this installation by the manufacturer of the sealant used.

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2.4 MASKING TAPE

- A. For masking around joints, provide an appropriate masking tape which will effectively prevent application of sealant on surfaces not scheduled to receive it, and which is removable without damage to substrate.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Concrete and ceramic tile surfaces:
 - 1. Install only on surfaces, which are dry, sound, and well brushed, wiping free from dust.
 - 2. At open joints, remove dust by mechanically blown compressed air if so required.
 - 3. To remove oil and grease, use sandblasting or wire brushing.
 - 4. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.
 - 5. Remove laitance and mortar from joint cavities.
- B. Steel surfaces:
 - 1. Steel surfaces in contact with sealant:
 - a. Sandblast as required to achieve acceptable surface for bond.
 - b. If sandblasting is not practical, or would damage adjacent finish, scrape the metal or wire brush to remove mill scale and rust.
 - c. Use solvent to remove oil and grease, wiping the surfaces with clean white rags only.
 - 2. Remove protective coatings on steel by sandblasting or by using a solvent which leaves no residue.
- C. Aluminum surfaces:
 - 1. Aluminum surfaces in contact with sealant:
 - a. Remove temporary protective coatings, dirt, oil, and grease.
 - b. When masking tape is used for protective cover, remove the tape just prior to applying the sealant.
 - 2. Use only such solvents to remove protective coatings as are recommended for that purpose by the manufacturer of the aluminum work, and which are non-staining.

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3.3 INSTALLATION OF BACKUP MATERIAL

- A. When using backup of tube or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock.
- B. Installation tool:
 - 1. For installation of backup material, provide a blunt-surfaced tool of wood or plastic, having shoulders designed to ride on the adjacent finished surface and a protrusion of the required dimensions to assure uniform depth of backup material below the sealant.
 - 2. Do not, under any circumstance, use a screwdriver or similar tool for this purpose.
 - 3. Using the approved tool, smoothly and uniformly place the backup material to the depth indicated on the Drawings or otherwise required, compressing the backup material 25% to 50% and securing a positive fit.

3.4 PRIMING

- A. Use only the primer approved by the Engineer for the particular installation, applying in strict accordance with the manufacturer's recommendations as approved by the Engineer.

3.5 BOND-BREAKER INSTALLATION

- A. Provide an approved bond-breaker where recommended by the manufacturer of the sealant, and where directed by the Engineer, adhering strictly to the manufacturers' installation recommendations.

3.6 INSTALLATION OF SEALANTS

- A. Prior to start of installation in each joint, verify the joint type according to details on the Drawings, or as otherwise directed by the Engineer, and verify that the required proportion of width of joint to depth of joint has been secured.
- B. Equipment:
 - 1. Apply sealant under pressure with power-actuated handgun or manually operated handgun, or by other appropriate means.
 - 2. Use guns with nozzle of proper size, and providing sufficient pressure to completely fill the joints as designed.
- C. Thoroughly and completely mask joints where the appearance of primer or sealant on adjacent surfaces would be objectionable.
- D. Install the sealant in strict accordance with the manufacturer's recommendations, thoroughly filling joints to the recommended depth.
- E. Tool joints to the profile shown on the Drawings, or as otherwise required if such profiles are not shown on the Drawings.
 - 1. Provide uniformly smooth joints with slightly concave surface.
 - 2. Do not use tooling agent unless specifically so recommended in writing by the manufacturer of the sealant.

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- F. Cleaning up:
1. Remove masking tape immediately after joints have been tooled.
 2. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.
 3. Upon completion of the work of this Section, promptly remove from the job site all debris, empty containers, and surplus material derived from this portion of the Work.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and the payments made under lump sum shall be considered as full compensation for these requirements

END OF SECTION

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ANTI-GRAFFITI COATING - 09860
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PART 1 GENERAL

1.1 DESCRIPTION

- A. Provide all labor, materials, equipment and services to apply anti-graffiti coatings on interior and/or exterior wall surfaces and elsewhere where noted or indicated on the Contract Drawings, as specified hereinafter and as needed for a complete and proper installation.

1.2. RELATED WORK

- A. Painting in Section 09900.

1.3 SUBMITTALS

- A. Comply with applicable provisions of SECTION 01330 of DIVISION 1 - GENERAL REQUIREMENTS of these Specifications.
- B. Product Data: Within 40 calendar days after the Contractor has received the City's "Notice to Proceed" submit the following:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Landscape Architect will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 QUALITY ASSURANCE

- A. Labor: The applicator shall be a certified installer of the manufacturer. Use adequate numbers of skilled craft persons who are thoroughly trained by CSL and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Coordination with manufacturer: Contractor shall contact the manufacturer prior to bidding the Work so as to become familiarized with current costs, application procedures and notification requirements.
- C. Job report: Applicator shall complete and file a "Job Report" with manufacturer certifying conformance of application procedures and quantities to the manufacturer's requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with pertinent provisions of Section 01620 - STORAGE AND PROTECTION

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DIVISION 1 - GENERAL REQUIREMENTS of these Specifications.

- B. Delivery: Deliver materials to the job-site in unopened suitable packaging properly identified with the manufacturer's labels indicating manufacturer's name, product name and model number.
- C. Storage: Store materials in a suitable location where directed by the Landscape Architect in original unopened containers in compliance with manufacturer's printed instructions. Store in a location under cover, safe from weather and damage by construction operations.
- D. Protection: Use all reasonable means necessary to protect materials before, during and after installation. In the event of damage to specified items, immediately make necessary repairs and/or replacements to the full approval of the Landscape Architect, at no added cost to the City.
- E. Inspect: Inspect for approval before containers are opened and any condemned materials to be removed from the job-site.

1.6 GENERAL REQUIREMENTS

- A. Warranty: Comply with provisions of the GENERAL CONDITIONS of these Specifications which shall include a 12-month warranty period which covers parts and labor; effective date of the warranty being the date of acceptance by the City.
- B. Guarantee: The Contractor shall also furnish the City with a written guarantee, which guaranties that during a period of five (5) years from the date of acceptance by the City the coating will not turn white, peel, chip or crack. The Contractor will without additional cost to the City, promptly make any repairs required as a result of ordinary wear and tear of the elements, and further guaranties that any defective material or Work shall be properly repaired or replaced without additional cost to the City.
- C. Extra Stock of Materials: Upon completion of anti-graffiti coating application at the job- site provide the City with 5 gallons of the anti-graffiti coating and 10 gallons of remover used on the project

PART 2 PRODUCTS

2.1 ACCEPTABLE MATERIALS

- A. Materials shall be the products of one manufacturer and be either the ones upon which the design is based on the products of the manufacturer approved in advance by the Landscape Architect in accordance with applicable conditions in the GENERAL CONDITIONS.
- B. Material shall be the appropriate type as recommended by the manufacturers (hereinafter named) or provide an equal product of another manufacturer approved in advance by the Landscape Architect.

2.2 ACCEPTABLE PRODUCTS

- A. Subject to compliance with specified requirements, anti-graffiti coatings

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shall be one of the following products, "or pre-approved equal:".

1. CSL Silicones Inc. SI-Coat 531 and 532

Contact Information: CSL Silicones Inc. 144 Woodlawn Road West
Guelph, ON N1H 1B5 Canada T + 1 519.836.9044 F + 1
519.836.9069 TF + 1 800.265.2753

2.3 MATERIAL PERFORMANCE CRITERIA

- A. Completed graffiti protection shall include the following performance criteria:

1. Shall have a flat non-glossy appearance.
2. Shall be non-yellowing and contain no waxes, urethane or other yellowing resins.
3. Shall cause little or no change in the appearance of the treated surface.
4. Shall allow moisture vapor transmission.
5. Can be non-sacrificial, permanent graffiti barrier.
6. Shall be renewable and repairable.
7. Be 100 % effective in removing all graffiti on masonry surfaces.
8. Dirt pickup shall be decreased by coating.
9. Manufacturer will warrant product performance.
10. Product shall be VOC compliant.
12. Product shall be capable by manufacturer's literature of withstanding 5 years exterior exposure without significant loss of protection, other than spot restoration of areas attacked by graffiti, cleaned, and re-coated per written instructions of manufacturer.
13. Anti-graffiti treatment must be resistant to rain, weather, abrasion, peel, ultra- violet, and be clear and non-yellowing.
14. Anti-graffiti treatment should be able to withstand repeated removal of all types of paint and other graffiti materials with little or no defacement of or change to the original surface.

- B. Any submitted product must be applied to sample area and have the test listed under "C" below performed.

- C. After application of materials, a field demonstration or test will be performed to the satisfaction of City which will include:

1. Spray paint applied to material to simulate graffiti attack.
2. Attack allowed to stand 14 days before removal.

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3. Removal by manufacturer's recommended process shall determine that at least 98% of the graffiti has been removed.

D. Anti-Graffiti Locations:

1. Full height of all exterior exposed surfaces, excluding paving and roofs.
 2. Include monument signs, interpretive signs, seating benches, tables, trash containers, ash urns, etc.
 3. On all exterior steel doors and frames.
 4. On all exterior wall mounted plaques and signs.
- E. Per manufactures recommendations install surface sealant where recommended and at rate recommended.

2.4 EQUIPMENT

- A. All clear materials shall be applied by airless spray equipment per manufactures recommendations.

PART 3 EXECUTION

3.1 INSPECTION OF CONDITIONS

- A. Examine the areas and conditions on which materials of this Section will be applied. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed with contracted Work of this Section until such detrimental conditions are corrected. . All detrimental conditions shall be corrected as directed and approved by the Landscape Architect, before proceeding with Work of this Section. Start of installation operations shall imply Contractor's acceptance of job conditions.

3.2 ENVIRONMENTAL CONDITIONS

- A. Do not proceed with application of anti-graffiti materials when the ambient temperature is less than 45 degrees F., when low temperature of 40 degrees F. or less is predicted within a period of 24 hours, or if rain is expected in the next 24 hours.
- B. Do not apply materials in rainy conditions or within 5 days after surfaces have become wet from rainfall or other moisture.

3.3 APPLICATION

- A. Preparation of Surface (As applicable):
 1. Do not commence application until surface is structurally sound, clean, dry, and free from excess dust, loose paint, greasy stains and efflorescence.
 2. Cleaning: Before applying coatings, clean substrates of dirt, dust,

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3. Removal by manufacturer's recommended process shall determine that chalking, grease, oil, release agents, curing compounds, laitance and other substances that could impair bond of coatings according to manufacturer's recommendations.
 3. Form oils should be completely removed.
 4. All cracks, voids, beeholes or mortar shrinkage shall be properly repaired and primed if necessary to make the surface uniform.
 5. Allow substrate to dry and age at least 3 weeks before applications of anti-graffiti coating.
 6. Seal all porous surfaces as recommended by the manufacture a minimum of 48 hours before application of anti-graffiti coating material.
 7. If using over a previously paint coated surface apply a small amount in an inconspicuous place to check for lifting.
 8. Remove existing graffiti with graffiti remover or approval equal.
 9. Applicator/Contractor to use the application tools and methods as recommended by the coating manufacturer and approved by the Landscape Architect.
 10. Applicator/Contractor is responsible for daily application of a small test area on surface to be coated before starting daily general application to assure desired results, especially if there have been temperature changes during application.
- B. Application of Anti-Graffiti Coating
1. Coverage: Apply materials at rate per square foot recommended by the material manufacturer and agreed to by the Landscape Architect.
- C. Protection: Applicator shall be responsible for protection of this and all adjacent Work from damage during application with drop cloths or other suitable materials.
1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings.
- D. Cleaning:
1. Cleanup: At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 - a. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
 - b. Fully cured coating is environmentally safe and can be disposed in a legal manner at local landfills, with landfill's verification of product.

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- E. Repairs: Any soiling of the Work of this Section shall be repaired by the installer of the anti-graffiti material as approved by the Landscape Architect at no added cost to the City
- F. Contractor shall carefully remove all protection materials from adjacent surfaces and any residue resulting from this operation. Completely remove overspray and spills as soon as possible before curing and excess materials from the job-site.
- G. Remove all excess materials, equipment, rubbish and debris from the job-site. All areas in the library structure used by the Contractor to be left in a clean and safe condition.

3.4 FIELD QUALITY CONTROL

- A. SAWS may 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.
 - 1. Testing agency will perform appropriate tests for the following characteristics as required by SAWS :
 - a. Materials analysis
 - b. Washability
 - 2. Remove noncomplying coating materials from Site, pay for testing, and recoat surfaces coated with rejected materials. If necessary, remove rejected materials from previously coated surfaces if, on recoating, the two coatings are not compatible.
- B. Demonstration: Apply alkyd-based graffiti to a 2 ft. sq. treated area selected by the Architect and allow to cure for a minimum of 5 days. After curing, demonstrate complete removal of the graffiti in the presence of the Architect and SAWS.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and shall be considered as full compensation for these requirements

END OF SECTION

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SECTION 09912 - PAINTING (PROFESSIONAL LINE PRODUCTS)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 35 calendar days after the Contractor has received SAWS " Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Product Data: For each product indicated.
 - 4. Samples: For each type of finish-coat material indicated.

1.3 QUALITY ASSURANCE

- A. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5.
 - 1. Wall Surfaces: Provide samples on at least 100 sq. ft.
 - 2. Small Areas and Items: Architect will designate items or areas required.
 - 3. Final approval of colors will be from benchmark samples.

1.4 PROJECT CONDITIONS

- A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
- B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

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1.5 EXTRA MATERIALS

- A. Extra materials may not be allowed for publicly funded projects.
- B. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to SAWS .
 - 1. Quantity: 5 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.
- C. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Benjamin Moore & Co. (Benjamin Moore).
 - 2. ICI Dulux Paint Centers (ICI Dulux Paints).
 - 3. Kelly-Moore Paint Co. (Kelly-Moore).
 - 4. Sherwin-Williams Co. (Sherwin-Williams).

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Colors: As selected from manufacturer's full range. Indicate paint colors in a separate schedule or show location and extent on Drawings. The number of colors used on a project and use of deep-tone colors will affect Project cost. See the Evaluations in Division 9 Section "Painting."

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2.3 PREPARATORY COATS

- A. Concrete Unit Masonry Block Filler: High-performance latex block filler of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
- B. Exterior Primer: Exterior alkyd or latex-based primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
 - 1. Ferrous-Metal and Aluminum Substrates: Rust-inhibitive metal primer.
 - 2. Zinc-Coated Metal Substrates: Galvanized metal primer.
 - 3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat. Revise below if alkyd products are not allowed and coordinate with finish coats selected.
- C. Interior Primer: Interior latex-based or alkyd primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
 - 1. Ferrous-Metal Substrates: Quick drying, rust-inhibitive metal primer.
 - 2. Zinc-Coated Metal Substrates: Galvanized metal primer.
 - 3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

2.4 EXTERIOR FINISH COATS

- A. Exterior Flat Acrylic Paint:
 - 1. Benjamin Moore; Moorcraft Super Spec Flat Latex House Paint No. 171.
 - 2. ICI Dulux Paints; 2200-XXXX Dulux Professional Exterior 100 Percent Acrylic Flat Finish.
 - 3. Kelly-Moore; 1205 Color Shield Exterior Flat Acrylic House Paint.
 - 4. Sherwin-Williams; A-100 Exterior Latex Flat House & Trim Paint A6 Series.
- B. Exterior Low-Luster Acrylic Paint:
 - 1. Benjamin Moore; Moorcraft Super Spec Low Lustre Latex House Paint No. 185.
 - 2. ICI Dulux Paints; 2402-XXXX Dulux Professional Exterior 100 Percent Acrylic Satin Finish.
 - 3. Kelly-Moore; 1245 Acry-Velvet Exterior Low Sheen Acrylic Finish.
 - 4. Waterborne Satin DTM Industrial Enamels.
 - 5. Sherwin-Williams; A-100 Exterior Latex Satin House & Trim Paint A82 Series.
- C. Exterior Semigloss Acrylic Enamel:
 - 1. Benjamin Moore; Moorcraft Super Spec Latex House & Trim Paint No. 170.
 - 2. ICI Dulux Paints; 2406-XXXX Dulux Professional Exterior 100 Percent Acrylic Semi-Gloss Finish.
 - 3. Kelly-Moore; 1250 Acry-Lustre Exterior Semi-Gloss Acrylic Finish.
 - 4. Sherwin-Williams; A-100 Latex Gloss A8 Series.
- D. Exterior Full-Gloss Acrylic Enamel for Concrete, Masonry, and Wood:
 - 1. Benjamin Moore; Moore's IMC Acrylic Gloss Enamel M28.

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2. ICI Dulux Paints; 3028-XXXX Dulux Interior/Exterior Acrylic Gloss Finish.
 3. Kelly-Moore; 1780 Kel-Guard Acrylic Gloss Enamel.
 4. Sherwin-Williams; SuperPaint Exterior High Gloss Latex Enamel A85 Series.
- E. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals:
1. Benjamin Moore; Moore's IMC Acrylic Gloss Enamel M28.
 2. ICI Dulux Paints; 3028-XXXX Dulux Interior/Exterior Acrylic Gloss Finish.
 3. Kelly-Moore; 5780 DTM Acrylic Gloss Enamel.
 4. Sherwin-Williams; DTM Acrylic Coating Gloss (Waterborne) B66W100 Series.
- F. Exterior Full-Gloss Alkyd Enamel:
1. Benjamin Moore; Moore's IMC Urethane Alkyd Enamel M22.
 2. ICI Dulux Paints; 4308-XXXX Devguard Alkyd Industrial Gloss Enamel.
 3. Kelly-Moore; 1700 Kel-Guard Gloss Alkyd Rust Inhibitive Enamel.
 4. Sherwin-Williams; Industrial Enamel B-54 Series.

2.5 INTERIOR FINISH COATS

- A. Interior Flat Acrylic Paint:
1. Benjamin Moore; Moorecraft Super Spec Latex Flat No. 275.
 2. ICI Dulux Paints; 1200-XXXX Dulux Professional Velvet Matte Interior Flat Latex Wall & Trim Finish.
 3. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint.
 4. Sherwin-Williams; ProMar 200 Interior Latex Flat Wall Paint B30W200 Series.
- B. Interior Flat Latex-Emulsion Size:
1. Benjamin Moore; Moorecraft Super Spec Latex Flat No. 275.
 2. ICI Dulux Paints; 1200-XXXX Dulux Professional Velvet Matte Interior Flat Latex Wall & Trim Finish.
 3. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint.
 4. Sherwin-Williams; ProMar 200 Interior Latex Flat Wall Paint B30W200 Series.
- C. Interior Semigloss Acrylic Enamel:
1. Benjamin Moore; Moorecraft Super Spec Latex Semi-Gloss Enamel No. 276.
 2. ICI Dulux Paints; 1406-XXXX Dulux Professional Acrylic Semi-Gloss Interior Wall & Trim Enamel.
 3. Kelly-Moore; 1649 Acrylic-Latex Semi-Gloss Enamel.
 4. Sherwin-Williams; ProMar 200 Interior Latex Semi-Gloss Enamel B31W200 Series.

2.6 INTERIOR WOOD STAINS AND VARNISHES

- A. Interior Wood Stain: Alkyd based.
1. Benjamin Moore; Benwood Penetrating Stain No. 234.
 2. ICI Dulux Paints; 1700-XXX WoodPride Interior Solventborne Wood Finishing Stain.
 3. Kelly-Moore; McCloskey Stain.
 4. Sherwin-Williams; Wood Classics Interior Oil Stain A-48 Series.

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- B. Clear Sanding Sealer: Fast-drying alkyd based.
 - 1. Benjamin Moore; Moore's Interior Wood Finishes Quick-Dry Sanding Sealer No. 413.
 - 2. ICI Dulux Paints; 1902-0000 WoodPride Interior Satin Polyurethane Varnish.
 - 3. Kelly-Moore; 2164 E Z Sand Alkyd Q. D. Sealer.
 - 4. Sherwin-Williams; Wood Classics Fast Dry Sanding Sealer B26V43.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Coordination of shop-applied primers with finish coats is critical. If compatibility problems develop, it may be necessary to provide barrier coats over shop-applied primers or to remove the primer and reprime the substrate.
 - 2. Provide barrier coats over incompatible primers or remove and reprime.
 - 3. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - 4. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - c. If transparent finish is required, backprime with spar varnish.

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- d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
5. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
- a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
6. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- E. Material Preparation:
- 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
- F. Exposed Surfaces: Include areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
- 1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 2. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 - 3. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
 - 4. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 - 5. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
- G. Sand lightly between each succeeding enamel or varnish coat.
- H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
- 1. Omit primer over metal surfaces that have been shop primed and touchup painted.

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2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
- I. Revise first paragraph below if the use of spray equipment for paint application is limited or restricted. Some SAWS s prohibit or restrict the use of spray on their projects. Spray application of paints can damage sensitive electronic operating equipment and might cause problems for personnel in occupied buildings.
- J. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
- K. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- L. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- M. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- N. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- O. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- P. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
- Q. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

3.2 CLEANING AND PROTECTING

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
- B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

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- C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
 - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.3 EXTERIOR PAINT SCHEDULE

- A. Concrete, Stucco, and Masonry (Other Than Concrete Unit Masonry):
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Exterior concrete and masonry primer.
 - b. Finish Coats: Exterior low-luster acrylic paint.
- B. Concrete Unit Masonry:
 - 1. Acrylic Finish: Two finish coats over a block filler.
 - a. Block Filler: Concrete unit masonry block filler.
 - b. Finish Coats: Exterior low-luster acrylic paint.
- C. Mineral-Fiber-Reinforced Cement Panels:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Exterior concrete and masonry primer.
 - b. Finish Coats: Exterior flat acrylic paint.
- D. Smooth Wood:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Exterior wood primer for acrylic enamels.
 - b. Finish Coats: Exterior low-luster acrylic paint.
- E. Wood Trim:
 - 1. Acrylic-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Exterior wood primer for acrylic enamels.
 - b. Finish Coats: Exterior semi-gloss acrylic enamel.
- F. Plywood:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Exterior wood primer for acrylic enamels.
 - b. Finish Coats: Exterior low-luster acrylic paint.
- G. Ferrous Metal:
 - 1. Acrylic Finish: Two finish coats over a rust-inhibitive primer.
 - a. Primer: Exterior ferrous-metal primer (not required on shop-primed items).
 - b. Finish Coats: Exterior low-luster acrylic paint.
- H. Zinc-Coated Metal:
 - 1. Acrylic Finish: One finish coat over a galvanized metal primer.
 - a. Primer: Exterior galvanized metal primer.
 - b. Finish Coats: Exterior low-luster acrylic paint.

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- I. Aluminum:
 - 1. Acrylic-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Exterior aluminum primer under acrylic finishes.
 - b. Finish Coats: Exterior semi-gloss acrylic enamel.

3.4 INTERIOR PAINT SCHEDULE

- A. Concrete and Masonry (Other Than Concrete Unit Masonry):
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Interior concrete and masonry primer.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- B. Concrete Unit Masonry:
 - 1. Acrylic Finish: Two finish coats over a block filler.
 - a. Block Filler: Concrete unit masonry block filler.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- C. Mineral-Fiber-Reinforced Cement Panels:
 - 1. Flat Acrylic Finish: Two finish coats.
 - a. Finish Coats: Interior flat acrylic paint.
- D. Gypsum Board:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- E. Plaster:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Interior plaster primer.
 - b. Finish Coats: Interior.
- F. Wood and Hardboard:
 - 1. Acrylic-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Interior wood primer for acrylic-enamel and semi-gloss alkyd-enamel finishes.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- G. Ferrous Metal:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Interior ferrous-metal primer.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- H. Zinc-Coated Metal:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Interior zinc-coated metal primer.
 - b. Finish Coats: Interior low-luster acrylic enamel.

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3.5 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

- A. Stain-Varnish Finish: Two finish coats of varnish over a sealer coat and interior wood stain. Wipe wood filler before applying stain.
 - 1. Filler Coat: Open-grain wood filler.
 - 2. Stain Coat: Interior wood stain.
 - 3. Sealer Coat: Clear sanding sealer.
 - 4. Finish Coats: Interior alkyd- or polyurethane-based clear satin varnish.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and the payments made under lump sum shall be considered as full compensation for these requirements

END OF SECTION

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ELASTOMERIC COATINGS – 09963

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SECTION 09963 - ELASTOMERIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and application of elastomeric coatings to exterior surfaces.
- B. Alternates: Refer to Division 1 Section "Alternates" for description of Work in this Section affected by alternates.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
- B. Stucco: A portland cement-based plaster used on exterior surfaces.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric coatings that comply with performance requirements specified in MPI 113.
- B. Provide elastomeric coating systems with the following properties as determined by test methods indicated:
 - 1. Elongation: Not less than 100 percent with a tensile strength of 200 psi and not less than 88 percent recovery after 1 hour and 90 percent recovery after 24 hours when tested according to ASTM D 2370 using parameters established by MPI 113.
 - 2. Accelerated Weathering: No cracking, peeling, blistering, chalking, or visual deterioration after 1000 hours when tested according to procedures in ASTM G 155.
 - 3. Low-Temperature Flexibility: No crack formation when tested according to ASTM D 1737.
 - 4. Moisture-Vapor Transmission: Not less than 2.0 perms according to ASTM D 1653.
 - 5. Wind-Driven Rain Resistance: No water penetration according to procedures in FS TT-C-555.
 - 6. Minimum Solids Content by Volume: Not less than 45 percent.

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1.5 SUBMITTALS

- A. Product Data: For each elastomeric coating system specified. Include crack fillers, 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: Technical information including label analysis and instructions for handling, storing, and applying each coating material.
 - 3. Certification by elastomeric coating manufacturer that products supplied comply with local VOC regulations.

- B. Samples for Initial Selection: For each type of finish-coat material indicated.
 - 1. After color selection, Architect will furnish color chips indicating colors selected.

- C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of actual substrate.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
 - 3. Submit 2 Samples on the following substrates for Architect's review of color and texture only:
 - a. Concrete, Masonry, and Stucco: **12x12 inch** Samples of actual substrate material for each color and texture.
 - b. Concrete Unit Masonry: **12x12 inch** rectangular Samples of concrete masonry, with mortar joint in the center, for each color and texture.

- D. Qualification Data: For Applicator.

- E. Material Certificates: For each elastomeric coating material, signed by manufacturers.

- F. Product Test Reports: Based on evaluation of comprehensive tests by a qualified testing agency for each elastomeric coating material indicating compliance of elastomeric coatings with requirements based on comprehensive testing within the last **two** years of current product formulations.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying elastomeric coating systems similar in material and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

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- B. Source Limitations: Obtain **crack fillers, block fillers, primers and other undercoat materials** from same manufacturer as finish coats.
- C. Benchmark Samples (Mockups): Provide full-coat benchmark finish samples for each type of coating on each substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample submittals.
 - 1. Architect will select one **concrete, and two stucco** exterior wall surfaces to represent surfaces and conditions for application of elastomeric coatings.
 - a. Wall Surfaces: Prepare samples on at least **100 sq. ft.** of wall surface.
 - 2. Apply benchmark samples according to requirements for the completed Work. Provide required sheen, color, and texture on each surface.
 - 3. Approved benchmark samples will be used to evaluate coating systems.
 - 4. Obtain Architect's approval of benchmark samples before starting application of coatings.
 - 5. Final approval of colors will be from benchmark samples.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Manufacturer's stock number and date of manufacture.
 - 3. Contents by volume, for pigment and vehicle constituents.
 - 4. Thinning instructions (if permitted).
 - 5. Application instructions.
 - 6. Color name and number.
 - 7. Handling instructions and precautions.
 - 8. VOC content.
- 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 storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect elastomeric coating materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.8 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 90 deg F, unless otherwise permitted by manufacturer's written instructions.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

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

1.9 WARRANTY

- A. Elastomeric Coating Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace elastomeric coatings that fail within specified warranty period. Failures include, but are not limited to, water penetration through the coating.
- B. Warranty Period for Elastomeric Coatings: **Five** year(s) from date of Substantial Completion.

1.10 EXTRA MATERIALS

- A. Furnish extra elastomeric coating materials from same production run as materials applied and in quantities described below. Package materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to SAWS .
 1. Quantity: Furnish SAWS with an additional **5** percent, but not less than 1 gal. or 1 case, as appropriate, of each color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
- B. Products: Subject to compliance with requirements, provide one of the products indicated in other Part 2 articles.
- C. Manufacturers Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 1. Benjamin Moore & Co. (Benjamin Moore).
 2. ICI Dulux Paint Centers, Inc. (ICI Dulux Paint).
 3. Sherwin Williams.
 4. PPG Industries, Inc.; Pittsburgh Paints (Pittsburgh Paints).
 5. Sonneborn, Div. of ChemRex, Inc. (Sonneborn).
 6. Sto Concrete Restoration; Sto Finish Systems Division (Sto).
 7. Tamms Industries, Inc. (Tamms).

2.2 ELASTOMERIC COATING MATERIALS, GENERAL

- A. Material Compatibility: Provide crack fillers, block fillers, primers, elastomeric finish-coat materials, and related materials that are compatible with one another and substrates indicated

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under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

- B. Material Quality: Provide manufacturer's best-quality elastomeric coating materials that are factory formulated, comply with requirements in FS TT-C-555, and are recommended by manufacturer for the application indicated. Material containers not displaying manufacturer's product identification are not acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance of proposed substitutions.
- C. Colors and Textures: See the Coating Schedule at the end of Part 3 for color selections.
- D. Colors and Textures: **As selected by Architect from manufacturer's full range.**

2.3 CRACK FILLERS

- A. Crack Fillers: Factory-formulated acrylic emulsion crack fillers compatible with substrate and finish-coat materials indicated.
 - 1. Crack Filler for Cracks up to 1/16 Inch
 - a. ICI Dulux Paint; Decra-Flex Smooth Brush Grade Elastomeric Patching Compound.
 - b. Modac; Acra Lastic Brush Grade 115-004.
 - c. Pittsburgh Paints; Buttering Grade Vinyl Sealant 236-2414.
 - d. Sonneborn; Hydrocide 750 Brush Grade or Knife Grade Patching Compound.
 - e. Sto; Flexible Crack Filler.
 - 2. Crack Filler for Cracks More Than 1/16 Inch
 - a. ICI Dulux Paint; Decra-Flex Smooth Knife Grade Elastomeric Patching Compound.
 - b. Modac; Acra Lastic Knife Grade 115-002.
 - c. Pittsburgh Paints; Regular Grade Vinyl Sealant 236-2397.
 - d. Sonneborn; Hydrocide 750 Knife Grade Patching Compound.
 - e. Sto; Flexible Crack Filler.
 - f. Tamms; Tamms Thin Patch.

2.4 CONCRETE MASONRY BLOCK FILLERS

- A. Concrete Unit Masonry Block Filler: Factory-formulated, high-performance latex block fillers.
 - 1. Benjamin Moore; Moorcraft Super Craft Latex Block Filler #285: Applied at a dry film thickness of not less than 8.1 mils.

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2. ICI Dulux Paint; Bloxfil 4000-1000 Interior/Exterior Heavy Duty Acrylic Block Filler: Applied at a dry film thickness of not less than 7.0 to 14.5 mils
3. Modac; 100% Acrylic Block Filler 019-146: Applied at a dry film thickness of not less than 4.0 mils
4. Pittsburgh Paints; 16-90 High-Performance Acrylic Block Filler: Applied at a dry film thickness of not less than 6.0 mils
5. Sonneborn; Colorflex Block Filler #749: Applied at a dry film thickness of not less than 1.3 mils
6. Sto; Flexible Coating CR212 Thinned 1:5 with 1 Gal. of Water per Each 5 Gal. of CR212: Applied at a dry film thickness of not less than 10 mils.
7. Tamms; H/P Primer: Applied at a dry film thickness of not less than 1.3 mils

2.5 PRIMERS

A. Concrete and Masonry Primer: Factory-formulated, alkali-resistant, acrylic-latex primer.

1. Benjamin Moore; Moore's Acrylic Masonry Sealer #066: Applied at a dry film thickness of not less than 0.7 mil.
2. ICI Dulux Paint; Aquacrylic GRIPPER 3210 Acrylic Primer: Applied at a dry film thickness of not less than 1.3 mils.
3. Modac; Acrylic Latex Surface Conditioner 019-156: Applied at a dry film thickness of not less than 4.0 mils.
4. Pittsburgh Paints; primer not required.
5. Pittsburgh Paints; Speedhide Alkali Resistant Primer 6-603: Applied at a dry film thickness of not less than 1.5 mils.
6. Sonneborn; primer not required.
7. Sonneborn; Colorflex Sealer #751: Applied at a dry film thickness of not less than 1.3 mils.
8. Sto; Flexible Coating CR212 Thinned 1:5 with 1 Gal. of Water per Each 5 Gal. of CR212: Applied at a dry film thickness of not less than 10 mils.
9. Tamms; H/P Primer: Applied at a dry film thickness of not less than 1.3 mils.

B. Stucco Primer: Factory-formulated stucco primer.

1. Benjamin Moore; Moore's Acrylic Masonry Sealer #066: Applied at a dry film thickness of not less than 0.7 mil
2. ICI Dulux Paint; Aquacrylic GRIPPER 3210 Acrylic Primer: Applied at a dry film thickness of not less than 1.3 mils
3. Modac; Acrylic Latex Surface Conditioner 019-156: Applied at a dry film thickness of not less than 4.0 mils
4. Pittsburgh Paints; primer not required.
5. Pittsburgh Paints; Pitt-Flex Exterior Masonry Coating 100 Percent Acrylic Elastomeric 4-110 Thinned with Water: Applied at a dry film thickness of not less than 5.5 mils
6. Sonneborn; primer not required.
7. Sonneborn; Colorflex Sealer #751: Applied at a dry film thickness of not less than 1.3 mils
8. Sto; Flexible Coating CR212 Thinned 1:5 with 1 Gal. of Water per Each 5 Gal. of CR212: Applied at a dry film thickness of not less than 10 mils
9. Tamms; H/P Primer: Applied at a dry film thickness of not less than 1.3 mils

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10. Tnemec; Elasto-Grip Series 151: Applied at a dry film thickness of not less than 3.5 mils

2.6 ELASTOMERIC FINISH-COAT MATERIALS

- A. Smooth Elastomeric Finish: Smooth, factory-formulated, 100 percent acrylic elastomeric coating.

1. Benjamin Moore; Moorlastic Elastomeric Waterproof Coating #055: Applied at a dry film thickness of not less than 10 mils
2. ICI Dulux Paint; Decra-Flex 2260-XXXX Smooth Elastomeric Coating System: Applied at a dry film thickness of not less than 6.0 mils
3. Modac; Elastomeric Acrylic Coating--Smooth Texture 019-146: Applied at a dry film thickness of not less than 7.0 mils
4. Pittsburgh Paints; Pitt-Flex Exterior Masonry Coating 100 Percent Acrylic Elastomeric 4-110: Applied at a dry film thickness of not less than 5.5 mils
5. Sonneborn; Sonocoat Colorflex Waterproof Elastomeric Coating: Applied at a dry film thickness of not less than 8.0 mils
6. Sto; Flexible Coating CR212: Applied at a dry film thickness of not less than 10 mils
7. Tamms; Tammolastic Smooth Elastomeric Decorative and Protective Coating: Applied at a dry film thickness of not less than 10 mils
8. Tnemec; Enviro-Crete Series 156 Smooth: Applied at a dry film thickness of not less than 8.0 mils

- B. Textured Elastomeric Finish: Textured, factory-formulated, 100 percent acrylic elastomeric coating.

1. ICI Dulux Paint; Decra-Flex 2270-XXXX Fine Finish Elastomeric Coating System: Applied at a dry film thickness of not less than 7.0 mils
2. Modac; Elastomeric Acrylic Coating--Medium Texture 019-027: Applied at a dry film thickness of not less than 7.0 mils
3. Pittsburgh Paints; Speedhide Texture Coatings 100 Percent Acrylic 4-50: Applied at a dry film thickness of not less than 6.1 mils
4. Sonneborn; Sonocoat Flextex Textured Elastomeric Coating: Applied at a dry film thickness of not less than 8.0 mils
5. Sto; Flexible Coating CR235: Applied at a dry film thickness of not less than 10 mils
6. Tamms; Tammolastic Textured Elastomeric Decorative and Protective Coating: Applied at a dry film thickness of not less than 10 mils
7. Tnemec; Enviro-Crete Series 157, Textured: Applied at a dry film thickness of not less than 9.0 mils

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for coating application. Comply with procedures specified in PDCA P4.

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1. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces are thoroughly dry.
 2. Start of coating application will be construed as Applicator's acceptance of surface conditions.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify Architect about anticipated problems when using coatings specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
1. After completing coating operations, reinstall items removed, using workers skilled in trades involved.
- B. Cleaning: Before applying coatings or other surface treatments, clean substrates of substances that could impair bond of coating systems. Remove oil and grease before cleaning.
1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for particular substrate conditions and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Surfaces: Prepare brick, concrete, concrete unit masonry, stucco, and similar surfaces to receive elastomeric coatings. Remove efflorescence, chalk, dust, dirt, release agents, grease, oils, and similar impediments to good adhesion by water blasting followed by a clear water rinse.
 - a. Remove mildew and neutralize surfaces according to manufacturer's written instructions before patching materials are applied.
 - b. Roughen as required to remove glaze. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
 - c. If hardeners or sealers have been used to improve concrete curing, use mechanical methods for surface preparation.
 - d. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. If surfaces are sufficiently alkaline to cause finish paint to blister and burn, correct this condition before application. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

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3. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.
 4. Deep Hairline Cracks: Remove dust and dirt from around cracks. Remove mildew by sterilizing before filling. Apply manufacturer's recommended primer to cracks before patching. If shrinkage occurs after applying crack filler, apply additional filler material to cracks before initial application of elastomeric coatings.
 - a. Cracks up to 1/16 Inch: Clean surface around cracks. Apply crack filler primer penetrating cracks as deeply as possible, overflowing crack 2 inches on each side. When crack filler primer is dry, apply manufacturer's recommended sealant, forced well into cracks using a brush, putty knife, or trowel. Smooth edges of primed area around cracks. Allow for sealant shrinkage when applying.
 - b. Cracks up to 3/8 Inch: Open cracks to 1/4 to 3/8 inch wide and 1/8 inch deep. Clean cracks and surrounding area removing dust, dirt, and other impurities. Apply crack filler primer recommended by manufacturer with a brush to obtain uniform coverage and spread approximately 2 inches on each side of cracks. Fill cracks with manufacturer's recommended crack filler applied with a putty knife or trowel, and allow for shrinkage. If excessive shrinkage occurs, reapply crack filler.
- D. Material Preparation: Mix and prepare materials according to coating manufacturer's written instructions.
1. Maintain containers used in mixing and applying elastomeric coatings in a clean condition, free of foreign materials and residue.
 2. Stir materials before application to produce a mixture of uniform density. Stir as required during application. If surface film forms, do not stir film into material. If necessary, remove film and strain coating material before using.
 3. If manufacturer permits thinning, use only thinners recommended by manufacturer, and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match color of finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply elastomeric coatings according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Colors, surface treatments, and finishes are indicated in coating schedule.
 2. Do not paint over conditions detrimental to formation of a durable coating film, such as dirt, rust, scale, grease, moisture, and scuffed surfaces.
 3. Provide finish coats compatible with primers used.
- B. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

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- C. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Number of coats and film thickness required are same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
 2. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
 3. 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 where application of another coat does not cause undercoat to lift or lose adhesion.
- D. Application Procedures: Apply elastomeric coatings by brush, roller, or spray according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for material being applied.
 2. Rollers: Use professional-quality quick-release rollers of carpet, velvet back, or high-pile sheep's wool covers with a 1- to 1-1/4-inch nap as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- E. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness as recommended by manufacturer.
1. Wherever spray application is used, apply each coat to provide equivalent hiding of brush-applied coats. Do not double back with spray equipment, building up film thickness of two coats in one pass.
- F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- G. Prime Coats: If recommended by manufacturer, apply a primer to material being coated before applying finish coats.
- H. Brush Application: Brush out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.
- I. Roller Application: Keep cover wet at all times; do not dry roll. Work in sections. Lay on required amount of material, working material into grooves and rough areas; then level material, working it into surface.
- J. Spray Application: Use spray equipment for application only when permitted by manufacturer's written instructions and authorities having jurisdiction.

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- K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

3.4 FIELD QUALITY CONTROL

- A. SAWS reserves the right to invoke the following test procedure at any time and as often as SAWS deems necessary during coating operations:
 - 1. SAWS will engage a qualified independent testing agency to sample coating material being used. Samples of material delivered to Project 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 SAWS :
 - a. Elongation.
 - b. Accelerated weathering.
 - c. Low-temperature flexibility.
 - d. Moisture-vapor transmission.
 - e. Wind-driven rain resistance.
 - f. Minimum solids content by volume.
 - 3. SAWS may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Contractor shall remove noncomplying 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.

3.5 CLEANING

- A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 - 1. After completing coating work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

- A. Protect work of other trades from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.
- B. Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their work after completing coating operations.

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1. After construction activities of other trades are complete, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

3.7 COATING SCHEDULE

A. Concrete: Provide the following elastomeric coating systems over exterior concrete surfaces:

1. Smooth Elastomeric Finish: **Two** finish coat(s) over a primer, **if required by manufacturer.**

- a. Primer: Concrete and masonry primer.
- b. Finish Coats: Smooth elastomeric finish.

2. Textured Elastomeric Finish: **Two** finish coat(s) over a primer **if required by manufacturer**

- a. Primer: Concrete and masonry primer.
- b. Finish Coats: Textured elastomeric finish.

B. Concrete Unit Masonry: Provide the following elastomeric coating systems over exterior concrete unit masonry surfaces:

1. Smooth Elastomeric Finish: **Two** finish coat(s) over a concrete unit masonry block filler **if required by manufacturer.**

- a. Block Filler: Concrete unit masonry block filler.
- b. Primer: Concrete and masonry primer.
- c. Finish Coats: Smooth elastomeric finish.

C. Stucco (Portland Cement Plaster): Provide the following elastomeric coating systems over exterior stucco surfaces:

1. Smooth Elastomeric Finish: **Two** finish coat(s) over a primer **if required by manufacturer.**

- a. Primer: Stucco primer.
- b. Finish Coats: Smooth elastomeric finish.

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and shall be considered as full compensation for these requirements

END OF SECTION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMU).
 - 3. Steel.
 - 4. Galvanized metal.
 - 5. Wood.
 - 6. Plastic trim fabrications.
 - 7. Exterior portland cement (stucco).
- B. Related Sections include the following:
 - 1. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.
 - 2. Division 6 Sections for shop priming carpentry with primers specified in this Section.
 - 3. Division 8 Sections for factory priming windows and doors with primers specified in this Section.
 - 4. Division 9 Section "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
 - 5. Division 9 Section "Wood Stains and Transparent Finishes" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 12 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.

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4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 50 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to SAWS .

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F

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- B. Do not apply paints 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.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Coronado Paint.
 - 3. ICI Paints
 - 4. Kalwal Paint
 - 5. Pittsburg Paint
 - 6. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: To be selected by Architect and SAWS during construction period

2.3 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler: MPI #4.

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1. VOC Content: E Range of E3.

2.4 PRIMERS/SEALERS

- A. Alkali-Resistant Primer: MPI #3.

1. VOC Content: E Range of E3

- B. Bonding Primer (Water Based): MPI #17.

1. VOC Content: E Range of E3

- C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint system indicated.

2.5 METAL PRIMERS

- A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E2.

- B. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E3.

- C. Waterborne Galvanized-Metal Primer: MPI #134.

1. VOC Content: E Range of E3.

2. Environmental Performance Rating: EPR 2.

- D. Quick-Drying Primer for Aluminum: MPI #95.

1. VOC Content: E Range of E3.

2.6 WOOD PRIMERS

- A. Exterior Latex Wood Primer: MPI #6.

1. VOC Content: E Range of E3.

- B. Exterior Oil Wood Primer: MPI #7.

1. VOC Content: E Range of E2.

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2.7 EXTERIOR LATEX PAINTS

- A. Exterior Latex (Flat): MPI #10 (Gloss Level 1).
 - 1. VOC Content: E Range of E3.
- B. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).
 - 1. VOC Content: E Range of E3
- C. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).
 - 1. VOC Content: E Range of E3.

2.8 EXTERIOR ALKYD PAINTS

- A. Exterior Alkyd Enamel (Flat): MPI #8 (Gloss Level 1).
 - 1. VOC Content: E Range of E1.
- B. Exterior Alkyd Enamel (Semigloss): MPI #94 (Gloss Level 5).
 - 1. VOC Content: E Range of E2.
- C. Exterior Alkyd Enamel (Gloss): MPI #9 (Gloss Level 6).
 - 1. VOC Content: E Range of E2.

2.9 QUICK-DRYING ENAMELS

- A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).
 - 1. VOC Content: E Range of E3.
- B. Quick-Drying Enamel (High Gloss): MPI #96 (Gloss Level 7).
 - 1. VOC Content: E Range of E3.

2.10 TEXTURED AND HIGH-BUILD COATINGS

- A. Latex Stucco and Masonry Textured Coating: MPI #42.
 - 1. VOC Content: E Range of E3.
- B. High-Build Latex (Exterior): MPI #40.

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1. VOC Content: E Range of E3.

2.11 ALUMINUM PAINT

- A. Aluminum Paint: MPI #1.

1. VOC Content: E Range of E3.

2.12 FLOOR COATINGS

- A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.

1. VOC Content: E Range of **E2**

- B. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.

1. VOC Content: E Range of **E2**.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Plaster: 12 percent.
 5. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

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3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and re-prime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Aluminum Substrates: Remove surface oxidation.
- I. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- J. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.
- K. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.

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3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: SAWS reserves the right to invoke the following procedure at any time and as often as SAWS deems necessary during the period when paints are being applied:
 - 1. SAWS will engage the services of a qualified testing agency to sample paint materials 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 tests for compliance of paint materials with product requirements.
 - 3. SAWS may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

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- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Non-traffic Surfaces:

- 1. Latex System: MPI EXT 3.1A.
 - a. Prime Coat: Exterior latex matching topcoat.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat.
- 2. Latex Aggregate/Latex System: MPI EXT 3.1 B.
 - a. Prime Coat: Latex stucco and masonry textured coating.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat

B. Concrete Substrates, Traffic Surfaces:

- 1. Clear Sealer System: MPI EXT 3.2G.
 - a. Prime Coat: Interior/exterior clear concrete floor sealer (solvent based).
 - b. Intermediate Coat: Interior/exterior clear concrete floor sealer (solvent based).
 - c. Topcoat: Interior/exterior clear concrete floor sealer (solvent based).
- 2. Water-Based Clear Sealer System: MPI EXT 3.2H.
 - a. Prime Coat: Interior/exterior clear concrete floor sealer (water based).
 - b. Intermediate Coat: Interior/exterior clear concrete floor sealer (water based).
 - c. Topcoat: Interior/exterior clear concrete floor sealer (water based).

C. Steel Substrates:

- 1. Quick-Drying Enamel System: MPI EXT 5.1A.
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - b. Intermediate Coat: Quick-drying enamel matching topcoat.
 - c. Topcoat: Quick-drying enamel flat or semigloss
- 2. Alkyd System: MPI EXT 5.1D.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel flat
- 3. Aluminum Paint System: MPI EXT 5.1K.

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- a. Prime Coat: Alkyd anticorrosive metal primer.
- b. Intermediate Coat: Aluminum paint.
- c. Topcoat: Aluminum paint.

D. Galvanized-Metal Substrates:

- 1. Latex System: MPI EXT 5.3A.
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss
- 2. Latex Over Water-Based Primer System: MPI EXT 5.3H.
 - a. Prime Coat: Waterborne galvanized-metal primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss

E. Aluminum Substrates:

- 1. Latex System: MPI EXT 5.4H.
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss.

F. Dressed Lumber Substrates: Including architectural woodwork, doors, soffits, ect.

- 1. Latex System: MPI EXT 6.3L.
 - a. Prime Coat: Exterior latex wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss
- 2. Latex Over Alkyd Primer System: MPI EXT 6.3A.
 - a. Prime Coat: Exterior oil wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss

G. Wood Panel Substrates: Including fascias, soffits, ect.

- 1. Latex System: MPI EXT 6.4K.
 - a. Prime Coat: Exterior latex wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss
- 2. Latex Over Alkyd Primer System: MPI EXT 6.4G.

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- a. Prime Coat: Exterior alkyd wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss
- H. Dimension Lumber Substrates, Non-traffic Surfaces: Including board siding, fencing, undersides of decking, ect.
- 1. Latex System: MPI EXT 6.2M.
 - a. Prime Coat: Exterior latex wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss
 - 2. Latex Over Alkyd Primer System: MPI EXT 6.2A.
 - a. Prime Coat: Exterior oil wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss
- I. Plastic Trim Fabrication Substrates:
- 1. Latex System: MPI EXT 6.8A.
 - a. Prime Coat: Bonding primer water based
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat or semigloss
- J. Stucco Substrates:
- 1. Latex System: MPI EXT 9.1A.
 - a. Prime Coat: Exterior latex matching topcoat.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat
 - 2. Latex Over Alkali-Resistant Primer System: MPI EXT 9.1J.
 - a. Prime Coat: Alkali-resistant primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat

PART 4 - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made to the CONTRACTOR for the work described in this Section. Such work shall be considered incidental to the project and shall be considered as full compensation for these requirements

END OF SECTION

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SECTION 16050 - BASIC MATERIALS AND METHODS

1.01 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.
- B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect.

1.02 SCOPE OF WORK

- A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.
- B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.
- C. The approximate locations of Electrical items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of SAWS or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to SAWS .
- D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.
- E. All discrepancies between the Contract Documents and actual job-site conditions shall be reported to SAWS or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least 7 working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.
- F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish SAWS with a turn-key and fully operating system in cooperation with other trades.
- G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified

later or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".

- H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.
- I. Contractor shall participate in the commissioning process; including but not limited to meeting attendance, completion of checklists and participation in functional testing.

1.03 RELATED SECTIONS

- A. General Conditions
- B. Supplementary Conditions
- C. Division 1

1.04 COOPERATION WITH TRADES:

- A. Cooperation with trades of adjacent, related, or affected materials or operations shall be considered a part of this work in order to affect timely and accurate placing of work and bring together in proper and correct sequence, the work of such trades.

1.05 REFERENCES

- A. National Electrical Code (NEC)
- B. American Society for Testing and Materials (ASTM)
- C. Underwriter's Laboratories, Inc. (UL)
- D. Insulated Cable Engineer's Association (ICEA).
- E. National Electrical Manufacturer's Association (NEMA).
- F. Institute of Electrical and Electronic's Engineers (IEEE).
- G. American National Standards Institute (ANSI).
- H. National Fire Protection Association (NFPA).
- I. International Energy Conservation Code (IECC).

1.06 COMPLETE FUNCTIONING OF WORK:

- A. All work fairly implied as essential to the complete functioning of the electrical systems shown on the Drawings and Specifications shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specifications to establish the types of the systems, but not set forth each item essential to the functioning of the system. In case of doubt as to the work intended, or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for supplementary instructions, Drawings, etc.
- B. Contractor shall review all pertinent Drawings and adjust his work to all conditions shown there on. Discrepancies between Plans, Specifications, and actual field conditions shall

be brought to the prompt attention of the Architect.

1. Approximate location of transformers, feeders, branch circuits, outlets, lighting and power panels, outlets for special systems, etc., are indicated on the Drawings. However, the Drawings, do not give complete and accurate detailed locations of such outlets, conduit runs, etc., and exact locations must be determined by actual field measurement. Such locations will, at all times, be subject to the approval of the Architect.
2. Communicate with the Architect and secure his approval of any outlet (light fixture, receptacle, switch, etc.) location about which there may be the least question. Outlets obviously placed in a location not suitable to the finished room or without specific approval, shall be removed and relocated when so directed by the Architect. Location of light fixtures shall be coordinated with reflected ceiling plans.

- C. Additional coordination with mechanical contractor may be required to allow adequate clearances of mechanical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.07 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

- A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

1.08 CONTRACTOR'S QUALIFICATIONS

- A. An approved contractor for the work under this Division shall be:
1. A specialist in this field and have the personnel, experience, training, and skill, and the organization to provide a practical working system.
 2. Able to furnish evidence of having contracted for and installed not less than 3 systems of comparable size and type that have served their SAWS satisfactorily for not less than 3 years.
 3. Perform work by persons qualified to produce workmanship of specified quality. Persons performing electrical work shall be required to be licensed. Onsite supervision, journeyman shall have minimum of journeyman license. Helpers, apprentices shall have minimum of apprentice license.

1.09 DATE OF FINAL ACCEPTANCE

- A. The date of final acceptance shall be the date of SAWS occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division 1 for additional requirements.
- B. The date of final acceptance shall be documented in writing and signed by the architect, SAWS and contractor.

1.10 DEFINITIONS AND SYMBOLS

- A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings

which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.

- B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.
- C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.
- D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.
- E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.
- F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.
- H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.
- I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.
- J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.
- K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply

exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to SAWS or Engineer via a request for information (RFI) for decision before proceeding.

- L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.
- C. Damaged equipment shall be promptly removed from the site and new, undamaged equipment shall be installed in its place promptly with no additional charge to SAWS .

1.12 SUBMITTALS

- A. Coordinate with Division 1 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded the Contractor shall submit a minimum of eight (8) complete bound sets of shop drawings and complete data covering each item of equipment or material. The first submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain one (1) copy each of all shop drawings for their files. Where full size drawings are involved, submit one (1) print and one (1) reproducible sepia or vellum in lieu of eight (8) sets. All literature pertaining to an item subject to Shop Drawing submittal shall be submitted at one time. A submittal shall not contain information from more than one Specification section, but may have a section subdivided into items or equipment as listed in each section. The Contractor may elect to submit each item or type of equipment separately. Each submittal shall include the following items enclosed in a suitable binder:
 - 1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.

2. An index page with a listing of all data included in the Submittal.
 3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
 4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
 5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
 6. Identification of each item of material or equipment matching that indicated on the Drawings.
 7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
 8. Additional information as required in other Sections of this Division.
 9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".
- B. Refer to Division 1 for additional information on shop drawings and submittals.
- C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.
- D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.
- E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:
1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
 2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
 3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not

approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.

4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
 5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
 6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.
- F. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by SAWS or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.
- G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.
- H. Furnish detailed shop drawings, descriptive literature, physical data and a specification critique for each section indicating "compliance" and/or "variations" for the following items:
- Distribution Panelboards
 - Lighting and Appliance Panelboards
 - Wiring Gutters
 - Heavy Duty Disconnect Switches
 - Lighting Fixtures
 - Lighting Contactors
 - Time Clocks
 - Lighting Control System
 - Photocells
 - Wiring Devices and Plates
 - Conduit and Fittings
 - Wire
 - Fire Alarm System
- I. Refer to each specification section for additional requirements.

1.13 OPERATION AND MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:
1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 4. Servicing instructions and lubrication charts and schedules.

1.14 COORDINATION DRAWINGS

- A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
 - a. Wall and type locations.
 - b. Clearances for installing and maintaining insulation.
 - c. Locations of light fixtures and sprinkler heads.
 - d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
 - e. Equipment connections and support details.
 - f. Exterior wall and foundation penetrations.
 - g. Routing of storm and sanitary sewer piping.
 - h. Fire-rated wall and floor penetrations.
 - i. Sizes and location of required concrete pads and bases.
 - j. Valve stem movement.
 - k. Structural floor, wall and roof opening sizes and details.
 2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
 3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
 4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.
- B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.
- C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DRAWINGS

1. Maintain a continuous record during the course of construction of all changes and deviations in the work from the contract drawings. Upon completion of the work, purchase a set of "Auto Positive Tracings" on vellum and make corrections as required to reflect the electrical systems as installed. Location and size of all conduit shall be accurately shown to dimension. Submit three prints of the tracings for approval. Make corrections to tracings as directed and deliver "Auto Positive Tracings" to the Architect. Record drawings shall be furnished in addition to shop drawings. Symbols on the Record drawings shall correspond to the identification symbols on the contract drawings and equipment identification plates and tags.
2. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by SAWS, Architect or Engineer at all times.
3. Refer to Division 1 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducible is a condition of final acceptance.
4. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.
5. Submit three prints of the tracings for approval. Make corrections to tracings as directed and delivered "Auto Positive Tracings" to the architect. "As-Built" drawings shall be furnished in addition to shop drawings.
6. When the option described in paragraph F., above is not exercised then upon completion of the work, the Contractor shall transfer all marks from the submit a set of clear concise set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY: _____
(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY: _____
(SIGNATURE)

1.16 CERTIFICATIONS AND TEST REPORTS

- A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.
- B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.
- C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.
- D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 16.

1.17 MAINTENANCE MANUALS

- A. Coordinate with Division 1 for maintenance manual requirements, unless noted otherwise bind together in "D ring type" binders by National model no. 79-883 or equal, binders shall be large enough to allow ¼" of spare capacity. Three (3) sets of all approved shop drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference and shall utilize the individual specification section numbers shown in the Electrical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by SAWS for proper operation and maintenance of equipment supplied by Division 16 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.
- B. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 16, include the following information for equipment items:
 - 1. Identifying names, name tags designations and locations for all equipment.
 - 2. Fault Current calculations and Coordination Study.
 - 3. Reviewed shop drawing submittals with exceptions noted compliance letter.
 - 4. Fabrication drawings.
 - 5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
 - 6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
 8. Equipment name plate data.
 9. Wiring diagrams.
 10. Exploded parts views and parts lists for all equipment and devices.
 11. Color coding charts for all painted equipment and conduit.
 12. Location and listing of all spare parts and special keys and tools furnished to SAWS.
 13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.
- C. Refer to Division 1 for additional information on Operating and Maintenance Manuals.
- D. Operating and Maintenance Manuals shall be turned over to SAWS or Engineer a minimum of 14 working days prior to the beginning of the operator training period.

1.18 OPERATOR TRAINING

- A. The Contractor shall furnish the services of factory trained specialists to instruct SAWS operating personnel. SAWS operator training shall include 12 hours of on site training in three 4 hour shifts.
- B. Before proceeding with the instruction of SAWS Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by SAWS . At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.
- C. Refer to other Division 16 Sections for additional Operator Training requirements.

1.19 SITE VISITATION

- A. Visit the site of the proposed construction in order to fully understand the facilities, difficulties and restriction attending the execution of the work.
- B. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.
- C. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.
- D. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.20 WARRANTY

- A. The undertaking of the work described in this Division shall be considered equivalent to

the issuance, as part of this work, of a specific guarantee extending one year beyond the date of completion of work and acceptance by SAWS , against defects in materials and workmanship. Materials, appliances and labor necessary to effect repairs and replacement so as to maintain said work in good functioning order shall be provided as required. Replacements necessitated by normal wear in use or by SAWS abuse are not included under this guarantee.

- B. All normal and extended warranties shall include parts, labor, miscellaneous materials, travel time, incidental expenses, freight/shipping, refrigerant, oils, lubricants, belts, filters and any expenses related to service call required to diagnose warranty problems.

1.21 TRANSFER OF ELECTRONIC FILES

- A. Project documents are not intended or represented to be suitable for reuse by Architect/ SAWS or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect, SAWS risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.
- B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/ SAWS .
- C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.
- D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.
- E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.

It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/ SAWS . The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement between Architect and SAWS .

If the client, Architect/ SAWS , or developer of the project requires electronic media for "record purposes", then an AutoCAD based compact disc ("CD") will be prepared. The "CD" will be submitted with all title block references intact and will be formatted in a "plot" format to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.

- F. At the Architect/SAWS request, Engineer will prepare one "CD" of electronic media to assist the contractor in the preparation of submittals. The Engineer will prepare and submit the "CD" to the Architect/ SAWS for distribution to the contractor. All copies of

BASIC MATERIALS AND METHODS

the "CD" will be reproduced for a cost of reproduction fee of Five Hundred Dollars (\$500.00) per "CD". The "CD" will be prepared and all title blocks, names and dates will be removed. The "CD" will be prepared in a ".dwg" format to permit the end user to revise the drawings.

- G. This Five Hundred Dollars (\$500.00) per "CD" cost of reproduction will be paid directly from the Contractor to the Engineer. The "CD" will be prepared only after receipt of the Five Hundred Dollars (\$500.00). The Five Hundred Dollars (\$500.00) per "CD" cost of reproduction is to only recover the cost of the manhours necessary to reproduce the documents. It is not a contractual agreement between the Contractor and Engineer to provide any engineering services, nor any other service.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

- A. The names and manufacturers and model numbers have been used in the Contract documents to establish types of equipment and standards of quality. Where more than one manufacturer is named for a specific item of equipment, only one of the specified manufacturers will be considered for approval. Where only one manufacturer is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer for consideration, provided the following conditions are met:

1. Submit alternate equipment with complete descriptive data in shop drawing form. Provide sample of equipment upon request for review by Architect. Samples will be returned if requested in writing.
2. Alternate equipment must be equal from the standpoint of materials, construction and performance.
3. Alternate submittal must be presented to the Engineer/Architect ten (10) days prior to bid date for approval.

- B. The Architect and Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.

2.02 All materials and products used on this project shall be listed by Underwriters' Laboratories.

2.03 ACCESS DOORS

- A. Wherever access is required in walls or ceilings to concealed junction boxes, pull boxes, equipment, etc., installed under this Division, furnish a hinged access door and frame with flush latch handle to another Division for installation. Doors shall be as follows:

1. Plaster Surfaces: Milcor Style K.
2. Ceramic Tile Surfaces: Milcor Style M.
3. Drywall Surfaces: Milcor Style DW.
4. Install panels only in locations approved by the Architect.

2.04 EQUIPMENT PADS

- A. Unless noted otherwise 4" high concrete pads for floor mounted equipment shall be installed under Division 3. Pads shall conform to the shape of the equipment with a minimum of 3" margin at equipment supports. Top and sides of pads shall be troweled to a smooth finish, equal to floor. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.

2.05 ESCUTCHEONS

- A. Provide heavy chrome or nickel plated plates, of approved pattern, on conduit passing through walls, floors and ceilings in finished areas. Where conduit passes through a sleeve, no point of the conduit shall touch the building construction. Caulk around such conduit with sufficient layers of two hour rated firesafing by Thermafiber 4.0 P.C.F. density, U.S.G. fire test 4/11/78 and seal off openings between conduit and sleeves with non-hardening mastic prior to application of escutcheon plate. Escutcheons shall be Gravler Sure-Lock, or approved equal.

2.06 SPACE LIMITATIONS

- A. Equipment shall be chosen which shall properly fit into the physical space provided and shown on the drawings, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearances in accordance with Code requirements. Physical dimensions and arrangement of equipment shall be subject to the approval of the Architect.

2.07 PAINTING

- A. All factory assembled equipment for electrical work, except light fixtures, that normally is delivered with a factory applied finish shall be delivered with a hard surface factory applied finish such as baked-on machinery enamel which will not require additional field painting. The finish shall consist of not less than 2 coats of medium gray color paint USA No. 61 Munsell Notation 8-3G, 6. 10/0.54 enamel. This Contractor shall protect this finish from damage due to construction operations until acceptance of the building. He shall be responsible for satisfactorily restoring any such finishes or replacing equipment that becomes stained or damaged.

2.08 ELECTRICAL SYSTEM IDENTIFICATION

- A. Conduit Systems: Provide adequate marking of major conduit which is exposed or concealed in accessible spaces to distinguish each run as either a power or signal/communication conduit. Except as otherwise indicated, use orange banding with black lettering. Provide self-adhesive or snap-on type plastic markers. Indicate voltage for that raceway. Locate markers at ends of conduit runs, on pull boxes, on junction boxes, near switches and other control devices, near items of equipment served by the conductors, at points where conduit passes through walls or floors, or enters non-accessible construction and at spacings of not more than 50 feet along each run of conduit. Switch-leg conduit and short branches for power connections do not have to be marked, except where conduit is larger than $\frac{3}{4}$ inch. Branch circuit conduits, junction boxes and pull boxes shall be marked with a permanent marker indicating panel name and branch circuit numbers.
- B. Underground Cable Identification: Bury a continuous, preprinted, bright colored plastic ribbon cable marker with each underground cable (or group of cables), regardless of whether conductors are in conduit, duct bank, or direct buried. Locate each directly over cables, 6 to 8 inches below finished grade.
- C. Identification of Equipment:
 - 1. All major equipment shall have a manufacturer's label identifying the manufacturer's address, equipment model and serial numbers, equipment size, and other pertinent data. Care shall be taken not to obliterate this nameplate in any way.
 - 2. A black-white-black laminated plastic engraved identifying nameplate shall be secured by stainless steel screws to each automatic transfer switch, switchboard, distribution panel, motor control center, motor starter panels and panelboards.

- a. Identifying nameplates shall have ¼ inch high engraved letters and shall contain the following information:
 - 1) Name
 - 2) Voltage
 - 3) Phase
 - 4) "3" or "4" wire, and
 - 5) Where it is fed from.
- b. An example of a panelboard nameplate is:
Center Panel – 1HB
480/277 volt, 3 phase, 4 wire
Center Fed from DP2
- c. An example of an automatic transfer switch nameplate is:
Center ATS #2
480/277 volt, 3 phase, 4 wire, 4 pole
Center Fed from MSB and DPE
3. Each feeder device in a switchboard, distribution panel, and motor control center device shall have a nameplate showing the load served in ½ inch high engraved letters.
4. A black-white-black laminated plastic engraved identifying nameplate shall be secured by screws to each safety switch, disconnect switch, individual motor starter, enclosed circuit breaker, wireway, and terminal cabinet.
 - a. Identifying nameplates shall have ¼ inch high engraved letters and shall indicate the equipment served.
 - b. An example if a disconnect switch is: AHU-1.
5. Cardholders and directory cards shall be furnished for circuit identification in panelboards. Cardholder shall be located on inside of panel door and shall be in a metal frame with clear plastic front. Circuit lists shall be typewritten. Circuit descriptions shall include location and name of each item of equipment served. Spares and spaces shall be written in erasable pencil for future use. Circuit directory shall show the room served by each circuit. The final graphs/signage room numbers shall be used. Do not use Architectural numbering on plans.
6. Prohibited Markings: Markings which are intended to identify the manufacturer, vendor, or other source from which the material has been obtained are prohibited for installation within public, tenant, or common areas within the project. Also, prohibited are materials or devices which bear evidence that markings or insignias have been removed. Certification, testing (example, Underwriters' Laboratories, Inc.), and approval labels are exceptions to this requirement.
7. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.
8. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical system, provide tags of plasticized card stock, either preprinted or hand printed. Tags shall convey the message, example: "DO NOT OPEN THIS SWITCH WHEN BURNER IS OPERATING."

PART 3 - EXECUTION

3.01 EXCAVATING AND BACKFILLING

- A. Trenching and backfilling and other earthwork operations required to install the facilities specified herein shall conform to the applicable requirements of Division 2 (95% of maximum standard density). Where trenching or excavation is required in improved areas, the backfill shall be compacted to a condition equal to that of adjacent undisturbed earth and the surface of the area restored to the condition existing prior to trenching or

excavating operations. Provide a minimum of 3" of sand underneath all conduits. The plans indicate information pertaining to surface and sub-surface obstructions; however, this information is not guaranteed. Should obstructions be encountered whether or not shown, the Contractor shall alter routing of new work, reroute existing lines, remove obstructions where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of new work and leave existing surfaces and structures in a satisfactory and serviceable condition. All work shall comply with OSHA Standards.

3.02 WORKMANSHIP AND CONCEALMENT

- A. The work of this Section shall be performed by workman skilled in their trade. Installation shall be consistent in completeness whether concealed or exposed. Each item of electrical work shall be concealed in walls, chases, under floors and above ceilings except:
 - 1. Where shown to be exposed.
 - 2. Where exposure is necessary to the proper function.

3.03 SLEEVES, CUTTING AND PATCHING

- A. This section shall be responsible for placing sleeves for all conduit passing through walls, partitions, sound walls, beams, floors, roof, etc. Sleeves through below-grade walls shall use water-tight fitting manufactured by O.Z. Gendey.
- B. All cutting and patching will be done under another Division, but this Section will be responsible for timely performance of this work and layout of holes and setting sleeves.
- C. All un-used sleeves shall be sealed with 2 hour UL approved fire sealant manufactured by "3M" or approved equal.
- D. Refer to 26 05 33 for additional requirements.

3.04 ELECTRICAL GEAR

- A. Install all electrical equipment in accordance with the National Electrical Code and as shown on the drawings.
- B. Lighting contractors, time clocks, disconnect switches, etc. mounted in mechanical/electrical rooms shall be mounted at a working height not requiring a ladder, when wall space is available. Installation of these devices at greater elevations shall be approved by the Engineer. Contractor shall provide a coordination sketch of each mechanical/electrical room noting locations and mounting heights of all electrical devices (note bottom and top elevations) shown to be installed. Sketches shall be provided to the Engineer for review and the general contractor for coordination with other trades working in these rooms.

3.05 CLEANING

- A. Clean lighting fixtures and equipment.
- B. Touch-up and refinish scratches and marred surfaces on panels, switches, starters, and transformers.

3.06 TESTS AND INSPECTIONS

- A. Tests and inspection requirements shall be coordinated with Division 1.

- B. Date for final acceptance test shall be sufficiently in advance of completion date of contract to permit alterations or adjustments necessary to achieve proper functioning of equipment prior to contract completion date.
- C. Conduct re-tests as directed by Architect on portions of work or equipment altered or adjusted as determined to be necessary by final acceptance test. No resultant delay or consumption of time as a result of such necessary re-test beyond contract completion date shall relieve Contractor of his responsibility under contract.
- D. Put circuits and equipment into service under normal conditions, collectively and separately, as may be required to determine satisfactory operation. Demonstrate equipment to operate in accordance with requirements of these specifications. Perform tests in the presence of Architect. Furnish instruments and personnel required for tests.
- E. Final Inspection:
 - 1. At the time designated by the Architect, the entire system shall be inspected by the Architect and Engineer. The contractor or his representative shall be present at this inspection.
 - 2. Panelboards, switches, fixtures, etc., shall be cleaned and in operating condition.
 - 3. Certificates and documents required hereinbefore shall be in order and presented to the Architect prior to inspection.
 - 4. Panel covers, junction box covers, etc., shall be removed for visual inspection of the wire, bus bars, etc.
 - 5. After the inspection, any items which are noted as needing to be changed or corrected in order to comply with these specifications and the drawings shall be accomplished without delay.

PART 4 - MEASUREMENT AND PAYMENT

- A. Payment will be based on each cost and lineal footage of material installed. Payments made shall be considered as full compensation for these requirements.

END OF SECTION 16050

SECTION 16110

RACEWAYS

PART 1 - GENERAL

1.01 SCOPE

- A. Provide electrical raceways and fittings as shown, scheduled and specified.
- B. The types of raceways and fittings required are as follows:
 - 1. Rigid hot-dipped galvanized steel conduit (RGS)
 - 2. Intermediate hot-dipped galvanized steel conduit (IMC)
 - 3. Electrical metallic tubing (EMT)
 - 4. PVC
 - 5. Flexible metal conduit
 - 6. Liquid-tight flexible metal conduit (non-metallic is not acceptable)
 - 7. PVC coated rigid galvanized steel conduit
 - 8. Aluminum Rigid Conduit (ARC)

1.02 STANDARDS

- A. ANSI, C80.1 & C80.3
- B. NEMA FB-1
- C. NEMA TC3
- D. UL, 6, 797 & 1242

1.03 ACCEPTABLE MANUFACTURERS

- A. Raceways
 - 1. Allied
 - 2. Triangle
 - 3. Republic
 - 3. Carlon
 - 4. Wheatland Tube
 - 5. Cantex
 - 6. Western Tube
 - 7. Robroy Industries
- B. Fittings
 - 1. Appleton
 - 2. Crouse Hinds
 - 3. Steel City
 - 4. O.Z. Gedney
 - 5. Carlon
 - 6. Raco, Inc.

1.04 SUBMITTALS

- A. Shop drawing shall include but not be limited to:

1. Cutsheets for raceways and fitting.

1.05 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

- A. National Electrical Code.
- B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 PROVIDE CONDUIT AS FOLLOWS:

- A. Except as noted or otherwise specified, all wiring shall be installed in galvanized rigid steel, rigid aluminum conduit or electrical steel tube (EMT) of the proper size to contain the number of conductors required in accordance with the latest edition of the N.E.C. Where conduit sizes are shown on the drawings, these shall take preference. Contractor shall epoxy coat galvanized rigid steel conduit for use in natatoriums.
- B. EMT in sizes up to 4 inches when concealed or not exposed to damage and located indoors only.
- C. PVC coated rigid galvanized steel shall be used for all penetrations of slab on grade.
- D. Rigid galvanized steel where embedded in concrete or masonry construction, mechanical yard or in exterior/interior applications where subject to damage.
- E. Rigid aluminum shall be used in exterior applications. (i.e. roof, top of canopies)
- F. Carlon Schedule 40 PVC may be utilized underground, in or below slab where shown on the construction documents.
- G. MINIMUM SIZE: [1/2], [3/4] inch. All homeruns shall be 3/4" minimum.
- H. PVC coated rigid galvanized steel conduit shall be coated inside and outside.
- I. PVC coated rigid galvanized steel conduit shall be used at cooling towers, corrosive areas and pool pump rooms.
- J. Fixture whips: Refer to 16510 for additional information.
- K. Flexible metal shall be used for connecting rotating equipment installed in conditioned spaces.
- L. Sealtite shall be used for connecting rotating equipment installed in non-conditioned spaces and outside.
- M. Bear the stamped approval of the UL and be approved by the Architect and Engineer.

2.02 Branch circuits run underground shall be run in Carlon Schedule 40 PVC conduit. Install ground wire in accordance with NEC table 250-122.

2.03 FITTINGS

- A. Couplings for rigid steel or intermediate conduit shall be hot dipped galvanized steel. Set screw type is not acceptable.
- B. Steel or malleable iron fittings shall be used on all other raceway types except for PVC.
- C. Couplings for aluminum raceways shall be threaded aluminum.
- D. EMT systems shall utilize steel insulated throat, set screw connectors and steel set screw couplings in all indoor conditioned spaces. EMT system shall utilize steel insulated throat, threadless, watertight compression type connectors and steel threadless watertight compression type coupling in all non-conditioned spaces.
- D. Coupling and connectors accessories and fittings for PVC coated rigid galvanized steel shall be PVC coated.
- E. Metal sealtite fittings shall be steel. Plastic is not acceptable.
- F. Provide nylon bushing on end of all low voltage cabling system conduits (sleeves, rough-ins, etc.).

PART 3 - EXECUTION

3.01 CONDUIT

A. GENERAL

The Drawings are diagrammatic, and are intended to show the general location of outlets, devices, fixtures, and arrangement and control of circuits. The Contractor shall determine exact locations by actual measurement of the building or by reference to the Architectural Drawings.

- B. Of such size, and so installed that conductors may be drawn in without injury or excessive strain.
- C. Where entering panels, pull boxes, junction boxes, or outlet boxes, shall be secured in place with lock nuts inside and outside, and insulated bushings inside.
- D. Have Red seal type VCC or approved equal cable supports in risers, as required by N.E.C.
- E. Have ends reamed after cutting and application of die.
- F. Keep conduit corked and dry during construction, and swab out before conductors are pulled.
- G. Have bends and offsets made with approved tools. Bends or offsets in which the pipe is crushed or deformed shall not be installed.
- H. Where not embedded in concrete or masonry, be firmly secured by approved clamps, half-straps or hangers.
- I. Have O.Z. Gedney or approved equal expansion fittings where crossing building expansion joints.
- J. EXPANSION JOINTS: Make provision for expansion and shifting of metal or PVC conduits where risers occur from underground.

- K. Except in the mechanical equipment rooms, run conduit concealed, and by the shortest practicable route between outlets. Install risers, drops, and offsets necessary to avoid conflict with ductwork, piping, structural members, and similar items.
- L. Install exposed conduit in mechanical rooms, and elsewhere as indicated, parallel to horizontal and vertical lines of walls, ceilings, and floors.
- M. In general, fluorescent fixtures in finished areas having suspended acoustical ceilings shall be connected to outlet boxes of lighting grid by flexible metal conduit; length not to exceed ten feet.
- N. Outlet boxes in partitions shall never be set back to back. They shall be offset to prevent undue noise transmission from room to room.
- O. Concealed conduit shall run in as direct manner as possible using long bends. Exposed conduit shall be run parallel with or at right angles to the lines of the building; and all bends shall be made with standard conduit elbows or conduit benders. Not more than equivalent of four quarter bends shall be used in any run between terminals and cabinet, of between outlet or junction boxes. Approved condulets shall be used in lieu of conduit elbows where ease of installation and appearance warrants their use and approved by the engineer. Conduit joints shall be made with approved couplings and unions.
- P. Conduits shall be continuous from outlet to outlet and from outlets to cabinets, junction or pull boxes and shall be electrically continuous throughout. Terminals of all conduits shall be provided with double lock nuts and bushing or terminated on conduit hubs. Use of running threads is prohibited.
- Q. Each entire conduit system shall be installed complete before any conductors are drawn in. Every run of conduit shall be finished before covering up to guard against obstructions and omissions.
- R. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of conduits. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel and set to extend 4" above slab.
- S. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty. All fire rating material shall be installed in accordance with manufacturer's printed instructions.
- T. All conduit shall be cleaned and swabbed to remove all foreign matter and moisture prior to pulling wire and cable. All boxes in which conduits terminate shall be cleaned of all concrete mortar and other foreign matter.
- U. Provide #30 nylon pulling line in all conduits in which permanent wiring is not installed.
- V. All conduit shall be securely fastened and supported using hot galvanized malleable iron one-hole pipe straps, clamps, hanger or other means approved by the engineer. Supports shall be as required by NEC Table 344-3 (B)(2). Tie wire shall not be used as support or securing means. Support conduit independently of ceiling hanger wire. Use all thread rods to support outlet boxes, junction boxes and conduit.
- W. When PVC conduit is routed underground, all stub-up's and 90° elbows shall be PVC

coated rigid galvanized steel. Use PVC coated rigid galvanized steel when penetrating concrete on grade.

- X. Route all conduit above grade unless otherwise noted on the construction documents.
- Y. Contact the Architect and Engineer for an installation review before covering any below grade or above grade conduit.
- Z. All new outlets shall be flush mounted. In remodeled areas where wall construction prohibits flush mounting, provide wiremold 2400 series. Verify exact location and routing with architect before installation.
- AA. Contractor shall not penetrate water proof barriers without using proper fitting to maintain barriers. This shall include exterior walls and slabs. Coordinate with Architect for proper methods.

3.02 FITTINGS

- A. Install approved expansion fitting in all conduit runs in excess of 150 feet or when crossing building expansion joints.

3.03 CONDUIT CORROSION PROTECTION

- A. Branch circuit conduits installed in concrete slabs on fill or grade shall be positioned in a manner to ensure complete concrete cover. In no case shall such conduits be exposed below or above the slab surfaces, or penetrate the waterproof membrane.
- B. At locations where metallic conduits pass through slabs on grade or transitions below grade, PVC coated rigid galvanized conduit shall be used.

3.04 OUTLET AND JUNCTION BOXES

- A. Provide an approved galvanized outlet box with adequate volume for number of conductors installed.
- B. Provide standard galvanized switch boxes of the required number of gangs. Switch boxes where conduit is exposed shall be handy boxes or approved equal.
- C. Outlet boxes for receptacles shall be similar to Universal 52151 with suitable raised cover. Receptacle boxes where conduit is exposed shall be handy boxes or approved equal.
- D. Weatherproof boxes shall be FS or FD. Provide these boxes in all non-conditioned areas, exterior areas and natatoriums.
- E. Outdoor boxes shall be NEMA 3R, with conduit connections made by Myers Hubs.
- F. See notes and details on Drawings for special box requirements.
- G. Provide junction boxes required to facilitate installation of the various conduit systems. Provide support boxes required for risers, each complete with approved cable supports as described elsewhere in this Division.
- H. Outlet boxes for drywall shall be standard galvanized 4" square boxes with the appropriate device cover.
- I. Provide floor outlet fittings for telephone to match fittings for duplex floor receptacles.

- J. Provide 3-1/2" deep gangable masonry boxes in all masonry wall (CMU). Steel City GW-135-G or approved equal.
- K. Provide shallow 4"x4" boxes in all demountable partitions.
- L. Metallic boxes located in fire rated walls or partitions shall be separated by a minimum horizontal distance of 24 in. This minimum separation distance between metallic boxes may be reduced when "Wall Opening Protective Materials" (CLIV) are installed according to the requirements of their Classification. Metallic boxes shall not be installed on opposite side of walls or partitions of staggered stud construction unless "Wall Opening Protective Materials" are installed with the metallic boxes in accordance with Classification requirements for the protective materials.
- M. Junction, pull boxes, condulets, gutters, disconnects, contactors, etc., above 2-foot x 2-foot grid ceilings shall be mounted within 18-inches of ceiling grid. Above 2-foot x 4 – foot grid ceiling they shall be mounted within 30-inches of ceiling grid. All junction box, pull box, gutter openings shall be side or bottom accessible.

3.05 THRU-WALL SEALS

- A. Provide O.Z. Gedney "Thru-wall" seals for all conduits passing through concrete structure below grade, above grade, and floor penetrations below grade. These prevent moisture from entering the building.
- B. Straight sleeves are not acceptable.

3.06 PULL BOXES

- A. Pull boxes shall be provided for conduit systems as required and shall be constructed of galvanized steel of not less than gauge and size specified by National Electrical Code.
- B. Where two or more feeders pass through a common pull box, they shall be tagged to indicate clearly their electrical characteristics, circuit number, and panel designation.

3.07 WIREWAYS

- A. Wireways shall be installed as indicated or required and locations shall be coordinated with architect.
- B. Wireways shall be made of not less than 16-gauge sheet steel for 4 inch and 6 inch square sizes and 14 gauge steel for 8 inch and 12 inch square sizes. Couplings end plates, and knockouts shall be furnished as required. Each section of wireways shall be rigidly supported.
- C. Wiring in wireways shall be neatly bundled, tied and suitably tagged.
- D. The finish shall be ANSI-49 gray epoxy paint applied by a cathodic electrodeposition paint process over a corrosion resistant phosphate preparation for NEMA 1 wireways. Provide galvanized steel for NEMA 3R wireways. NEMA 3R wireways and auxiliary gutters are for horizontal mounting only.

END OF SECTION

SECTION 16120

WIRE, CABLE AND RELATED MATERIALS

PART 1 - GENERAL

1.01 SCOPE

- A. Provide 600 volt building wire, cable and connectors and 300 volt wire, cable and connectors.
- B. WORK INCLUDED: Include the following Work in addition to items normally part of this Section.
 - 1. Wiring for lighting and power.
 - 2. Automatic Control Wiring.
 - 3. Connection of equipment shown.
 - 4. Fire Alarm System.
- C. WORK SPECIFIED ELSEWHERE:
 - 1. Heating, ventilating, and air conditioning equipment.
 - 2. Structured cabling system.
 - 3. Coaxial cables

1.02 STANDARDS

- A. UL83
- B. ASTM B-3
- C. All wire cable and connectors shall be UL approved.

1.03 ACCEPTABLE MANUFACTURERS

- A. 600 VOLT WIRE AND CABLE
 - 1. Southwire
 - 2. Encore
 - 3. Cerro
 - 4. Tyco Thermal Controls
- B. 300 VOLT WIRE AND CABLE
 - 1. Westpenn
 - 2. Beldon
 - 3. Alpha
 - 4. Tappan-Southwire
- C. FLEXIBLE CABLE SYSTEMS
 - 1. AFC Modular Cable Systems
- D. CONNECTORS
 - 1. AMP-TYCO

2. Burndy
3. Ideal
4. 3M
5. O.Z. Gedney
6. Thomas & Betts

1.04 SUBMITTALS

- A. Shop drawings shall include, but not limited to:
 1. Cutsheets of wire, cable and connectors to indicate the performance, fabrication procedures, product variations, and accessories.

1.05 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

- A. National Electrical Code.
- B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 WIRING

- A. All wire shall be new and continuous without weld, splice, or joints throughout its length. It must be uniform in cross-section, free from flaws, scales and other imperfections.
- B. WIRE MATERIAL: Soft drawn, annealed, 98% pure copper, with tin coating. Aluminum wiring is not acceptable.
- C. TYPES:
 1. Provide type "THHN/THWN" insulation for all buried feeders and service entrance conductors.
 2. Provide type "THHN/THWN" insulation for all branch circuits and above grade feeders.
 3. All wire No. 8 and larger shall be stranded. All wire No. 10 and smaller shall be stranded or solid.
 4. Provide type "XHHW" or other 90 degrees insulation wiring for branch circuit wiring installed through continuous rows of fluorescent fixture bodies.
 5. All 300-volt cable including but not limited to telephone, fire alarm, data, CATV and security shall be UL listed for use in return air plenums.
- D. CONDUCTOR SIZES
 1. Feeder conductors shall be sized for a maximum of 2% drop in rated voltage at scheduled load.
 2. Branch circuit conductors shall be sized for a maximum 3% drop in the rated voltage to the longest outlet on the circuit.
 3. Minimum wire shall be No. 12, unless otherwise shown on Drawings or required by Code
- E. COLOR CODING: No. 6 or larger shall use tape for color coding. No. 8 and smaller wire shall be color coded in accordance with the governing authority requirements or as follows:

120/208 VOLT
NEUTRAL: White
PHASE A: Black
PHASE B: Red
PHASE C: Blue
GROUND: Green

277/480 VOLT
Neutral: Gray
Phase A: Brown
Phase B: Purple
Phase C: Yellow
Ground: Green

120/240 VOLT
Neutral: White
Phase A: Black
Phase B: Orange
Phase C: Blue
Ground: Green

2.02 GROUNDING

Permanently connect all conduit work, motors, starters, and other electrical equipment to grounding system in accordance with the National Electrical Code.

PART 3 - EXECUTION

3.01 WIRE

- A. Do not pull wire into conduit until Work of an injurious nature is completed. Where two or more circuits run to a single outlet box, each circuit shall be properly tagged. Wyreze or approved equal may be used as a lubricant where necessary.
- B. Splices shall be fully made up in outlet boxes with compression crimp-on type splice connectors.
- C. Joints and splices will not be permitted in service entrance or in feeders. Joints in branch circuits will be permitted where branch circuits divide, and then shall consist of one through-circuit to which the branch shall be spliced. Joints shall not be left for the fixture hanger to make. Connect joints and splices with Buchanan Series "2000" solderless connectors complete with insulating caps or properly sized wire nuts.
- D. All stranded conductors shall be furnished with lugs or connectors.
- E. Connectors furnished with circuit breakers or switches shall be suitable for copper wire termination.
- F. "Sta-Cons" shall be used to terminate stranded conductors on all switches and receptacles.
- G. Metal Clad Cable - Type MC
 - 1. Not Allowed.
- G. Armored Cable - Type AC
 - 1. Not Allowed.
- H. All stranded #10 and small conductors shall be terminated with an approved solderless terminal if the device or light fixture does not have provisions for clamp type securing of the conductor.
- I. The jacket for all travelers used on 3-way and 4-way switches shall be pink.

3.02 BALANCING SYSTEM

The load on each distribution and lighting panel shall be balanced to within 10% by proper

arrangement of branch circuits on the different phase legs. Provide written documentation showing results. Submit with O & M manuals.

3.03 LOW VOLTAGE WIRING

- A. Low voltage wiring shall be plenum rated. All wiring in mechanical rooms, electrical rooms, drywall ceiling, inaccessible areas, underground, plaster ceiling, inside concealed walls areas exposed to occupant view, and other areas subject to physical damage shall be run in conduit.
- B. Low voltage wiring shall be routed in separate raceways from power wiring systems.
- C. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of wiring. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel.

3.04 CABLE SUPPORTS

- A. Provide cable supports in all vertical raceways in accordance with Article 300-19 of the NEC.

3.05 DEFECTS

- A. Defects shall include, but are not to limited to, the following:
 - 1. Tripping circuit breakers under normal operation.
 - 2. Improperly connected equipment.
 - 3. Damaged, torn, or skinned insulation.

PART 4 - MEASUREMENT AND PAYMENT

- A. Payment will be based on each cost and lineal footage of material installed. Payments made shall be considered as full compensation for these requirements.

END OF SECTION

SECTION 16490

SAFETY AND DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 SCOPE

- A. Provide safety and disconnect switches as shown, scheduled and as specified herein.

1.02 STANDARDS

- A. Products shall be designed, manufactured, tested and installed in compliance with applicable standards.
 - 1. NEMA KS1 - Enclosed switches
 - 2. Federal specification W-S-865C-Heavy duty switches
- B. Products shall conform all applicable UL standards, including UL98 (standard for safety, enclosed and dead front switches) and shall be UL-labeled.

1.03 ACCEPTABLE MANUFACTURERS

- A. Provide one of the following manufacturers:
 - 1. General Electric Company
 - 2. Square D Company
 - 3. Siemens
 - 4. Eaton

1.04 SUBMITTALS

- A. Shop drawings shall include, but not be limited to:
 - 1. Cutsheets of switches with ratings, physical dimensions and all accessories clearly labeled.

1.05 REQUIREMENTS OF REGULATORY AGENCIES

- A. WORK IN ACCORDANCE WITH:
 - 1. National Electrical Code.
 - 2. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Furnish and install heavy duty type safety switches with the number of switched poles as indicated on the plans and specifications. All safety switches shall be NEMA Heavy Duty Type HD, and Underwriters Laboratories listed.

2.02 MATERIALS AND COMPONENTS

- A. Switch Interior

All switches shall have switch blades that are fully visible in the "OFF" position when the door is open. Switches shall have removable arc suppressor where necessary, to permit easy access to line side lugs. Lugs shall be front removable and UL listed for 60°C and 75°C copper or aluminum cables. All switches blades and contacts shall be plated copper. Adjust fuse block to accept Class J fuses.

B. Switch Mechanism

Switches shall have a quick-make and quick-break operating handle and mechanism, which shall be an integral part of the box, not the cover. Padlocking provisions shall be provided for locking in the "OFF" position with at least three padlocks. Switches shall have a dual cover interlock to prevent unauthorized opening of the switch door when the handle is in the "ON" position, and to prevent closing of the switch mechanism with the door open. A means shall be provided to permit authorized personnel to release the interlock for inspection purposes. Handle position shall indicate if switch is "ON" or "OFF".

C. Neutral

Provide a solid neutral with the safety switch where a neutral is present in the circuit.

D. Ratings

Switches shall be horsepower rated for ac and/or dc as indicated by the plans. The fused switches shall have Class R rejection fuse clips. UL listed short circuit ratings of the switches, when equipped with Class R fuses, shall be 200,000 symmetrical amperes.

E. Enclosures

1. Indoor switches shall be furnished in NEMA 1 enclosures.
2. Outdoor switches, switches located in wet areas or sprinkled areas shall be furnished in NEMA 3R enclosures.
3. Switches installed in wet areas such as cooling tower areas shall be NEMA 4X stainless steel or fiberglass reinforced polyester.
4. Switches installed in kitchens shall be stainless steel.
5. Switches installed in areas of a corrosive nature and subjected to salt air shall be NEMA 4X stainless steel or fiberglass reinforced polyester.

F. Service Entrance

Switch shall be suitable for use as service entrance equipment when installed in accordance with the National Electrical Code.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install safety and disconnect switches, including electrical connections, and fuses in accordance with manufacturer's written instructions, NEC and recognized industry practices.
- B. Location: Install switches within sight of controllers.
- C. Hubs: Provide bolt-on hubs for rainproof or wet area applications.

3.02 IDENTIFICATION

- A. Nameplate: Each disconnect switch shall have an engraved bakelite nameplate. Nameplates shall be white with black letters and show equipment served. Nameplate shall be attached with stainless steel screws.

PART 4 - MEASUREMENT AND PAYMENT

- A. Payment will be based on each cost and lineal footage of material installed. Payments made shall be considered as full compensation for these requirements.

END OF SECTION

16490-2



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MEMO

To:
Jeff Tyler, PE (San Antonio River Authority)

Cc
Walter Heard (Terra Design Group)
Fred Blumberg, Danny Applegate, PE

From:
Jody Hughey

Date:
August 25, 2014

ARCADIS Project No.:
06353029.0000

Subject:
Westside Creeks/Apache, San Pedro, Alazan, Martinez
Floodplain Impact Assessment of Proposed Improvements over Alazan and San
Pedro Creeks and Along the Alazan and Martinez Trails Phases of the Project

Introduction

The purpose of this memorandum is to document the results of the floodplain impact assessment for the proposed Alazan Creek, Martinez Creek, Apache Creek and San Pedro Creek hike and bike trail improvements which are part of the Westside Creeks Restoration Project.

Alazan and Martinez

The Federal Emergency Management Agency (FEMA) has designated Alazan Creek, Martinez Creek, and their surrounding floodplains within the project area as a Zone AE Special Flood Hazard Areas (SFHA) with no established floodways. FEMA regulations require coordination with FEMA if the project will result in an increase in the base floodplain elevations.

However, there are no crossings of FEMA designated SFHA's or floodways as part of the Alazan Creek and Martinez Creek improvements. In addition, the trail improvements along Alazan and Martinez Creeks are being constructed at or below existing grading and will not result in the placement of significant fill or other obstructions within the designated floodplain.

Therefore, the trail improvements along Alazan and Martinez Creeks would not be expected to increase base floodplain elevations and a floodplain impact assessment and coordination with FEMA is not required.

Apache and San Pedro

The proposed Apache and San Pedro improvement phases include grading within the limits of the 100-year floodplain and two new trail crossings of Alazan Creek (just upstream of the confluence of Apache Creek with Alazan Creek) and San Pedro Creek (just upstream of the confluence of Apache Creek with San Pedro Creek).

The floodplain impact assessment was based on the 95% design plans submitted previously to the San Antonio River Authority (SARA) by Terra Design Group. The results are subject to change pending assessment of the final design.

The Federal Emergency Management Agency (FEMA) has designated Apache Creek, San Pedro Creek, Alazan Creek and their surrounding floodplains within the project area as a Zone AE Special Flood Hazard Areas (SFHA) with no established floodways. FEMA regulations require coordination with FEMA if the project will result in an increase in the base floodplain elevations. Hydraulic modeling was performed to determine if the proposed project results in an increase in the base floodplain elevations.

Based on an initial comparison of the existing and proposed conditions modeling results, the proposed Alazan Creek crossing does not increase the base floodplain elevations on Alazan Creek, resulting in a “no-rise” condition for the Alazan Creek crossing.

Based on an initial comparison of the existing and proposed conditions modeling results, the proposed San Pedro Creek crossing results in a slight increase in the base floodplain elevation on San Pedro Creek. The increase of 0.03-feet is contained within the channel, and occurs at a single cross-section approximately 90-feet downstream of the proposed crossing.

The following offers a more detailed discussion of the modeling effort and results.

Modeling Methodology (Apache and San Pedro)

HEC-RAS version 4.1.0 was used to evaluate the effects of the proposed project on the base floodplain elevations. The effective models for Alazan and San Pedro Creeks were obtained from SARA during an earlier phase of the project.

The effective models were run in HEC-RAS version 4.1.0 to confirm that the results matched the information in the effective Flood Insurance Study (FIS). The effective models serve as the duplicate

effective models because the results of running it in HEC-RAS version 4.1.0 match the effective FIS information. The duplicate effective models were then modified to reflect the existing conditions by:

- Replacing station elevation data for cross-sections within the study reach with data based on field survey; and
- Adding additional cross-sections where needed to model the proposed trail crossings and the proposed grading.

The proposed conditions models of Alazan and San Pedro Creeks were formed by updating the existing models with the proposed trail crossings at stations 157 (Alazan Creek) and 9610 (San Pedro Creek), and updating cross sections as needed just upstream and downstream of the crossings to reflect proposed grading.

Results (Apache and San Pedro)

Modeling based on the 95% design submittal resulted in a “no-rise” condition (no increase in the 100-year WSEL when compared to existing conditions) on Alazan Creek.

Modeling based on the 95% design submittal resulted in a slight increase the base floodplain elevations on San Pedro Creek when compared to existing conditions. The increase is limited to 0.03-feet, is contained within the channel, and occurs at a single cross-section approximately 90-feet downstream of the proposed crossing. At all other cross-sections there was either a decrease in WSEL or no change.

**Floodplain Impact Assessment Results
for
Westside Creeks Restoration Project/Alazan Creek Trail Crossing**

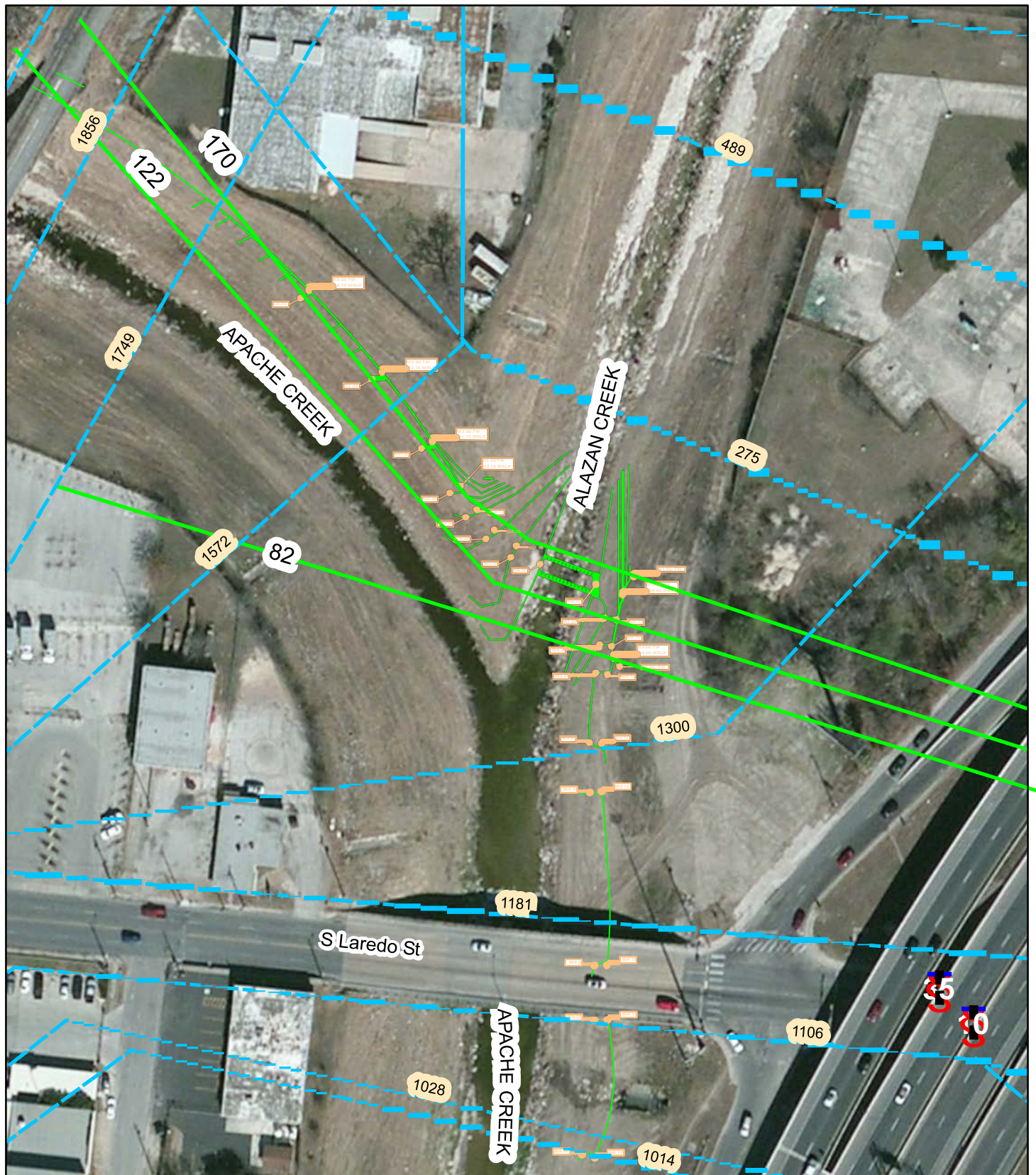
NOTE: The results below provide a comparison between existing conditions and the proposed 95% design submitted to SARA

River Sta	Profile	Plan	Q Total	Min Ch EI	W.S. Elev	Delta WSEL (100-year Proposed - Existing)
611	0.01	Proposed	27935	608.97	627.07	
611	0.01	Alazan MP Rev Ex	27935	608.97	627.07	0
489	0.01	Proposed	27935	608.23	624.43	
489	0.01	Alazan MP Rev Ex	27935	608.23	624.43	0
275	0.01	Proposed	27935	605.06	621.67	
275	0.01	Alazan MP Rev Ex	27935	605.06	621.67	0
170	0.01	Proposed	27935	604	620.33	
170	0.01	Alazan MP Rev Ex	27935	604	620.54	-0.21
157			Bridge			
122	0.01	Proposed	27935	604	621.03	
122	0.01	Alazan MP Rev Ex	27935	604	621.51	-0.48
82	0.01	Proposed	27935	604	617.69	
82	0.01	Alazan MP Rev Ex	27935	604	617.99	-0.3

**Floodplain Impact Assessment Results
for
Westside Creeks Restoration Project/San Pedro Creek Trail Crossing**

NOTE: The results below provide a comparison between existing conditions and the proposed 95% design submitted to SARA

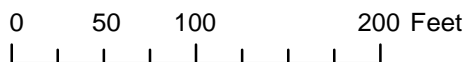
River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Delta WSEL (100-year Proposed - Existing)
10022	100	Proposed	6896	606.3	627.91	
10022	100	100 year Rev	6896	606.3	628.65	-0.74
9900	100	Proposed	6896	604.79	627.93	
9900	100	100 year Rev	6896	604.79	628.67	-0.74
9629	100	Proposed	6896	601	627.95	
9629	100	100 year Rev	6896	601	628.68	-0.73
9610			Bridge			
9587	100	Proposed	47576	600.13	627.98	
9587	100	100 year Rev	47576	600.13	627.98	0
9500	100	Proposed	47576	600.79	627.02	
9500	100	100 year Rev	47576	600.79	626.99	0.03
9395	100	Proposed	47576	600.79	626.85	
9395	100	100 year Rev	47576	600.79	626.85	0
9348	100	Proposed	47576	600.79	626.77	
9348	100	100 year Rev	47576	600.79	626.77	0
9319			Bridge			
9290	100	Proposed	47576	600.79	626.04	
9290	100	100 year Rev	47576	600.79	626.04	0
9233	100	Proposed	47576	600.79	625.83	
9233	100	100 year Rev	47576	600.79	625.83	0
9100	100	Proposed	47576	600.79	625.2	
9100	100	100 year Rev	47576	600.79	625.2	0
8900	100	Proposed	48543	600.79	625.39	
8900	100	100 year Rev	48543	600.79	625.39	0
8754	100	Proposed	48543	600.79	624.56	
8754	100	100 year Rev	48543	600.79	624.56	0
8720			Bridge			
8686	100	Proposed	48543	600.79	622.01	
8686	100	100 year Rev	48543	600.79	622.01	0
8500	100	Proposed	48543	599.79	621.65	
8500	100	100 year Rev	48543	599.79	621.65	0
8137	100	Proposed	48543	595.84	620.95	
8137	100	100 year Rev	48543	595.84	620.95	0



LEGEND

- — — — — Effective FEMA Cross-Sections
- — — — — New Cross-Sections

**Westside Creeks Restoration Project
Alazan Creek Crossing
(HEC-RAS Cross-Section Location Map)**

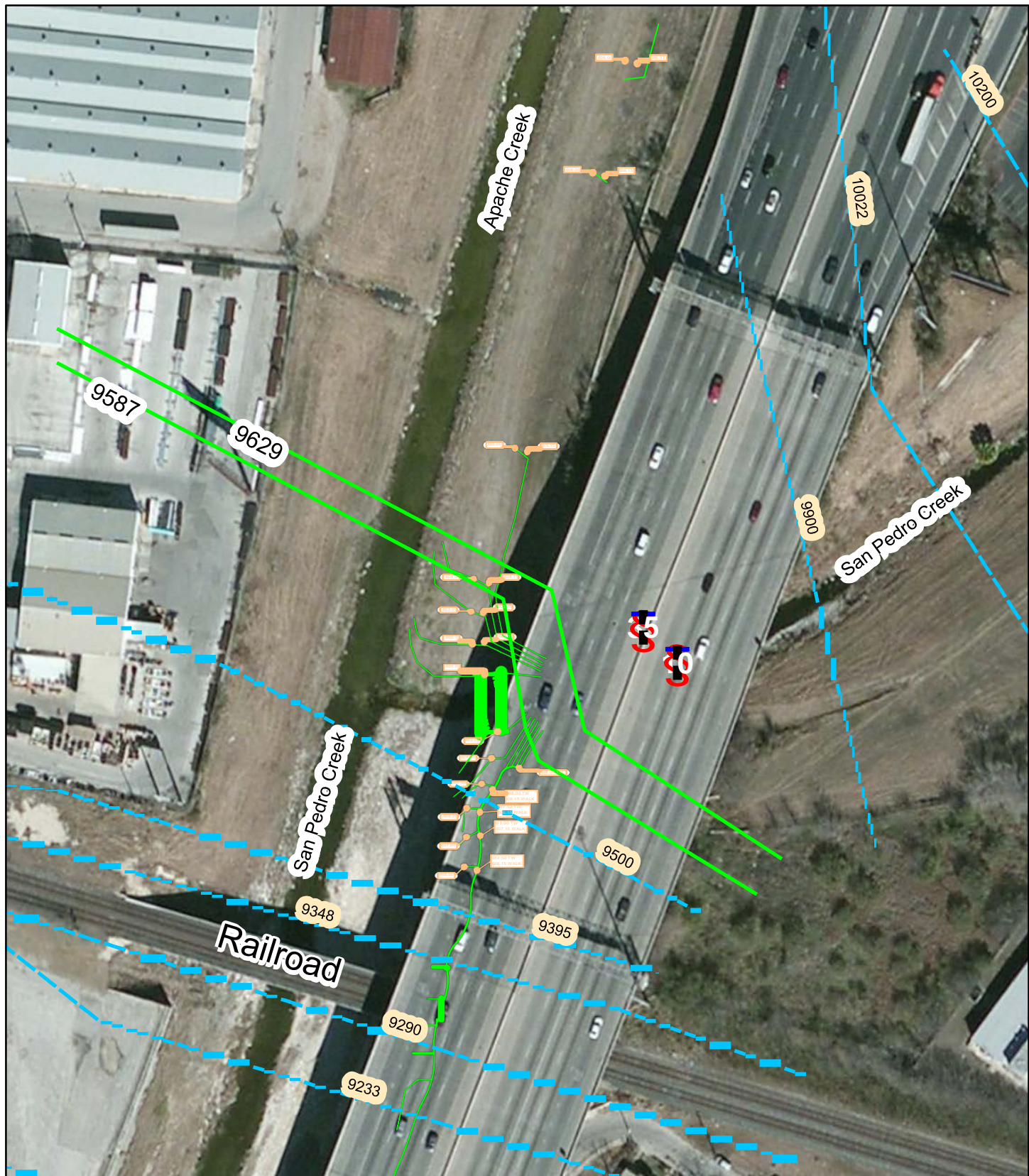


San Antonio River Authority



FIGURE

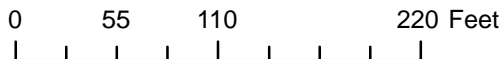
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LEGEND

- Effective FEMA Cross-Sections
- New Cross-Sections

**Westside Creeks Restoration Project
San Pedro Creek Crossing
(HEC-RAS Cross-Section Location Map)**



San Antonio River Authority



FIGURE

3



APPENDIX B

Imagine the result

San Antonio River Authority

Stormwater Pollution Prevention Plan (SWPPP)

Westside Creeks Improvement Project

North Apache Creek Trail

Bexar County, Texas

February 2015



Stormwater Pollution Prevention Plan

Westside Creeks
Improvement Project
North Apache Creek Trail

Prepared for:
San Antonio River Authority

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Our Ref.:
06353029.0001

Date:
February 2015

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Appendix C: Notice of Intent

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Appendix G: Texas Commission on Environmental Quality
General Permit to Discharge Under the
Texas Pollutant Discharge Elimination System
(TPDES General Permit No. TXR150000)



1 STORMWATER POLLUTION PREVENTION PLAN CERTIFICATION

Contract Number: _____ Project: _____
Owner: _____

Each Contractor and Subcontractor identified in the Stormwater Pollution Prevention Plan (SWPPP) must certify that they understand the permit conditions and their responsibilities. Every Contractor and Subcontractor performing an activity that involves soil disturbance shall sign this certification and provide it to the Engineer prior to performing Work. This certification shall be signed by an Owner, Principal, President, Secretary or Treasurer of the firm.

I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP for the construction site identified in such SWPPP as a condition of authorization to discharge stormwater. I also understand that my firm and its employees and subcontractors must comply with the terms and conditions of the Owner’s general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards.

Firm: _____

Address: _____

City: _____ State _____ Zip _____

Name (Print)

Signature

Date

Title

2 CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the federal Water Pollution Control Act, the Texas Commission on Environmental Quality (TCEQ) General Permit, and National Pollutant Discharge Elimination System (NPDES) permit that authorizes the stormwater discharges associated with construction activity from the project site identified as part of this certification.

SIGNATURE	COMPANY	RESPONSIBLE FOR
		General Contractor
		Temporary and Permanent Stabilization Practices
		Stabilization Construction, Entrances, Earth Dikes, and Sediment Basins

3 OVERVIEW

This Stormwater Pollution Prevention Plan (SWPPP) was prepared according to the requirements of the Texas Pollutant Discharge Elimination System (TPDES) General Permit No. TXR150000 for stormwater discharges associated with construction activity. These requirements became effective on March 5, 2013. This Plan describes the best management practices (BMPs) to be implemented during the Westside Creek Improvement Project (Project) in Bexar County, Texas, to prevent the release of pollutants to the waters of the state during construction activities. The Westside Creek Improvement Project involves the construction of trails along Alazán, Martínez, Apache, and San Pedro Creeks. This SWPPP covers the northern portion of the Apache Creek Trail. This permit was developed using the document entitled “Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites” (USEPA document 833-R-06-004, May 2007).

This SWPPP includes the following information:

- A site description that provides an overview of the planned site activities;
- Identification of potential pollutant sources;
- Sequence of major construction activities;
- Identification of BMPs that will be implemented to reduce pollutants in stormwater discharges;
- Inspection and maintenance requirements; and
- Recordkeeping and reporting requirements.

3.1 Project Description

In order to meet public needs for outdoor recreation and connectedness, as well as environmental requirements for purifying threatened and impaired waters classified under Section 303(d) of the Clean Water Act, San Antonio River Authority (SARA) will be implementing trail and park improvements along Apache Creek (Figure 1). Construction will include the addition of hike and bike trails along 1 mile of Apache Creek from Elmendorf Lake Park at 19th Street to Potosi Street in Cassiano Park. The project will disturb approximately 3 acres.

3.2 Project Site

The trails will be located along Apache Creek within the San Antonio watershed on the west side of San Antonio, Texas in Bexar County. Apache Creek begins at Elmendorf Lake and flows in a southerly direction until its confluence with San Pedro Creek under the I-35/I-10 overpass. The

Project is located within a Municipal Separate Storm Sewer System (MS4) managed by San Antonio Water System (SAWS). An MS4 is a publicly-owned system that collects storm water and discharges it to waters of U.S. and is responsible for the quality of the water that it discharges.

3.2.1 Ecoregion

The project is within the Texas Blackland Prairies ecoregion. This ecoregion is characterized by deep, fertile, black soils. Historically, the ecoregion was dominated by tall grass prairies. Dominant plant species include little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), sideoats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), tall dropseed (*Sporobolus asper*), silver bluestem (*Bothriochloa saccharoides*), and Texas winter-grass (*Nassella leucotricha*) (EPA 2014a). Within San Antonio, a majority of the region has been converted to industrial and commercial use, as is the case with the land surrounding the project areas.

3.2.2 Hydrology

Receiving water at the site is Apache Creek. Stormwater runoff will occur from construction activities along the perimeter of the creek and from surrounding roadways. Currently, stormwater drainage pipes convey water from roadways that run perpendicular to the creek. Construction will include retaining walls and concrete flumes to convey water off roads into the creek.

The Apache Creek watershed spans approximately 23.4 square miles, stretching from just north of the intersection of Fredericksburg Road and Wurzbach Road to the confluence with Alazán Creek near Laredo Street.

Apache creek is located within the Upper San Antonio 8-digit hydrologic unit code 12100301. The San Antonio River is the major river within the basin. It begins in Bexar County and flows southeast approximately 240 miles to drain into the Guadalupe River in Refugio County.

Federal Emergency Management Agency (FEMA) floodplain maps were referenced to determine the presence of floodplains within the Project area. According to these resources, a large portion of the Project area is located within Flood Zone A. Zone A is defined as the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the one percent annual chance flood can be carried without substantial increases in flood heights. There will be no changes to flood zone elevations as a result of this project.

3.2.3 Wetlands

Wetlands are defined by the U.S. Army Corps of Engineers (USACE) (33 Code of Federal Regulations (CFR) 328.3, 1986) and the U.S. Environmental Protection Agency (EPA) (40 CFR

230.3, 1980) as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Many wetlands and other aquatic features, including ephemeral, intermittent, and perennial streams, are considered waters of the U.S. by the USACE and deemed “jurisdictional” under Section 404 of the Clean Water Act. There were no wetlands identified within the limits of the project. In addition, the project is being completed in conjunction with the USACE; therefore, the stream crossings are covered under their riparian restoration project.

3.2.4 Soils

Multiple soil associations are present at the project area. The site is primarily located within the U.S. Department of Agriculture (USDA)-Natural Resources Conservation Service (NRCS) listed Tinn-Frio soil series. These soils formed in calcareous clayey alluvial sediments. The climate associated with this series is subhumid with mean annual precipitation ranging from 28 to 40 inches and mean annual temperature ranging from 65 to 70 degrees Fahrenheit (F). Frost free days range from 220 to 280 days and elevation ranges from 300 to 700 feet (NRCS 2012).

The Tinn series (Tinn and Frio soils, 0 to 1 percent slopes, frequently flooded; USDA NRCS-listed hydric soil) consists of very deep; moderately well drained, very slowly permeable soils that formed in calcareous clayey alluvium. Soils are on nearly level flood plains. Slopes are mainly less than 1 percent, but some are as much as 2 percent. Mean annual precipitation ranges from 32 to 42 inches, and mean annual temperature ranges from 64 to 68 degrees F. Frost free days range from 230 to 270 days and elevation ranges from 250 to 550 feet (NRCS 2012).

The Frio series (Tinn and Frio soils, 0 to 1 percent slopes, frequently flooded; USDA NRCS- listed hydric soil) consists of very deep, well drained, moderately slowly permeable soils that formed in loamy and clayey calcareous alluvium. These flood plain soils have slopes ranging from 0 to 2 percent. Soils are on flood plains of major streams. The alluvium derived mainly from soils that formed in limestone of Cretaceous age. The climate is moist subhumid. Mean annual precipitation ranges from 25 to 36 inches; mean annual temperature is 64 to 68 degrees F. Frost free days range from 220 to 260 and elevation ranges from 400 to 1700 feet above sea level (NRCS 2012).

A small segment is also located within the Lewisville series (silty clay, 0 to 1 percent slopes, well-drained). These are very deep, well drained, moderately permeable soils that formed in ancient loamy and calcareous sediments. These soils have slopes ranging from 0 to 10 percent, but are mostly between 2 and 6 percent. Mean annual precipitation is between 28 and 38 inches, and mean annual temperature is about 66 degrees F.

4 CONSTRUCTION ACTIVITIES

4.1 Sequence of Major Construction Activities

Construction is scheduled to begin in April 2015 and be complete by December 2015. Storm drain inlet protections, where appropriate, and BMPs will be installed before the start of construction.

4.2 Potential Pollutants

The primary stormwater contaminants expected to be generated during the Phase I construction activities are soil particles that can affect the turbidity of the site run-off water. This type of contamination can be generated when stormwater comes in contact with disturbed soils or with stockpiles of construction materials such as fill dirt, sand, rock, etc.

Mechanisms that can result in increased sediment loadings in stormwater include:

- Direct impingement of rain onto material stock piles and/or disturbed sloped areas where force of the rain impact results in the dislodging and entrainment of particles;
- Direct erosion of disturbed areas by stormwater flow (this can be from either sheet flow or channelized flow); and
- The tracking of site soils or material via equipment or vehicle tires onto non-disturbed areas or onto paved areas where they are washed into drainage ditches.

There is a potential for oil and grease from vehicles and equipment, and from fuel spillage on the site, to come into contact with stormwater. Oil and grease contamination is generally the result of equipment failure which results in a direct discharge, or of routine and non-routine vehicle and equipment maintenance operations. Releases of oil and/or grease to the ground during maintenance activities are usually the result of either accidental spillage while adding or draining fluids, or by intentional discharge of spent fluids or fluid residues. Releases of fuel occur as a result of spillage during on-site fueling operations or leakage from temporary fuel storage tanks. Since most large construction equipment operates hydraulically, there is also the potential that release of hydraulic fluids may occur. Primary release mechanisms include failure (rupture) of hydraulic hoses, seal failures on hydraulic pistons, and spillage during maintenance activities.

Other potential stormwater pollutants include solid waste and debris. These wastes may come into contact with stormwater if their storage containers (e.g., drums or roll-off bins) are not properly covered when not receiving or removing wastes.

5 STORMWATER POLLUTION CONTROLS

Generation of waste will be minimized to the greatest extent possible. Waste generated during construction activities will be managed in accordance with applicable laws and regulations.

Portable sanitary waste units may be made available if required. All sanitary wastes from the portable units will be managed by a licensed sanitary waste management company, as required by the local government agencies. In the case that a hazardous spill should occur, the Contractor will notify the construction manager right away, contain the spill and implement corrective actions. In addition:

- No hazardous materials, chemicals, fuels, or lubricating oils will be stored within 100 feet of any waterbody, or within any designated municipal watershed area where feasible.
- All construction equipment will be refueled at least 100 feet from any waterbody where feasible.

5.1 Structural Erosion Controls

This section will discuss the applicability, alternatives, and limitations for silt fences, sediment basins, and stabilized entrances. Silt fences are typically used near roads, waterways, and during grading. Structural control placement is shown in Figure 2.

5.1.1 Riprap

Riprap is a layer of stones that may be made of a variety of rock types and sizes. It is useful for protecting exposed slopes from erosion and can be used in sediment traps. Riprap is useful for controlling erosion caused by both water and wind. Riprap will be used within drainage outfalls as indicated in Figure 5.

5.1.1.1 Applicability

Riprap can be used to stabilize cut-and-fill slopes; channel side slopes and bottoms; inlets and outlets for culverts, bridges, slope drains, grade stabilization structures, and storm drains; and stream banks and grades (EPA 2013).

Limitations

- Riprap must not be used on slopes greater than 2:1 because riprap may be lost due to erosion and sliding
- Improper use can increase erosion
- May be more expensive than other stabilization options

5.1.1.2 Siting and Implementation Guidelines

Prior to installation the following guidelines will be considered (Smolen et al., 1988):

- *Gradation.* Use a well-graded mixture of rock sizes instead of one uniform size.
- *Quality of stone.* Use riprap material that is durable so that freeze and thaw cycles do not decompose it in a short time; most igneous stones, such as granite, have suitable durability.
- *Riprap depth.* Make the riprap layer at least two times as thick as the maximum stone diameter.
- *Filter material.* Apply a filter material—usually a synthetic cloth or a layer of gravel—before applying the riprap. This prevents the underlying soil from moving through the riprap.
- *Riprap Limits.* Place riprap so it extends to the maximum flow depth, or to a point where vegetation will be satisfactory to control erosion.
- *Curves.* Ensure that riprap extends to five times the bottom width upstream and downstream of the beginning and ending of the curve and the entire curved section.
- *Riprap Size.* The size of the riprap material depends on the shear stress of the flows the riprap will be subject to, but it ranges from an average size of 2 inches to 24 inches in diameter.
- *Wire Riprap Enclosures.* Consider using chain link fencing or wire mesh to secure riprap installations, especially on steep slopes or in high flow areas.

Installation Procedures for Riprap

- A filter of crushed rock, gravel, or filter fabric must be placed underneath the rock.
- If using filter fabric sheets place geotextile with the machine direction parallel to the direction of water flow and overlap adjacent sheets by at least 12 inches in a shingle pattern.
- Begin riprap placement at the toe and proceed up slope.
- Backfill all holes with smaller stone to ensure full coverage.
- After placement, avoid grading that would result in movement of riprap.

Maintenance

- Riprap will be inspected annually and after major storm events.
- Damaged riprap will be repaired immediately to prevent progressive failure.
- If repeated damage occurs at one site, the site will be re-evaluated to determine if original site conditions have changed

- Brush and weed growth will be controlled if necessary

Effectiveness

- When placed properly riprap can prevent erosion from the protected area (EPA 2013).

5.1.2 Silt Fence

A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site. They consist of a length of filter fabric stretched between anchoring posts spaced at regular intervals along the site perimeter. The fabric will be entrenched in the ground between the support posts. Silt fence placement is shown on Figure 3.

5.1.2.1 Applicability

Silt fences will be used in areas where runoff will be occurring as low-level shallow flow, not exceeding 0.5 cubic feet per second (cfs). The drainage area for silt fences will not exceed 0.125 acre per 100-foot fence length. The slope length above the fence will not exceed approximately 100 feet. Silt fences will be used around temporary stockpiles, but they will not be installed across streams, waterways, or other concentrated flow areas. Silt fences will also be used to catch wind-blown sand and to create an anchor for sand dune creation if needed. Silt fences will be used in combination with other erosion controls to be more effective. Silt fences are required immediately after the initial disturbance of the soil, as described below.

- At the outlet of a water bar when vegetation is not adequate to control erosion.
- Along banks of water bodies between the graded right-of-way (ROW) and waterbody after clearing.
- Downslope of any stockpiled soil in the vicinity of water bodies and wetlands.
- At side slope and downslope boundaries of the construction area where run-off is not otherwise directed by a water bar/terrace.
- Maintained throughout construction and remain in place until permanent restoration has been judged successful, upon which they will be removed (hay bales may be left in place).
- In the ROW at boundaries between water bodies (including wetlands) and adjacent disturbed upland areas.
- As necessary to prevent siltation of ponds, wetlands, or other water bodies adjacent to/downslope of the ROW.
- At the edge of the construction ROW as needed to contain soil and sediment.

Silt Fence Main Objectives are:

- Erosion control
- Sediment control
- Reduce runoff speed
- Perimeter control
- Wind erosion control
- Reduce development of rills and gullies

Potential Alternatives:

- Sandbag barriers
- Straw bale barrier

Silt Fence Limitations

- Silt fences may not be installed along areas where rocks or other hard surfaces will prevent uniform anchoring of fence posts and entrenching of the filter fabric.
- Silt fences may not be used in areas where large amounts of concentrated runoff are likely.
- Silt fences may not be installed across streams or waterways.
- Pore size in the filter fabric must be considered prior to installation to prevent failure.
- Frequent inspection and maintenance must be conducted to ensure effectiveness.
- Silt fences may not be used as mid-slope protection on slopes greater than 4:1.
- Silt fences may not be used in locations where ponded water may cause flooding.
- Silt fences must be removed and disposed of once construction is completed.

5.1.2.2 Siting and Implementation Guidelines

Material used for filter fabric fences will be a pervious sheet of synthetic fabric such as polypropylene, nylon, polyester, or polyethylene yarn, which is chosen based on minimum synthetic fabric requirements. Filter fabric fence fabric shall meet the National Engineering Handbook Part 642 Ch. 3 requirements as stated in Material Specification 592-GEOTEXTILE Table 592-1 or 592-2 as a class I geotextile with a minimum apparent opening size of 30 mm for nonwoven and 50 mm for woven. Filter fabric fence shall be installed on the down-slope edge of the construction limits on level ground along the topographic contour where the upland drainage does not exceed the length defined in Table 1. In areas within 50 feet of any surface water, these controls shall be installed within 2-days of the onset of construction activity.

Table 1: Maximum Slope Length for Filter Fabric Fence Construction

Slope (%)	Maximum Slope Length (ft.)
25	50
20	75
15	125
10	175
Flatter than 10	200

The following are additional guidelines for filter fabric fence installation:

- In area of high runoff or if a standard strength fabric is used, it will be reinforced with wire mesh to increase the rigidity.
- The maximum life expectancy for synthetic fabric silt fences is approximately 6 months, depending on the amount of rainfall and runoff for a given area.
- Wooden stakes will be used to anchor the filter fabric.
- Wooden stakes will be at least 5 feet long and have a minimum diameter of 2 inches.
- The filter fence will be installed in a continuous fashion with a single roll of fabric to eliminate unwanted gaps in the fence. A six inch overlap will be used to join rolls along the fence.
- A trench will be excavated to bury the bottom of the fabric fence at least 6 inches below the ground surface.
- The height of the fence posts will be between 16 and 34 inches above the original ground surface.
- Posts will be spaced no more than 8 feet apart.
- The fence will be designed to withstand the runoff from a 10-year peak storm event.
- Silt fences will be installed along the contour, never up or down a slope.
- On slopes with grades greater than 7 percent, the silt fence will be located at least 5 to 7 feet beyond the base of the slope with silt fence stakes perpendicular to the ground surface.

Maintenance

- The fences will be inspected regularly (once every second week) to ensure that they are intact and there are no gaps at the fence-ground interface or tears along the length of the fence.
- Installed silt fence will be visually inspected on a daily basis in areas of active construction or equipment operation.
- The fence will be inspected within 24 hours of the end of a storm event producing 0.5 inches or greater of rainfall.
- Torn or damaged fabric will be repaired immediately.
- Accumulated sediments will be removed from the fence base when the sediment reaches one-third to one-half the height of the fence.
- Silt fences will remain in place until disturbed areas have been permanently stabilized.
- Once permanent stabilization has occurred, fence will be removed and disposed of properly.
- When the silt fence is removed, the accumulated sediment will also be removed.
- Holes, depressions, or other ground disturbance caused by the removal of the silt fences will be backfilled and repaired.

Effectiveness

The United States Environmental Protection Agency (USEPA) estimates the following effectiveness ranges for silt fences constructed of filter fabric that are properly installed and well maintained: average total suspended solids removal of 70 percent, sand removal of 80 to 90 percent, silt-loam removal of 50 to 80 percent, and silt-clay-loam removal of 0 to 20 percent. These removal rates are highly dependent on local conditions and installation effectiveness (USEPA 2012).

Installation Procedures for Sediment and Silt Fence

- Excavate a 6" x 6" trench along the line where the silt fence will be placed.
- Place the excavated material along the upstream (high side) of the trench.
- Lay the silt fence out to its full width along the trench.
- Lift each fence stake to the vertical position and drive the fence stakes into the backside (downstream) of the trench. The stakes will be driven at least one-third of their length into the ground, or until the loose section of the silt fence material is completely below the

surface of the ground. The minimum depth of post will be 12 inches. Attach the filter fence/filter fabric to posts or the sewn pockets over post and extend it into the trench.

- Lay the silt fence fabric flap (skirt) into the excavated area so that all of the backfill material will be placed on the skirt in the trench.
- Backfill and tamp (compact) the excavated material into the trench. The silt fence fabric flap should be securely toed into the ground, so that you cannot pull it out.

5.1.3 Storm Water Inlet Protection

Sediment and debris will be prevented from entering the site from storm water inlets through the use of inlet protectors. Inlet protectors may include excavation around inlet entrances, fabric barriers, block and gravel, and sandbags. These measures are usually temporary and are installed prior to disturbance of the site.

5.1.3.1 Applicability

Temporary inlet protectors should not have a drainage area greater than one acre per inlet. Excavated drop and block and gravel inlet protectors should be used in areas of expected high flows. Fabric barriers are recommended in smaller drainage areas with slopes less than five percent. Temporary inlet protectors are usually used along with other erosion control practices. On street drains, dandy bags and inlet protectors designed for use along curbs may be utilized.

Limitations

- Best used in areas receiving relatively clean runoff without large amounts of sediment or debris.
- Most effective when used in conjunction with small impoundments and sediment traps.
- Clogged inlet protection may lead to erosion in unprotected areas.
- Most inlet protectors are not designed for long-term use.

Maintenance

All temporary control measures should be inspected after each storm event and during regularly scheduled inspections. Remove accumulated debris and sediment from inlet protectors after each storm event or when capacity is reduced by one third.

Effectiveness

When properly installed and maintained, storm water inlet protectors prevent sediment and debris from entering a project site. Inlet protectors improve the effectiveness and reliability of sediment traps and barriers (USEPA 2014b).

5.1.4 Stabilizing a Construction Entrance

The project construction entrances will be located at each egress/ingress location onto maintained roads. Stabilizing a construction entrance will be used to limit the amount of sediment that leaves the construction site. They consist of a stone-stabilized pad over filter cloth where construction traffic leaves a site. The constructed entrances cause mud and sediment to be removed from the vehicle's wheels when driven over the gravel pad, and offsite transport of soil is reduced. The filter fabric separates the gravel from the soil below, preventing the gravel from being ground into the soil. In addition to the gravel, it is also wise to establish a vehicle washing station at the site entrance. Runoff from this washing station should be diverted into a sediment trap and disposed of properly.

5.1.4.1 Applicability

Construction entrance/exit stabilization is applicable at any location where construction traffic leaves or enters an existing paved road. This practice is also useful on sites adjacent to water bodies, and where surrounding soils are poor.

Limitations

- Despite the stabilization mechanisms, some soil may still be deposited from construction vehicles onto paved surfaces, necessitating sweeping of the paved area.
- If using a wash station, a reliable water source must be made available.
- Entrances/exits require periodic top dressing with additional stones.
- Entrances/exits should be constructed on level ground only.

5.1.4.2 Siting and Implementation Guidelines

- Entrances should be stabilized before the construction begins.
- The entrances will be constructed long and wide enough that the largest vehicle to enter the site will fit in the entrance with room to spare.
- On high-traffic entrances the pad will be constructed wide enough for the passage of two vehicles at the same time with room to spare.
- When an entrance leads to a paved road, the end of the entrance will be "flared" (made wider as in the shape of a funnel) so that long vehicles do not leave the stabilized area when turning onto or off of the paved roadway.
- Stones and gravel used in stabilization will be large enough that they are not carried away on construction traffic.
- The gravel will be installed at a depth of at least six inches the entire length and width of the entrance.

- The speed of entering vehicles will be limited to control dust.
- The construction sites will be properly graded to prevent runoff from leaving the site.

Maintenance

- Entrances will be inspected and maintained until construction site has been fully stabilized.
- Stone and gravel will be added periodically to the entrance to maintain effectiveness.
- Soil will be periodically removed from the sediment traps.
- All temporary roadway ditches will be kept clear.
- The gravel and filter fabric will be removed at the end of construction.

Effectiveness

This method is effective only if it is carried out on all entrances. Otherwise the sediment saved at one entrance exits another. Effectiveness is optimized when a wash station is properly installed and used (NPDES, 2007).

6 STATE AND LOCAL REGULATORY REQUIREMENTS

Construction activities will adhere to erosion control measures as specified in this SWPPP to protect the surrounding environment in accordance with state or local guidelines. In addition, the activities will meet the requirements of the Texas TPDES General Permit and the TCEQ General Permit authorization for stormwater discharges associated with construction activity under the NPDES. Currently, there are no compliance requirements for archeological and historical resources or for threatened and endangered species.

7 INSPECTION AND MAINTENANCE PROCEDURES

7.1 Environmental Inspection

Inspections shall be the responsibility of and performed by Contractor and/or its appointed designee. Inspections will be recorded on the SWPPP Inspection Checklist (Appendix B). Environmental Inspectors shall have peer status with all other activity inspectors. Environmental Inspectors shall have the authority to stop activities that violate the conditions of the environmental permits and approvals of this SWPPP and order corrective action.

A copy of a site map (Appendix A) or plan will accompany inspections and be manually updated as necessary during the inspection to reflect any changes or additions in the following features:

- Construction site boundaries
- Areas of soil disturbance
- Areas that will not be disturbed
- Approximate slopes after major grading
- Areas of cut and fill
- Locations of major erosion control facilities or structures
- Locations where stabilization practices are expected to occur
- Springs, streams, wetlands, and other surface waters
- Stormwater discharge locations

The updated maps and the SWPPP Inspection Checklist will be maintained as records, consistent with the Stormwater Permit.

7.2 Responsibilities for the Environmental Inspector

At a minimum, the Environmental Inspector(s) shall be responsible for:

- Ensuring compliance with the requirements of this SWPPP and the conditions of the environmental permits and approvals.
- Verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing.
- Verifying the location of drainage and irrigation systems.
- Identifying stabilization needs in all areas.
- Advising when conditions (such as wet weather) make it advisable to restrict construction activities in agricultural areas.
- Ensuring restoration of contours and topsoil.
- Approving imported soils for use in agricultural and residential areas.
- Ensuring that temporary erosion controls are properly installed and maintained, daily if necessary.
- Inspecting temporary erosion control measures at least:
 - a) On a daily basis in areas of active construction or equipment operation;
 - b) On a bi-weekly basis in areas with no construction or equipment operation; and
 - c) Within 24 hours of each 0.5 inches of rainfall (NPDES Stormwater Permit condition).

- Ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification; (NPDES Stormwater Permit condition).
- Keeping records of compliance with the conditions of the federal or state environmental permits and approvals during active construction and restoration.

7.3 Regulatory Inspection

In the event of a site inspection by the TCEQ, the Contractor will supply a copy of this SWPPP, a copy of the Notice of Intent (NOI) (Appendix C), a copy of the notification of receipt of the NOI from the TCEQ, and a copy of the General Permit (Appendix G). These documents must be retained at the construction site. The TCEQ inspector should be allowed to inspect the project area, equipment, and take samples or monitor the site.

After construction, a Notice of Termination (Appendix D) should be submitted to the TCEQ after the land disturbing activities are complete and the site has been finally stabilized. An area is finally stabilized when all land disturbing activities are complete and a uniform perennial vegetative cover with a density of 70 percent or consistent with preconstruction cover has been established on areas without permanent structures or equivalent permanent stabilization measures have been used.

7.4 General Site Inspection

If evidence of, or the potential for, pollutants leaving the work site is detected, it will be corrected during the inspection. All erosion control and sediment control measures will be observed to assure correct operation. Where discharges to water bodies and wetlands occur, they shall be inspected to ensure that control measures are effective in preventing impacts to the receiving waters. Vehicle entrances and exits at the construction sites shall be inspected for evidence of off-site tracking. The contractor will designate a qualified person or persons to perform the inspections outlined in the General Site Inspection form in Appendix B. General site inspection should include, but is not limited to:

- Construction entrances will be inspected where vehicles enter or exit the site for evidence of off-site sediment tracking.
- All material storage areas exposed to precipitation will be inspected for evidence of or the potential for pollutants entering stormwater runoff.
- Stormwater discharge locations or points, where accessible, will be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Where discharge locations are inaccessible, nearby downstream locations shall be inspected to the extent that such inspections are practicable.

- Discharge locations will be inspected for sediment or other pollutants that may have been discharged from the site.
- The location of the following will be identified: the BMPs that need to be maintained; BMPs that potentially failed to operate as designed or proved inadequate for a particular location; and/or locations where additional BMPs might be needed that did not exist at the time of the inspection.
- Inspection frequency may be reduced to at least once every month if:
 - a) The entire site is temporarily stabilized;
 - b) Runoff is unlikely due to winter conditions; or
 - c) Construction is occurring during seasonal arid periods in arid and semi-arid areas.

7.5 Inspection Records

A record of each inspection and of any actions taken in accordance with this part must be retained as part of the SWPPP for at least three years from the date that permit coverage expires or is terminated.

Stormwater Inspection Report: Prepared by the contractor using the form included in Appendix B, and will be filed in a log book kept on site when activities are being conducted. A copy of each report will be provided to SARA and the TCEQ upon request. These reports will be completed:

- Pre-construction: After placement of stormwater management measures, including sediment and erosion controls, and site offices, prior to starting other Work at the Site.
- Every fourteen days during the Work until Notice of Termination is completed.
- After every wet weather event with over 1/2-inch of precipitation until Notice of Termination is completed.
- Final: Final inspection report will be prepared prior to completion of Notice of Termination.

Monthly Stormwater Report: Prepared by the Engineer, summarizing previous month's Stormwater Inspection Reports. These reports will be filed in a log book kept on site when activities are being conducted. On a monthly basis, the contractor shall post at the Site, in a location accessible during business hours Monday through Friday, the Monthly Stormwater Report. An example report is in Appendix E.

8 MAINTENANCE

The Contractor will maintain good housekeeping practices and take precautionary measures as appropriate to prevent spills. If a spill occurs, SARA personnel will be notified immediately. Spills will be contained and cleaned up as quickly as possible.

Maintenance of the stormwater pollution stabilization and structural erosion and sediment controls will be performed, as necessary, by the Contractor. Maintenance will be required when site inspections identify controls that have been damaged or that are not operating effectively. Maintenance activities may include, but are not limited to, activities such as repair of silt fence, and re-application of temporary seed. Any required maintenance activities will be performed before the next anticipated storm event. If maintenance prior to the next storm event is impracticable, then maintenance will be scheduled and completed as soon as is practicable.

9 RESTORATION

Areas that were vegetated prior to construction will be re-vegetated upon completion of the project. Permanent seeding will be applied to these areas if they will be idle for more than a year.

9.1 Temporary Seeding

Wherever possible, existing vegetation will be retained. Vegetative cover is one of the most effective methods of erosion control and sediment containment. Temporary seeding is the establishment of a temporary vegetative cover for areas with a slope of 3:1 or flatter that show signs of erosion and will be disturbed at a later date. This BMP is designed to prevent the migration of soil down a slope due to construction disturbances.

9.1.1 Applicability

Temporary seeding can be used on areas needing temporary protection that will eventually require permanent vegetation at the completion of the construction project. It is also appropriate for areas that will be re-disturbed after a long period of inactivity. This BMP provides quick erosion protection for disturbed areas. Once the vegetation has been established, it traps sediment, promotes infiltration, and improves site appearance. It is a relatively inexpensive method of erosion control.

Limitations

- Temporary seeding may not be appropriate in dry areas or areas without supplemental irrigation.
- Areas with continual construction traffic will not be able to maintain viable vegetative growth.
- Temporary seeding must have sufficient time to be established.
- Additional mulching may be necessary to protect seeding during the weeks before true establishment of vegetation.
- Steep slopes are not to be temporarily seeded.

- Seeding may require fertilizer on poor quality soils.
- Temporary seeding is not appropriate for short-term inactivity (less than 14 days).

BMP Objectives

- Sediment containment
- Soil stabilization
- Wind erosion control

Potential Alternatives

- Erosion seeding
- Permanent seeding
- Mulching
- Geotextiles
- Preservation of natural vegetation

9.1.2 Siting and Implementation Guidelines

- Soil type and site conditions will govern seed selection design.
- If soil is compacted, it will be disked, plowed, tilled or scarified to provide seed lodgment.
- The contractor will not seed between November 1 and March 15. Additional seeding times will be based on moisture content of the soil and weather conditions.

Seeds will be evenly applied with a cyclone seeder, drill, culti-packer seeder or hydroseeder. Seed slopes will be 3:1 or flatter. Following the application, the slopes will be roughened with furrows along the contours to a depth 1-2 inches below grade. To enhance plant establishment, mulching will be added to promote the growth of temporary seeding. Mulch will keep the seeds in place and moderate soil temperature and moisture until the seeds germinate. Follow-up application will be made to cover spots of poor germination as necessary to maintain adequate soil protection.

Maintenance

- Seed areas will be inspected for failures, re-seeded and mulched within the planting season. If germination does not occur, they must be re-seeded to provide appropriate cover.
- After rainfall, inspections will be made to ensure continued seed and vegetative cover.
- Seed rows are most efficient when they are planted perpendicular to the prevailing wind direction.

Effectiveness

This is an inexpensive method of erosion control. After the initial effort of seeding and germination, temporary seeding needs only minimal inspection to ensure continued viability. A well-established vegetative cover is one of the best erosion controls available, and is nature's own method of erosion control (USEPA 2007).

9.2 Permanent Seeding and Planting

Permanent seeding is the planting of perennial vegetation such as trees, shrubs, vines, grasses, or legumes on exposed areas for final permanent stabilization. Where permanent reseeding is necessary it will be used to re-vegetate all areas that were previously vegetated. This is done in order to provide stabilization to the soil by holding soil particles in place. It also serves to reduce stormwater runoff velocity, maintain sheet flow, protect the soil surface from erosion, promote infiltration of runoff into the soil, improve wildlife habitat, and improve the aesthetics of a construction area. This BMP is economical because of lower initial costs and labor inputs; adaptable to different site conditions; and allows selection of the most appropriate plant materials. Using the Seeding Method, seed shall be applied uniformly with a cyclone seeder, drill, cultipacker seeder, or hydroseeder. When feasible, seed that has been broadcast shall be covered by raking or dragging and then lightly tapped into place using a roller or cultipacker. If hydroseeding is used, the seed and fertilizer will be mixed on-site and the seeding shall be done immediately and without interruption. Areas along Apache Creek trails where vegetation was removed and were not covered by impervious surfaces will be re-vegetated as needed.

9.2.1 Applicability

Permanent seeding is appropriate where permanent, long-lived vegetative cover is the most practical or most effective method of stabilizing the soil. It will work best in areas that are roughly graded, and will not be re-graded for at least a year. Other areas include filter strips, buffer areas, vegetated swales, steep slopes and stream banks. It is also very effective on areas where soils are unstable because of their texture, structure, a high water table, high winds or steep slope. Vegetation will grow most efficiently in areas where the topsoil was never stripped, or where it has been returned and incorporated into the soil surface.

BMP Objectives

- Soil stabilization
- Wind erosion control
- Reduce stormwater runoff velocity
- Promote infiltration
- Improve wildlife habitat

- Improve aesthetics
- Provide permanent stabilization

Limitations

- There is high erosion potential during establishment of vegetative cover.
- Areas that fail to establish growth will need to be reseeded.
- Seeding times are limited depending on the season.
- Vegetative growth needs stable soil temperature and soil moisture content during germination and early growth.
- Permanent seeding does not immediately stabilize soils so they may require other temporary erosion and sediment control methods.
- Establishing vegetation may require irrigation.
- Success depends initially on climate and weather.

9.2.2 Siting and Implementation Guidelines

When stripping a site, topsoil will be stockpiled for later use. In all cases soil piles will be controlled by BMPs to control erosion and sediment from leaving the construction site whether by wind erosion or erosion by precipitation. This stabilization of stockpiles can be accomplished by the use of temporary seeding.

- The ROW will be seeded as soon as practicable following final grading in accordance with recommended seeding dates, weather and soil conditions permitting.
- Where a suitable planting medium is not present, topsoil will be imported and incorporated.
- The seedbed will be prepared to depth of three to four inches using appropriate equipment to provide a firm, smooth seedbed, free of debris.
- The contractor will follow the vegetation restoration plan for replanting.
- Seed shall be purchased in accordance with the Pure Live Seed (PLS) specifications for seed mixes and used within 12 months of testing with a certified weed free native seed mixture not to exceed 15 pounds per acre.
- The seed shall be applied and covered uniformly per local soil conservation authority's recommendations, depending on seed size.
- Where broadcast or hydro-seeding is to be done, the seedbed will be scarified to ensure sites for seeds to lodge and germinate.
- Where broadcast seeding is used, the seedbed shall be firmed after seeding.

- Areas seeded after the recommended seeding date should be mulched if permitted.
- A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed, inspected and maintained as specified.
- When access is no longer required, the travel lane must be removed and the ROW restored.

Grading and Shaping

Grading and shaping may not be required where hydraulic seeding and fertilizing equipment is to be used.

- Grading will often bring to the surface subsoils that have low nutrient value, little organic matter content, few soil microorganisms, rooting restrictions, and conditions less conducive to infiltration of precipitation.
- The slope will be graded so that equipment can be used safely and efficiently during seedbed preparation, seeding, mulching and maintenance of the vegetation.
- Concentrations of water that could cause excessive soil erosion will be diverted to a safe outlet.

Topsoil

- Topsoil will be friable and loamy, free of debris, objectionable weeds and stones, and contain no toxic substances that may be harmful to plant growth.
- Soil pH will be between 6.0 and 6.5 and can be increased with liming if soils are too acidic.
- Topsoil will be handled only when it is dry enough to work without damaging soil structure.
- A uniform application of five inches (unsettled) is recommended, but may be adjusted.

Topsoil Preparation

- The surface soil must be loose enough for water infiltration and root penetration.
- Tillage will be used to loosen the soil to a depth of four to six inches; alleviate compaction; incorporate topsoil, lime, and fertilizer; smooth and firm the soil; allow for the proper placement of seed, sprigs, or plants; and allow for the anchoring of straw or hay mulch if a crimper is to be used.

Maintenance

- Grasses will emerge within 4-28 days after seeding.
- A successful area should exhibit:

- a) Vigorous dark green or bluish green seedlings, not yellow
 - b) Uniform density, with nurse plants, legumes and grasses with well intermixed green leaves
- Inspection of the seeding application will be regularly performed.
 - Reseed or replace areas that have eroded.
 - Low-maintenance areas will be mowed infrequently or not at all, and do not receive lime, pesticide or fertilizer on a regular basis.
 - High-maintenance areas will be mowed frequently; fertilizer and pesticide treated regularly; and requires maintenance to a particular aesthetic standard.
 - If vegetation continually fails to grow, soil will be tested to determine if low pH or nutrient imbalances are responsible.

Effectiveness

Perennial vegetative cover from seeding has been shown to remove between 50 and 100 percent of total suspended solids from stormwater runoff, with an average removal of 90 percent.

USDA NRCS specifications for temporary and permanent seeding applications should be reviewed. Weed barrier fabric may be used to inhibit invasive plant competition (USEPA 2006).

9.3 Mulching

Mulching is a temporary erosion control practice which involves the spreading of organic materials over exposed or recently planted soil surfaces. If possible, the mulch should consist of materials produced on site. Benefits resulting from mulch are wide ranging. Not only does the spread of mulch prevent erosion and stabilize soils, it also aids in plant growth by holding seeds, fertilizers and topsoil in place, prevents birds from eating the seeds, helps retain moisture, and insulates against extreme temperatures. There are three main types of mulching.

Straw mulch- Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a tackifier. Straw mulch protects the soil surface from the impact of rain drops, which prevents soil particles from being dislodged.

Wood mulch- Wood mulch consists of applying a mixture of shredded wood, bark or compost to exposed soil surfaces. Wood mulch is mostly applicable to landscape projects. The main function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Hydraulic mulch- Hydraulic mulch consists of applying a mixture of small cellulose fibers made from shredded wood or recycled paper, and a stabilizing emulsion or tackifier with hydro-mulching

equipment. This mixture temporarily protects exposed soil from erosion by raindrop impact or wind. It also provides protection and warmth for seed growth.

BMP Objectives

- Soil stabilization
- Erosion control
- Wind erosion control
- Sediment control
- Moisture retention
- Promote seed germination
- Prevent surface compaction
- Modify soil temperature

Potential Alternatives

- Hydroseeding
- Soil binders
- Geotextiles
- Temporary seeding

9.3.1 Applicability

Mulching can best be used in areas in need of immediate, effective and inexpensive erosion control. It is often used in areas where temporary seeding cannot be used because of environmental constraints. It can also be used to promote vegetation germination and growth during a vegetative stabilization practice, especially where slopes are steeper than 3:1 or where sensitive seedlings require insulation from extreme temperatures or moisture retention.

Straw mulch- Straw mulch is most applicable in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Wood mulch- Wood mulch is most applicable as a stand-alone, short term ground cover on slopes. It is a useful cover until soils can be prepared for revegetation.

Hydraulic mulch- Hydraulic mulch is most useful in conjunction with temporary seeding practices. Use of hydraulic mulch will be avoided where the mulch would be incompatible with immediate earthwork activities and would have to be removed.

Limitations

Mulching may delay seed germination as the cover reduces the soil surface temperatures. The mulch cover is subject to erosion, and may be washed away in a large storm. Close inspections and maintenance are necessary to ensure effective erosion control.

Straw mulch

- Availability of straw and straw forecasting equipment may be limited just prior to rainy seasons or storms due to an increased demand.
- There is a potential for introduction of weed seed and unwanted plant material.
- Wind may limit application of straw and blow straw into undesired locations.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 45m (150 feet) of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time intensive and potentially costly.
- Mulching may have to be removed prior to permanent seeding or soil stabilization.
- Straw does not work on sandy surfaces.

Wood mulch

- Wood mulch will not be used on slopes steeper than 3:1. It is best suited to flat areas or gentle slopes or 5:1 or flatter.
- Green material has the potential for the presence of unwanted weeds and other plant materials.
- Shredded wood does not withstand concentrated flows and is prone to sheet erosion.
- Delivery system is primarily by manual labor, although pneumatic application equipment is available.
- Wood mulch may need to be removed prior to further earthwork.

Hydraulic mulch

- Wood fiber hydraulic mulches are generally short-lived, and often require a second application in order to remain effective for an entire rainy season.
- Hydraulic mulch needs 24 hours to dry before a rainfall occurs to be effective (USEPA 1992).

9.3.2 Site Preparation and Implementation Guidelines

Site preparation

- The site will be graded to enable the use of equipment for applying and anchoring mulch.
- BMPs will be installed as required, such as sediment barriers and diversions.
- Compacted soil will be loosened to a minimum depth of four inches if using mulch while seeding.

Installation

- Organic mulches will be used for erosion control and plant material establishment, when needed.
- There will be adequate cover to prevent erosion, washout, and poor plant establishment.
- The mulch will be anchored by pressing the straw into soil immediately after the mulch is spread. Serrated discs are preferred and should be 20 inches or more in diameter and eight to ten inches apart.

Straw mulch

- Roughen embankments and fill rills before placing the straw mulch by rolling with a crimping or punching type roller or by track walking.
- The straw mulch must be evenly distributed on the soil surface.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- A tackifier will be used to hold straw in place, if necessary. A tackifier acts to glue the straw fibers together and to hold the soil surface.

Wood mulch

- The existing vegetation will be removed prior to applying the wood mulch.
- The embankment and fill areas will be roughened by rolling with a device such as a punching type roller or by track walking.
- The mulch will be applied by hand or pneumatic methods if possible.
- The mulch will be evenly distributed on site to a depth of two to three inches.

Hydraulic mulch

- The embankments and fill areas will be roughened by rolling with a crimping or punching type roller.

- Hydraulic mulch requires 24 hours drying time to be effective.
- Mulch over spray will be avoided onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Paper based hydraulic mulches alone will not be used for erosion control.

Maintenance

- Mulches will be anchored to resist wind displacement.
- Mulched areas will be inspected frequently to identify areas where mulch has loosened or been removed, especially after rain storms.
- Faulty or removed mulch will be replaced immediately.

Effectiveness

Soil loss reduction for:

- Straw mulch ranges from 89.3 to 93.2 percent.
- Wood mulch ranges from 28.8 to 93.6 percent.
- Hydraulic mulch ranges from 85.9 to 99.1 percent.
- Water velocity reductions range from 24 to 78 percent (USEPA 1992).

10 REVISIONS TO THE STORMWATER POLLUTION PREVENTION PLAN

Based on the inspection results and the maintenance procedures implemented, this Plan will be amended, if necessary. Appendix F contains a form that will be completed to document any changes to this SWPPP. The contractor shall prepare a SWPPP Revision per applicable stormwater permit when:

- There is a significant change in design, construction, operation, or maintenance that significantly affects the potential of discharging pollutants to Waters of the United States, and has not otherwise been addressed in the SWPPP.
- SWPPP proves to be ineffective relative to:
 - a) Eliminating or significantly minimizing pollutants from sources identified in the SWPPP required by this permit, or
 - b) Achieving general objectives of controlling pollutants in stormwater discharges from permitted construction activity.
 - c) A SWPPP Revision identifying contractors and subcontractors responsible for implementing part of the SWPPP shall be provided.

Any amendments that are required will be made within seven days following the inspection that necessitated the change.

11 TRAINING

It shall be the responsibility of the Contractor, Contractor's employees and their subcontractors to read, understand, and comply with the requirements and commitments set forth in this SWPPP.

12 NON-STORMWATER DISCHARGES

No solid (other than sediment) or liquid waste, including building materials, shall be discharged in stormwater runoff. The contractor must implement all necessary BMPs to prevent the discharge of non-sediment pollutants to the drainage system of the site or surface waters of the state. Under no circumstance shall concrete trucks wash out directly into a drainage channel, storm sewer or surface waters of the state.

The Contractor will insure that equipment is refueled and lubricated within the ROW and at least 100 feet away from all water bodies and wetlands with the following exceptions:

- Areas such as rugged terrain or steep slopes where movement of equipment to refueling stations would cause excessive disturbance to the ROW;
- Sites where moving equipment to refueling stations from pre-fabricated equipment pads is impracticable or where there is a barrier from the waterbody/wetland (i.e., road or railroad);
- Locations where the waterbody or wetland is located adjacent to a road crossing (from which the equipment can be serviced).

Control Measures for Pollutant Sources during Construction Activities

Specific measures to control pollution discharge from pollutant sources during construction include:

- **Vehicle and Equipment Fueling Areas:** All fueling stations will have temporary secondary containment around the fuel tanks.
- **Loading and Unloading Areas:** Any material/fuel spilled during loading and unloading will be cleaned up immediately.
- **Vehicle and Equipment Maintenance Areas:** If vehicle maintenance is necessary, it will be performed in an area designated for this purpose. Any spills will be cleaned up immediately. Precautions will be taken to prevent the release of pollutants to the environment from vehicle maintenance. Precautions will include the use of drip pans, mats, and other similar methods. No vehicle wash water shall be allowed to run off the construction site or enter state waters.

- Excavated/Trenched Areas: To prevent the mobilization of contaminants in stormwater runoff from entering and/or leaving excavated areas, the BMPs described in section 5.1 will be implemented.
- Waste and Material Storage Area: Materials on the construction site will be stored in areas designated for that purpose.

Suitable measures will be taken in these areas to reduce the likelihood of a discharge.

13 REFERENCES

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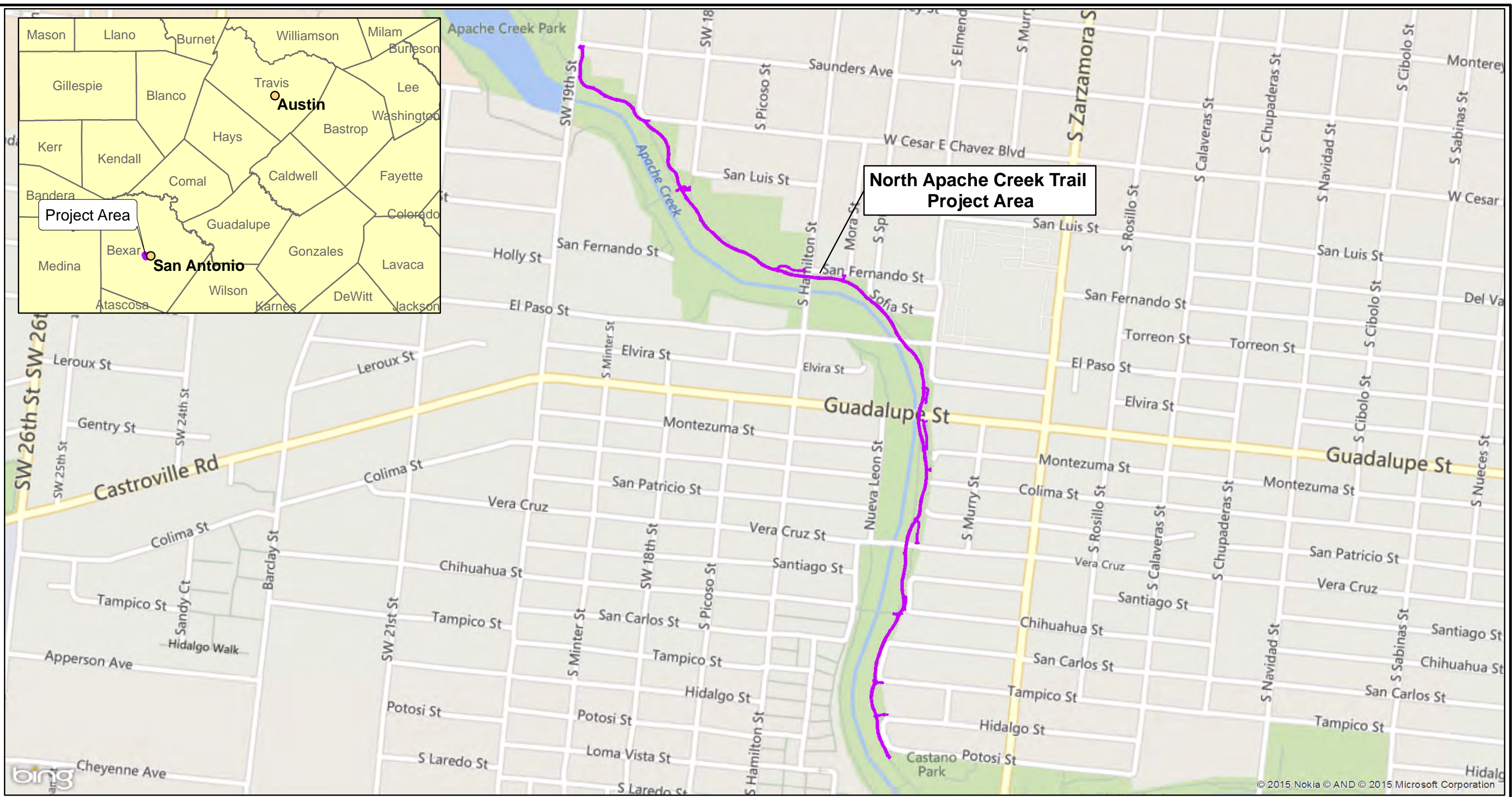
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Stormwater Pollution Prevention Plan

North Apache Creek Trail

FIGURES



North Apache Creek Trail Project Area

Project Area

 North Apache Creek Trail Project Area



San Antonio River Authority
North Apache Creek Trail Project
 Stormwater Pollution Prevention Plan

Vicinity Map



FIGURE
1

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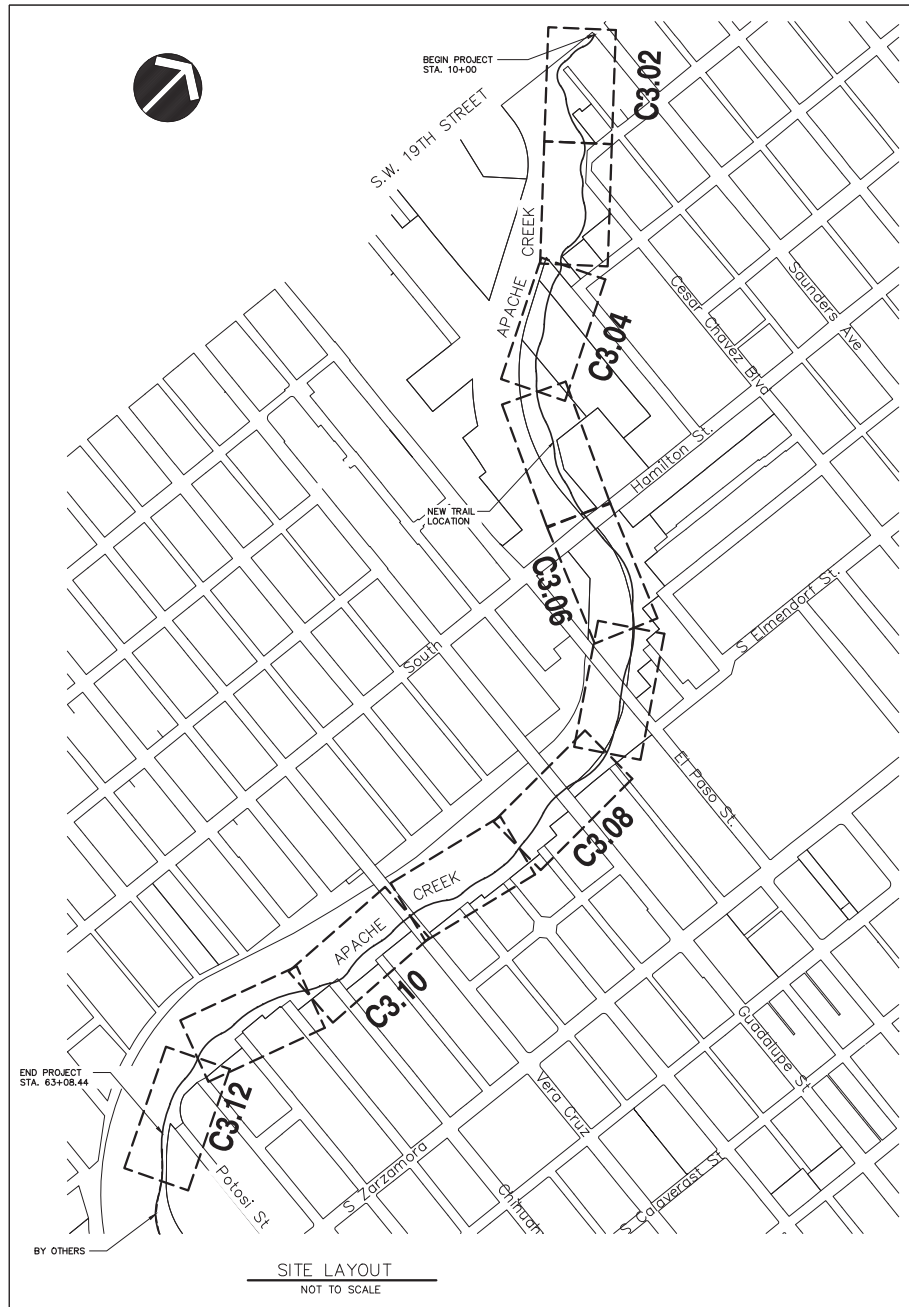


Figure 2:
 North Apache
 Creek Trail Site
 Layout

REVISION	DATE

Project no: 06353029.0100
 Date: 06/13/2014
 Sheet: _ OF _

**SITE LAYOUT
 AND
 LEGEND**
C3.01



Date: Jan 15, 2014 - 4:49pm (UTC-06:00)
 User: jason@terradesign.com
 User Email: jason@terradesign.com
 User IP: 192.168.1.100
 User Agent: Mozilla/5.0 (Windows; U; MSIE 9.0; en-US; Win64; x64; Trident/6.0; rv:11.0) like Gecko
 User Name: Jason

SITE LAYOUT
 NOT TO SCALE

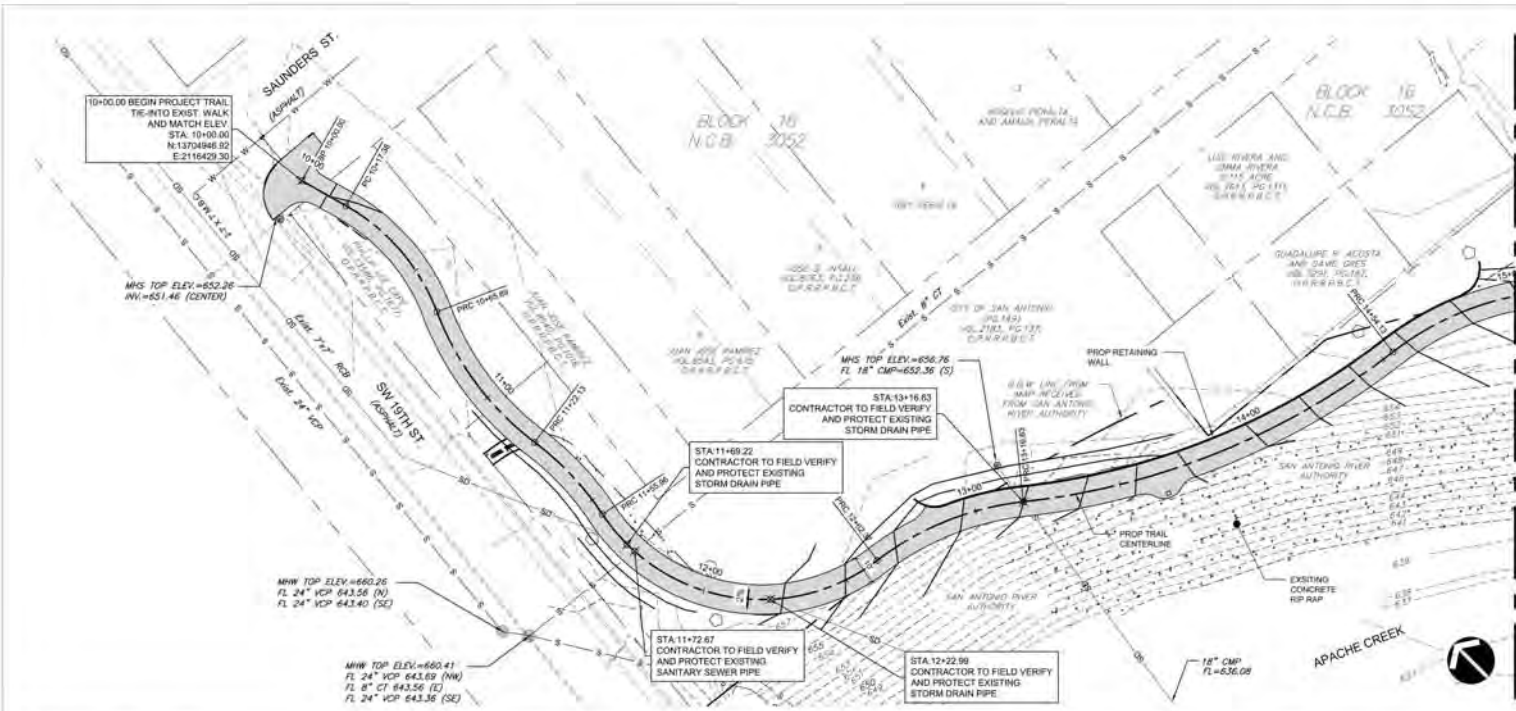
EXISTING		PROPOSED	
	PROPERTY LINE		TRAIL CENTERLINE ALIGNMENT
	OVERHEAD ELECTRIC		CONCRETE TRAIL
	GAS		1' INDEX CONTOUR
	WATER		RETAINING WALLS
	SANITARY SEWER		STORM PIPING
	STORM DRAIN		HEAD WALL STRUCTURES
	CHAIN LINK FENCE		SLOPE PERCENTAGE
	WIRE FENCE		DRAINAGE AREA ID
	EDGE OF PAYMENT		NUMBER OF ACRES
	WATER EDGE		SURFACE FLOW
	INDEX CONTOUR LINE WITH ELEVATION		BY OTHERS
	CONCRETE SURFACE		
	GAS VALVE		
	GAS METER		
	POWER AND LIGHT POLE		
	GUY WIRE		
	SPRINKLER HEAD		
	DRAIN INLET		
	CLEANOUTS		
	TELEPHONE MANHOLE		
	STORM MANHOLE		
	TELEPHONE PEDESTAL		
	WASTEWATER MANHOLE		
	ELECTRIC METER		
	WATER METER		
	WATER VALVE		
	FIRE HYDRANT		
	POWER BOX		
	SIGN		
	JUNCTION BOX		
	IRRIGATION CONTROL VALVE		
	FAUCET		
	CONTROL POINT		
	TREES		

ABBREVIATIONS

A	AREA
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX.	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING & MATERIALS
AWWA	AMERICAN WATER WORKS ASSOCIATION
C	RUN OFF COEFFICIENT
CCP	CONCRETE CYLINDER PIPE
CF	CUBIC FEET
CL	CENTER LINE
COMM	COMMUNICATIONS
CMP	CORRUGATED METAL PIPE
CR	COUNTY ROAD
CT	CLAY TILE
DIA.	DIAMETER
E	EASTING
E.F.	EACH FACE
EL	ELEVATION
ELEC	ELECTRICAL
EX. OR EXIST.	EXISTING
F.A.	FINISHED GRADE
FM	FARM TO MARKET
FOC	FIBER OPTIC CABLE
FT	FEET
GA	GAUGE
HORIZ	HORIZONTAL
I	RAINFALL INTENSITY (IN/HR)
Is	RAINFALL INTENSITY 5 YEAR EVENT (IN/HR)
IN	INCH
LBS	POUNDS
LF	LINEAR FOOT
LONG	LONG
LP	LIGHT POLE
m	METER
MIL	ONE THOUSANDTH OF AN INCH
MIN	MINIMUM
mm	MILLIMETER
mph	MILES PER HOUR
N	NORTHING
No. #	NUMBER
NTS	NOT TO SCALE

ABBREVIATIONS

O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O/S	OFFSET
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PB	PULLBOX
PC	POINT OF CURVATURE
PLCS	PLACES
PRC	POINT OF REVERSE CURVE
PROPOSED	PROPOSED
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PVI	POINT OF VERTICAL INFLECTION
Q	PEAK DISCHARGE (CUBIC FEET PER SECOND)
Q5	PEAK DISCHARGE 5 YEAR EVENT(CUBIC FEET PER SECOND)
RCP	REINFORCED CONCRETE PIPE
RCB	REINFORCED BOX CULVERT
RECT	RECTANGULAR
REF	REFERENCE
REQ	REQUIRED
RP	POINT OF RADIUS
S.S.	STAINLESS STEEL
SCH	SCHEDULE
SEC	SECTION
SHT	SHEET
SP.	SPACING
SPECS	SPECIFICATIONS
SQ.	SQUARE
STA.	STATION
t	TIME (MIN)
TEL	TELEPHONE
T.O.P.	TOP OF PIPE
TECD	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
TCP	TRAFFIC CONTROL PLAN
THWN	THERMOPLASTIC HEAT AND WATER RESISTANT NYLON COATED
TYPICAL	TYPICAL
VAR	VARIOUS
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VOL	VOLUME
V.V.	VALVE VAULT
W.L.	WATER LINE
W/	WITH



- NOTES:**
- THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM AVAILABLE RECORDS AND ARE NOT GUARANTEED, BUT SHALL BE INVESTIGATED AND VERIFIED BY THE CONTRACTOR BEFORE STARTING WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGES TO AND FOR THE MAINTENANCE AND PROTECTION OF THE EXISTING UTILITIES EVEN IF THEY ARE NOT SHOWN ON THE PLANS. LOCATION AND DEPTH OF EXISTING UTILITIES SHOWN HERE ARE APPROXIMATE ONLY. ACTUAL LOCATIONS AND DEPTHS MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION AND HE SHALL BE RESPONSIBLE FOR PROTECTION OF THE SAME DURING CONSTRUCTION.
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 - ALL TREE PRESERVATION SHALL BE IN ACCORDANCE WITH THE "TREE PRESERVATION" SHEETS.
 - SEE "STRUCTURAL SHEETS" FOR RETAINING WALL AND CONCRETE TRAIL DETAILS.

MATCHLINE SHEET C3.03

APACHE CREEK TRAIL

PLAN SHEET NO.	DETAIL NO.	BEGINNING STATION	ENDING STATION	
S2.01	3	46 + 89.93	47 + 35.00	
		47 + 35.65	48 + 00.00	
		52 + 68.88	55 + 35.00	
S2.01	5	21 + 75.00	21 + 83.00	
		47 + 97.00	42 + 66.00	
S2.02	1	47 + 97.00	42 + 66.00	
	2	12 + 83.00	14 + 00.00	
S2.02		29 + 17.00	35 + 12.00	
		38 + 73.00	40 + 18.00	
		47 + 35.00	48 + 01.00	
		48 + 00.00	49 + 49.00	
		50 + 82.00	52 + 67.00	
		55 + 35.00	55 + 35.00	
		57 + 35.00	57 + 78.00	
	S2.02	3	35 + 12.00	38 + 73.00
			40 + 18.00	41 + 97.00
			42 + 66.00	44 + 25.37
		49 + 49.00	50 + 82.00	
		59 + 06.00	61 + 35.00	



Terra design group, inc.
 916 Cameron Suite 103
 San Antonio, Texas 78212
 210.221.1400
 210.220.1404
 wheron@terradesign.com



APACHE CREEK TRAIL

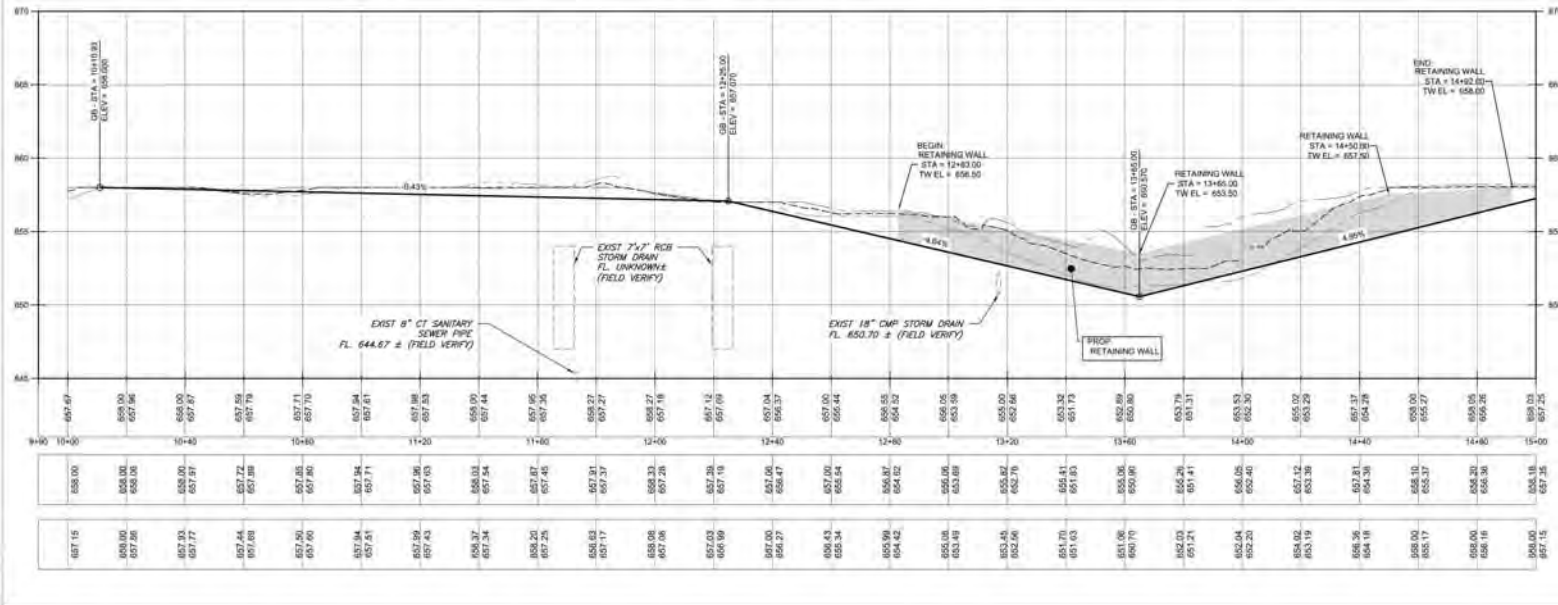
19th Street to
 Cassiano Park
 San Antonio, Texas

REVISION DATE

Project no: 06353029.0100
 Date: 06/13/2014
 Sheet: _____ OF _____

PLAN AND PROFILE
 10+00 to 15+00

C3.02

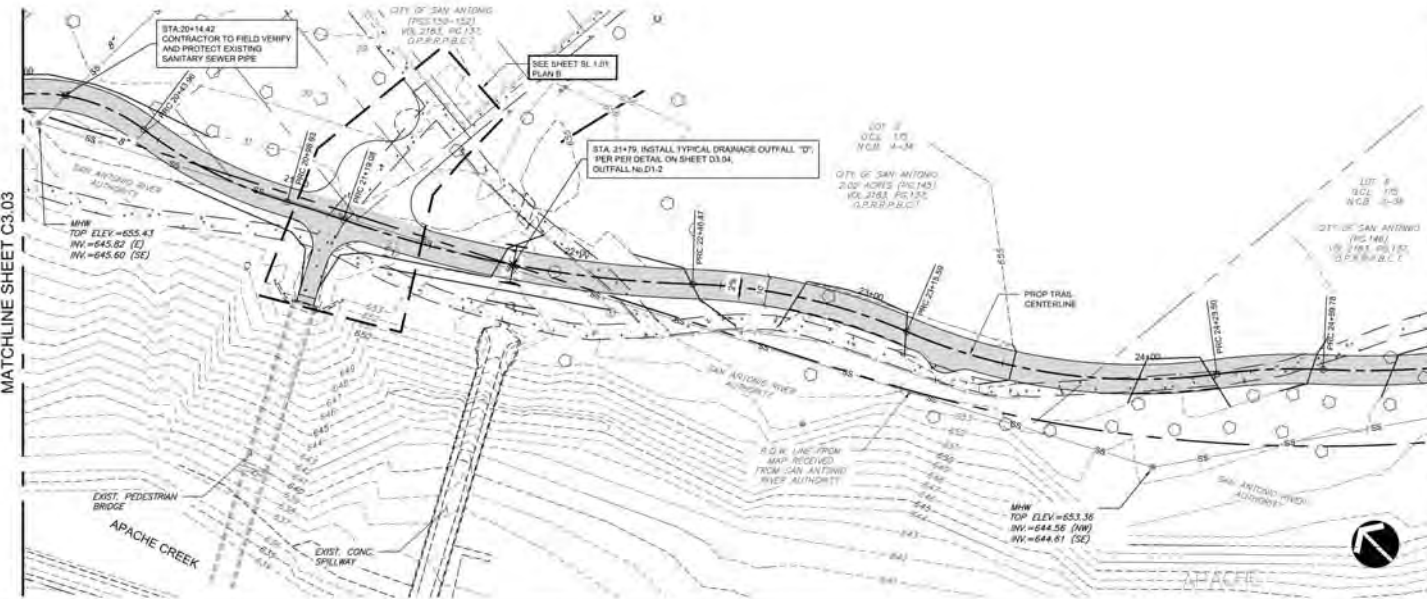


- PROFILE LEGEND**
- EXISTING
 - EXISTING C.L.
 - 5' LEFT OF C.L.
 - 5' RIGHT OF C.L.
 - PROPOSED
 - PROPOSED CENTER LINE (C.L.)
 - GRADE BREAK



Date: 06/13/2014 10:40 AM
 User: David Wheron
 Job: Apache Creek Trail
 Job Path: S:\Projects\06353029\0100\C3.02.dwg
 Plot Date: 06/13/2014 10:40 AM
 Plot Path: S:\Projects\06353029\0100\C3.02.plt

MATCHLINE SHEET C3.03

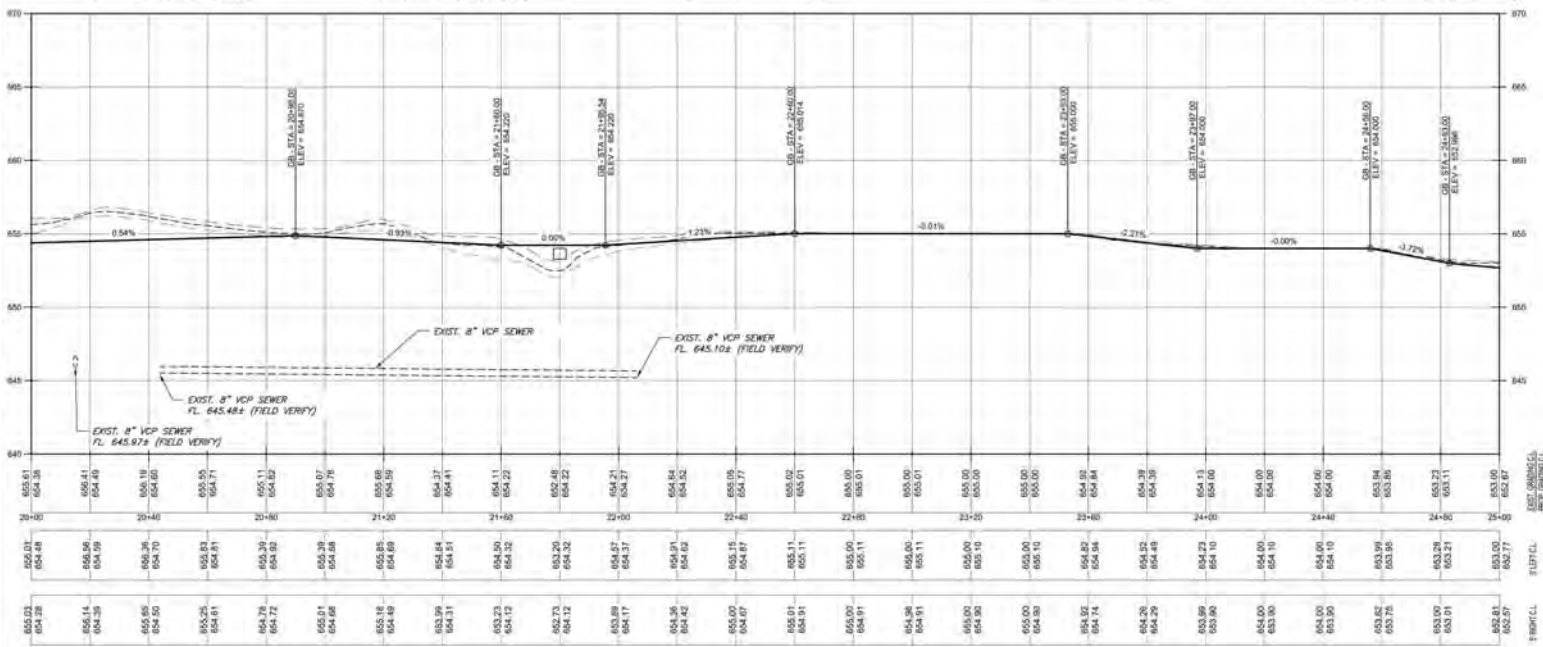


- NOTES:**
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MATCHLINE SHEET C3.05

APACHE CREEK TRAIL

PLAN SHEET NO.	DETAIL NO.	BEGINNING STATION	ENDING STATION
5.201	3	46 + 89.93	47 + 35.00
		47 + 35.05	48 + 50.00
		52 + 68.88	53 + 35.00
5.201	5	21 + 75.00	21 + 83.00
5.202	1	47 + 97.00	42 + 66.00
5.202	2	12 + 83.00	14 + 92.00
		29 + 17.00	35 + 12.00
5.202	3	47 + 35.00	48 + 01.00
		48 + 30.00	49 + 49.00
		50 + 32.00	52 + 67.00
		55 + 35.00	55 + 96.00
		57 + 35.00	57 + 76.00
		35 + 12.00	38 + 73.00
		40 + 18.00	41 + 97.00
		42 + 66.00	44 + 25.37
		49 + 49.00	50 + 82.00
	55 + 96.00	57 + 35.00	



PROFILE LEGEND

- EXISTING
- EXISTING C.L.
- 5' LEFT OF C.L.
- 5' RIGHT OF C.L.
- PROPOSED
- PROPOSED CENTER LINE (C.L.)
- GRADE BREAK



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 whern@terradesign.com



APACHE CREEK TRAIL

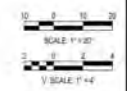
19th Street to
 Cassiano Park
 San Antonio, Texas

REVISION DATE

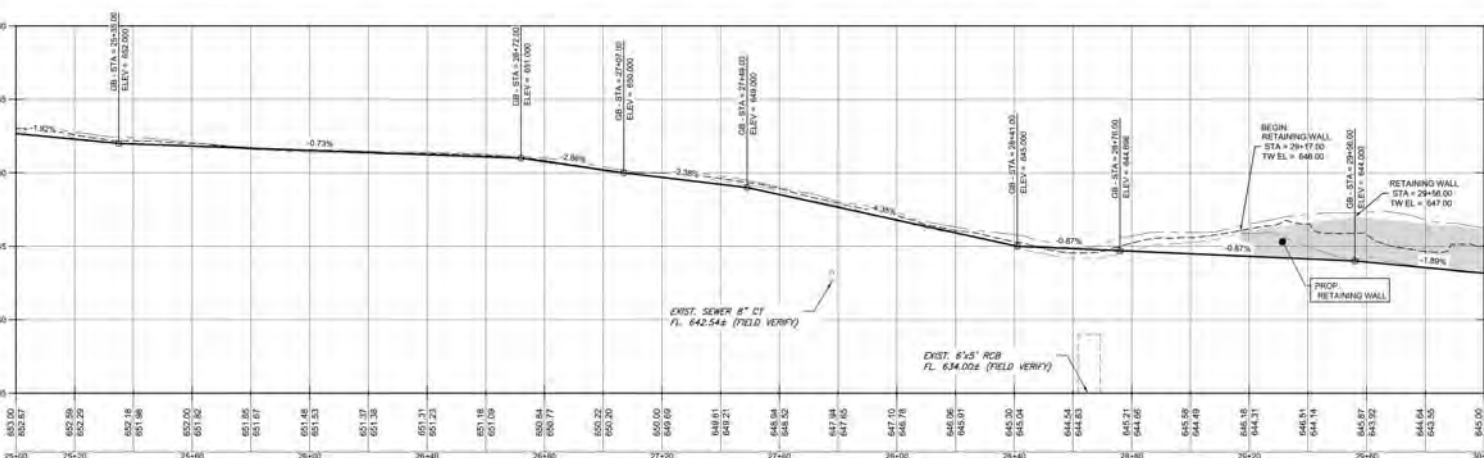
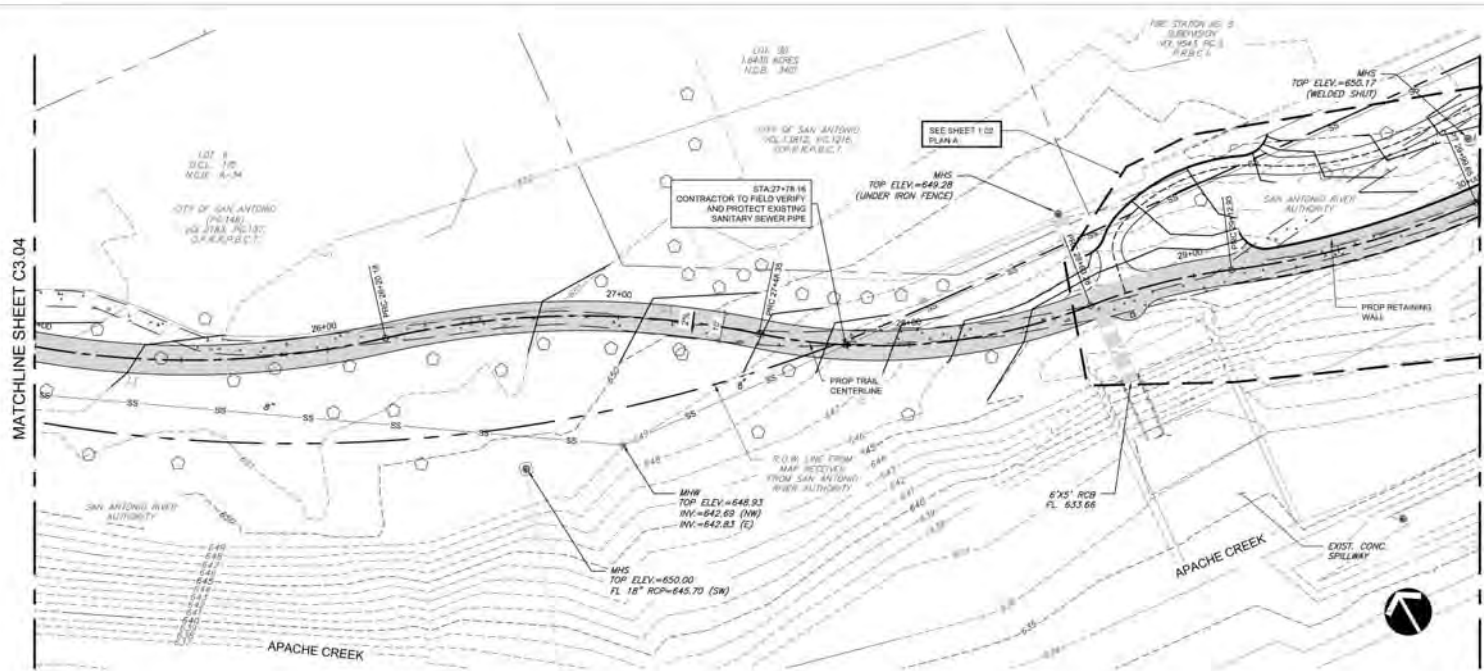
Project no: 06353029.0100
 Date: 06/13/2014
 Sheet: OF

PLAN AND PROFILE STATION
 20+00 to 25+00

C3.04



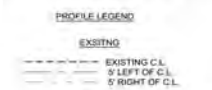
Drawn by: J. Lopez
 Checked by: J. Lopez
 Date: 06/13/2014



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 - SEE STRUCTURAL SHEETS FOR RETAINING WALL AND CONCRETE TRAIL DETAILS.

APACHE CREEK TRAIL

PLAN SHEET NO.	DETAIL NO.	BEGINNING STATION	ENDING STATION
S 2.01	3	98 + 68.93	47 + 35.00
		87 + 95.65	48 + 90.00
		52 + 68.88	55 + 35.00
S 2.01	5	21 + 75.00	21 + 83.00
S 2.02	1	47 + 97.00	42 + 86.00
S 2.02	2	12 + 83.00	14 + 92.00
		29 + 17.00	35 + 12.00
		38 + 73.00	40 + 18.00
		47 + 35.00	48 + 01.00
		48 + 90.00	49 + 49.00
		50 + 92.00	52 + 67.00
		55 + 35.00	55 + 96.00
		57 + 35.00	57 + 76.00
S 2.02	3	35 + 12.00	38 + 73.00
		40 + 18.00	41 + 97.00
		42 + 86.00	44 + 25.37
		49 + 49.00	50 + 82.00
		55 + 96.00	57 + 35.00



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 918 Cameron Suite 103
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 210.220.1404
 wheron@terradesign.com



APACHE CREEK TRAIL

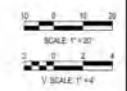
19th Street to
 Cassiano Park
 San Antonio, Texas

REVISION DATE

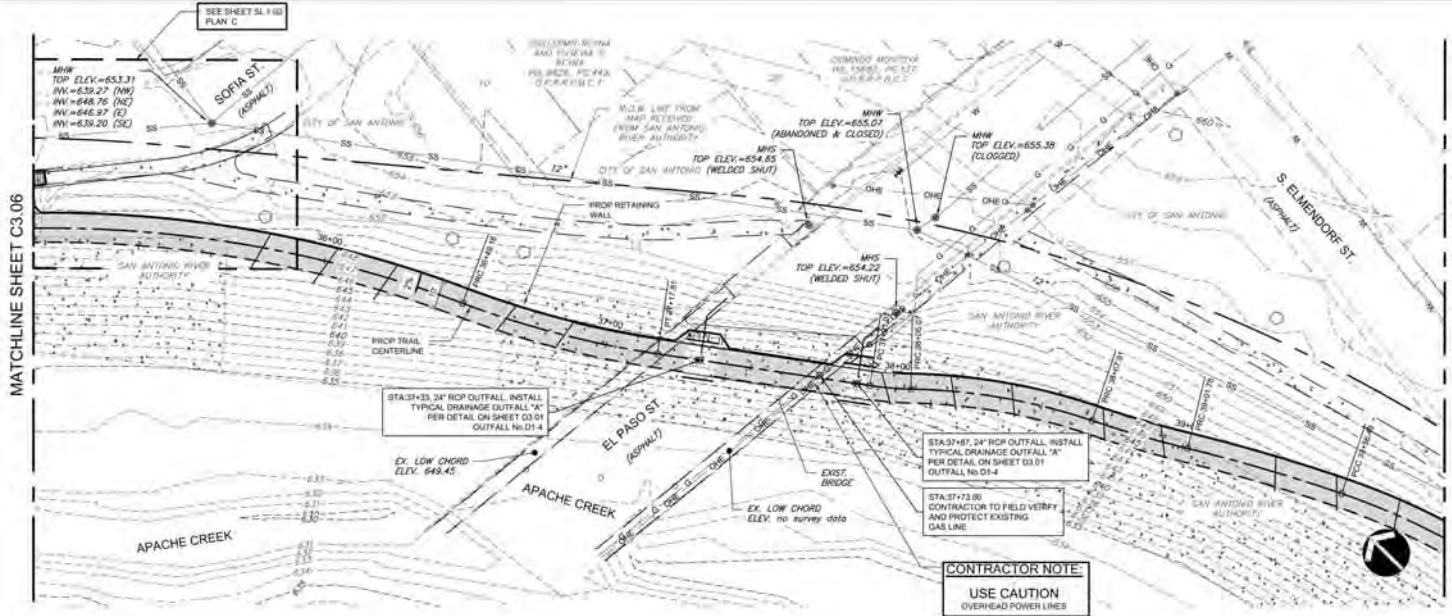
Project no: 06353029.0100
 Date: 06/13/2014
 Sheet: _____ OF _____

PLAN AND PROFILE STATION
 25+00 to 30+00

C3.05



Date: 06/13/2014 10:40 AM
 User: Travis Wheron
 San Antonio, Texas 78212
 210.221.1400
 210.220.1404
 wheron@terradesign.com

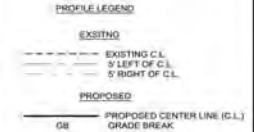
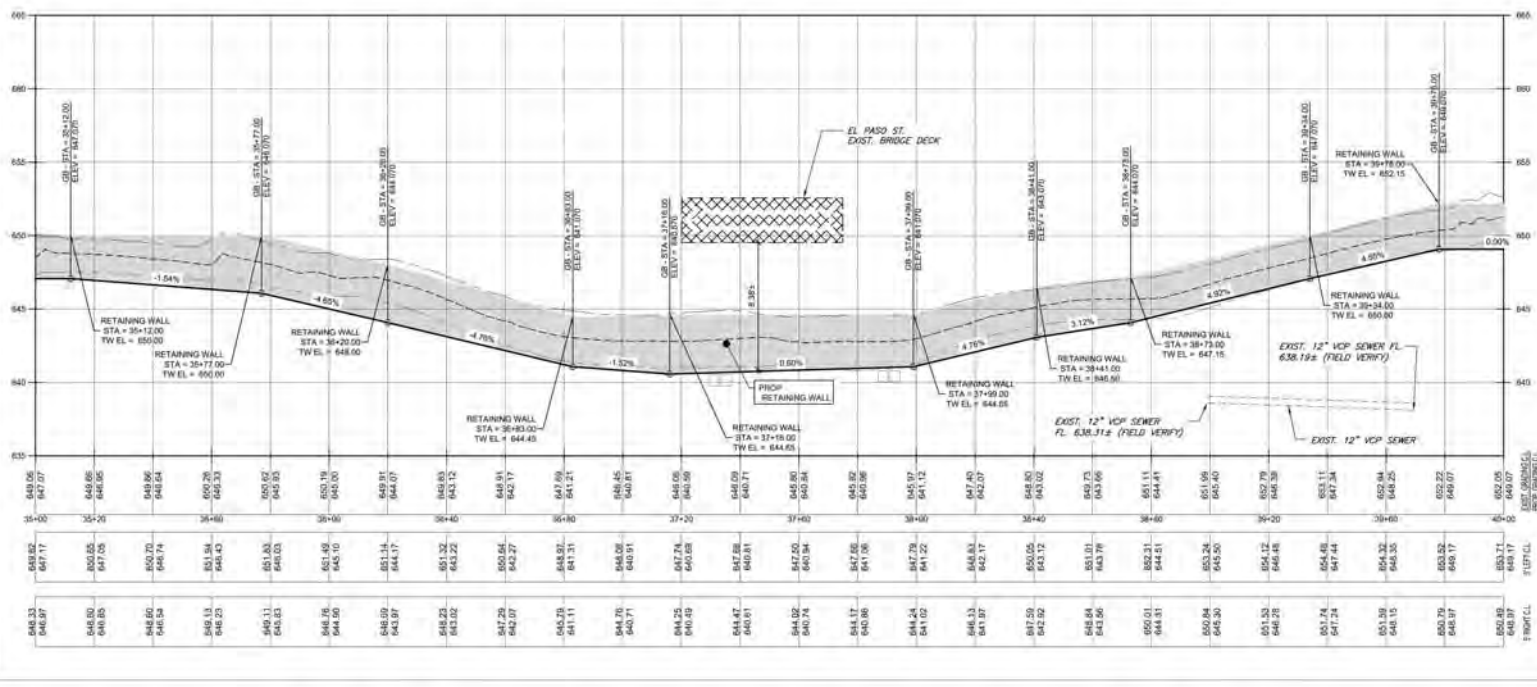


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APACHE CREEK TRAIL

PLAN SHEET NO	DETAIL NO	BEGINNING STATION	ENDING STATION
S2.01	3	46 + 69.93	47 + 35.00
		47 + 36.65	48 + 90.00
		52 + 88.88	55 + 35.00
S2.01	5	21 + 75.00	21 + 83.00
S2.02	1	47 + 97.00	42 + 66.00
S2.02	2	12 + 63.00	14 + 92.00
		29 + 17.00	35 + 12.00
		38 + 73.00	40 + 18.00
		47 + 35.00	48 + 01.00
		48 + 80.00	49 + 49.00
		50 + 82.00	52 + 67.00
		55 + 35.00	55 + 88.00
		57 + 35.00	57 + 78.00
S2.02	3	35 + 12.00	38 + 73.00
		40 + 18.00	41 + 97.00
		42 + 66.00	44 + 25.37
		49 + 49.00	53 + 82.00
		55 + 86.00	57 + 35.00

CONTRACTOR NOTE
USE CAUTION
OVERHEAD POWER LINES



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918 Cameron Suite 103
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210.221.1400
210.220.1404
whs@terradesign.com



APACHE CREEK TRAIL

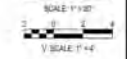
19th Street to
Cassiano Park
San Antonio, Texas

REVISION DATE

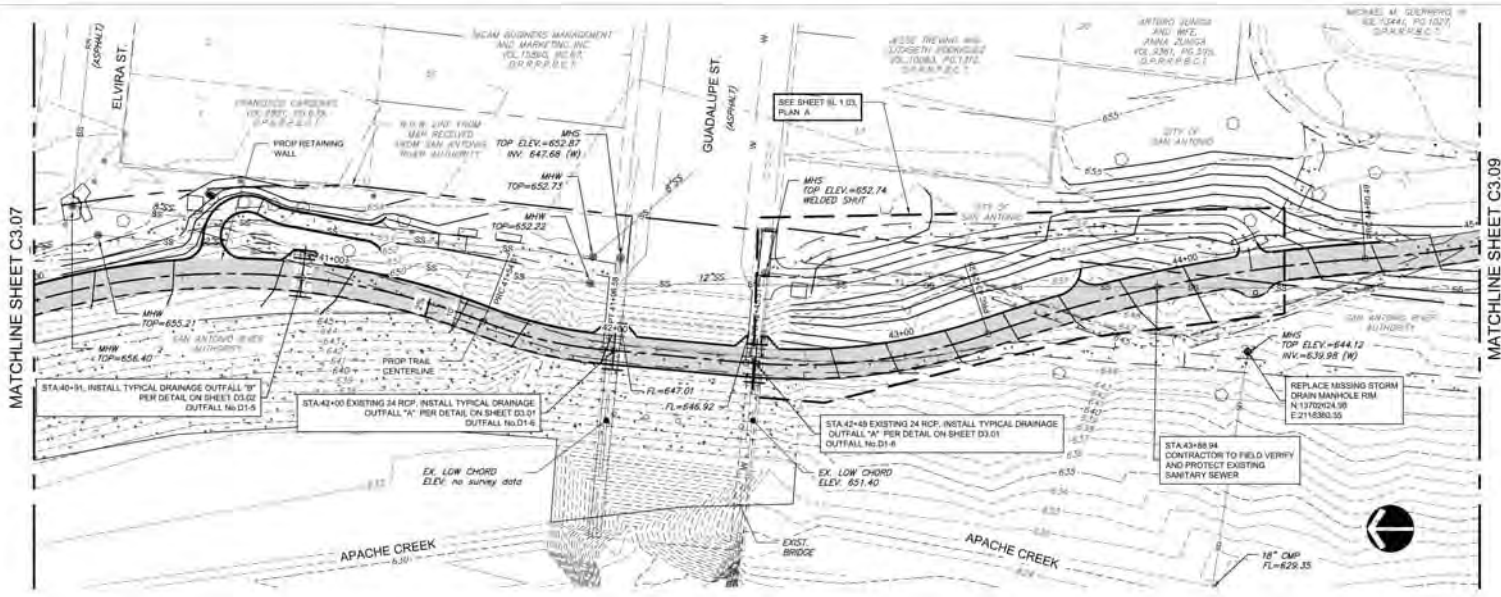
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Date: 06/13/2014
Sheet: _____ OF _____

PLAN AND PROFILE STATION
35+00 to 40+00

C3.07



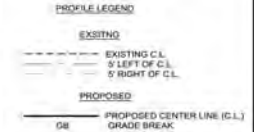
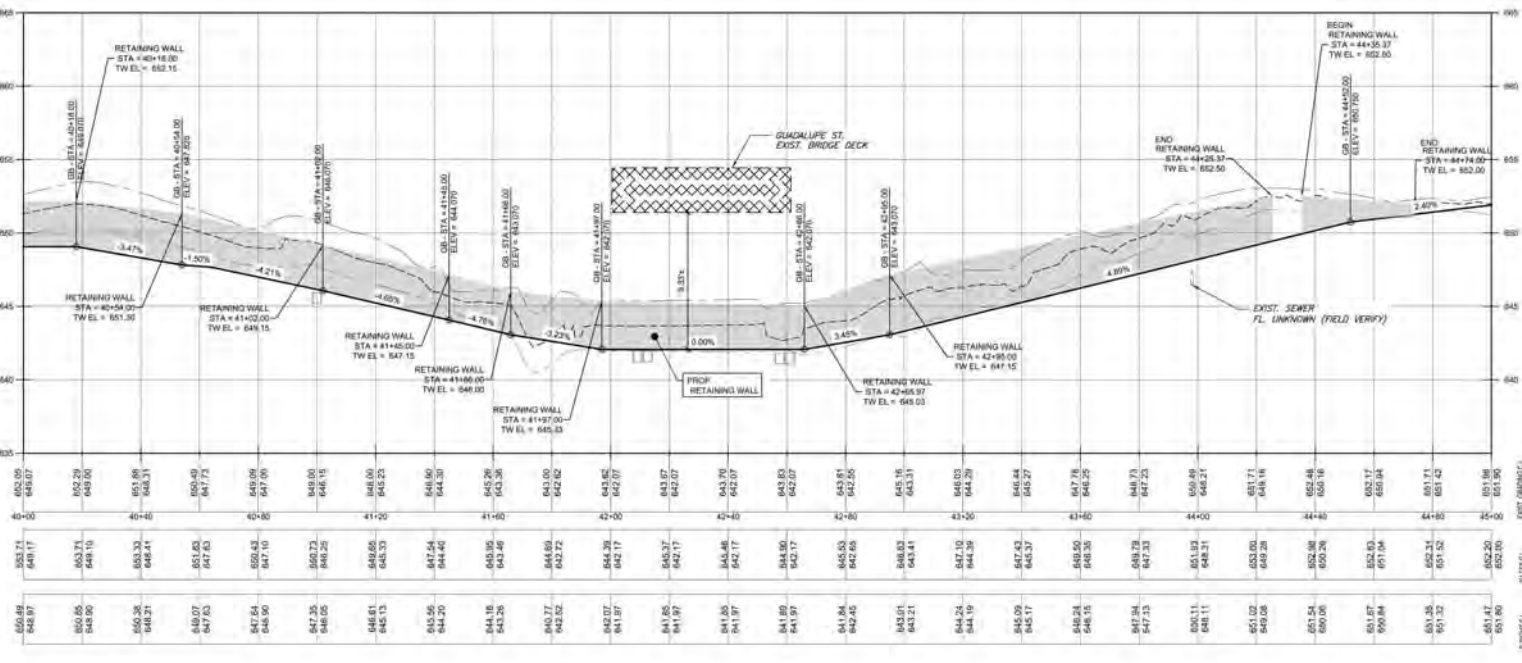
Date: 06/13/2014 10:58 AM
 User: jh
 File: C:\Projects\06353029\06353029.dwg
 Plot: 06/13/2014 10:58 AM
 Plot Device: HP DesignJet 500



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APACHE CREEK TRAIL

SHEET NO.	DETAIL NO.	BEGINNING STATION	ENDING STATION
S 2.01	3	46 + 60.00	47 + 35.00
	4	47 + 35.00	48 + 30.00
	5	48 + 08.88	55 + 35.00
S 2.01	5	21 + 75.00	21 + 83.00
	6	47 + 07.00	42 + 06.00
S 2.02	7	12 + 05.00	14 + 02.00
	8	29 + 17.00	35 + 12.00
	9	35 + 73.00	40 + 18.00
	10	47 + 35.00	48 + 01.00
	11	48 + 90.00	49 + 48.00
	12	50 + 02.00	52 + 07.00
	13	55 + 35.00	55 + 36.00
	14	57 + 35.00	57 + 76.00
S 2.02	15	35 + 12.00	38 + 73.00
	16	40 + 18.00	41 + 07.00
	17	42 + 06.00	44 + 25.37
	18	48 + 49.00	50 + 82.00
	19	55 + 36.00	57 + 35.00
	20	57 + 35.00	57 + 35.00



Terra design group, inc.
 916 casiano suite 103
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 210.201.1400
 210.201.1404
 wheron@terradesign.com



APACHE CREEK TRAIL

19th Street to
 Casiano Park
 San Antonio, Texas

REVISION DATE

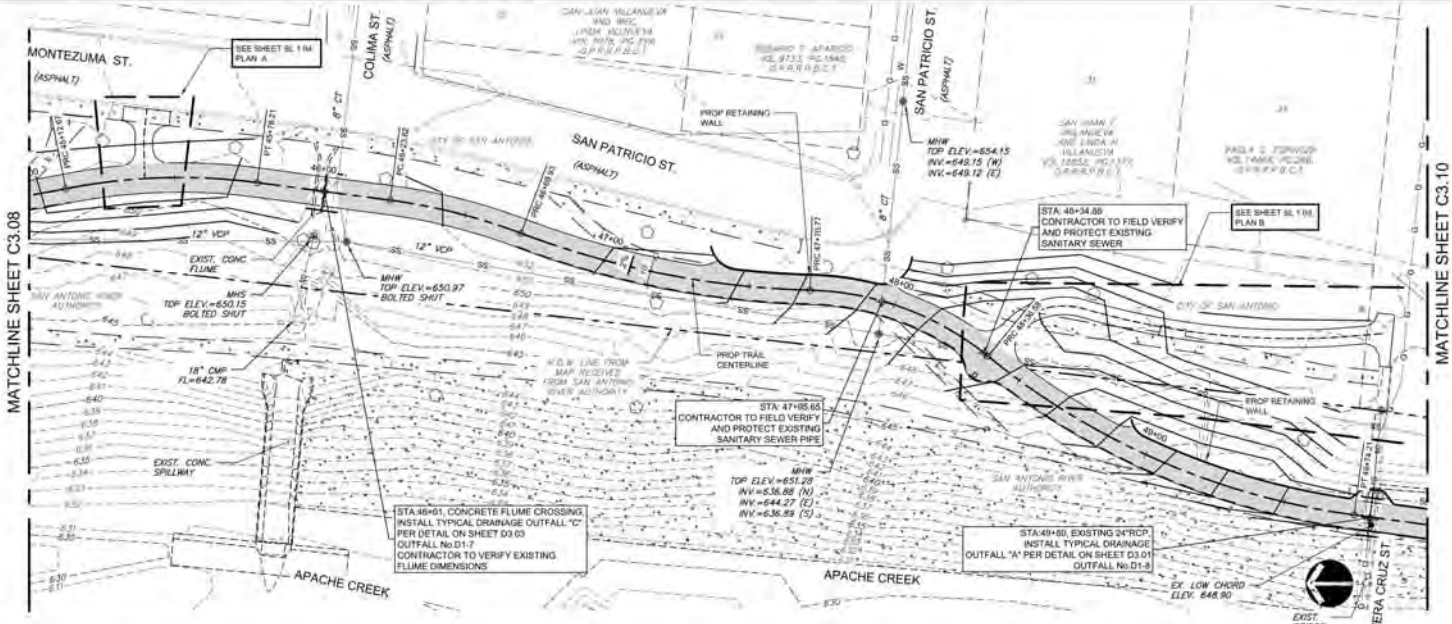
Project no: 0635029.0100
 Date: 06/13/2014
 Sheet: _____ OF _____

PLAN AND PROFILE STATION
 40+00 to 45+00

C3.08



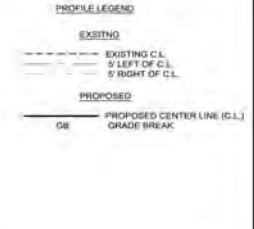
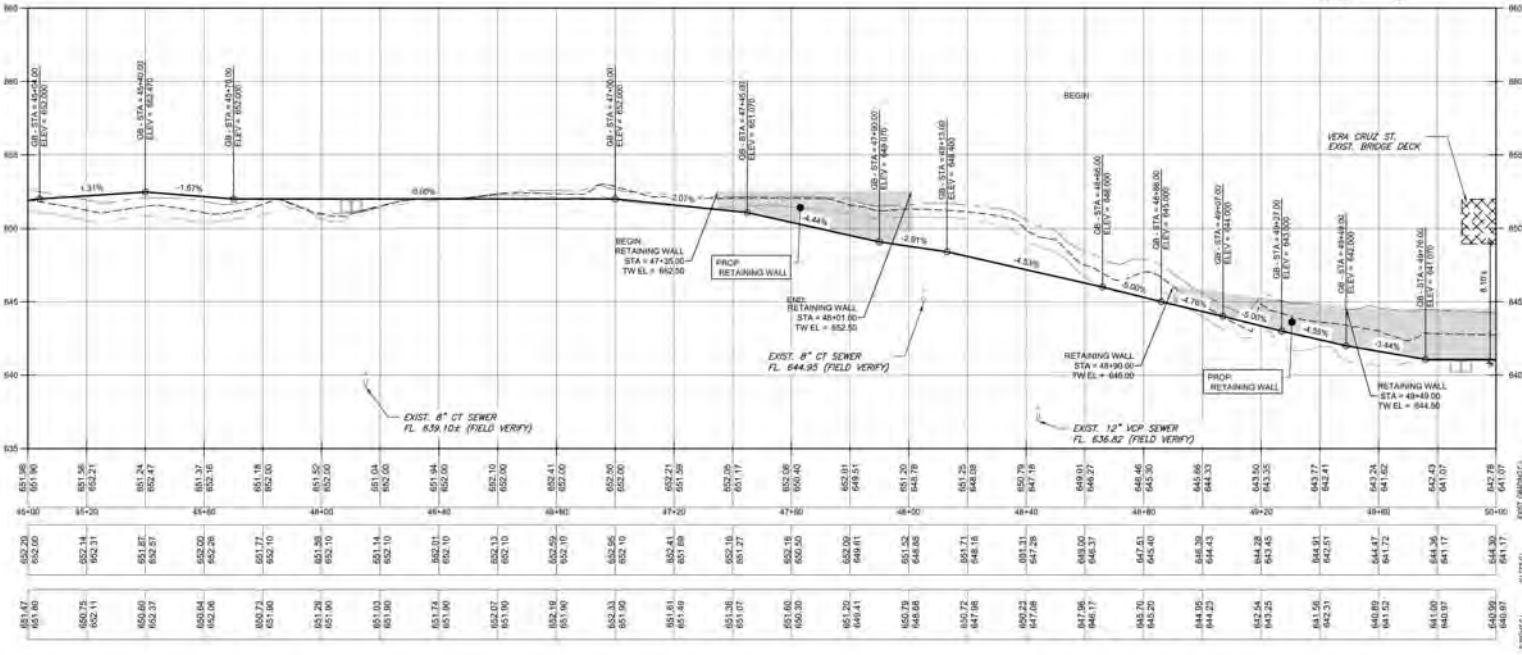
Date: 06/13/2014 11:00 AM
 User: mwheron
 Job: Apache Creek Trail
 Job Number: 0635029.0100
 Job Name: C3.08



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APACHE CREEK TRAIL

PLAN SHEET NO.	DETAIL NO.	BEGINNING STATION	ENDING STATION	
S2.01	3	46 + 69.93	47 + 35.00	
		47 + 35.85	48 + 30.00	
		52 + 68.88	55 + 35.00	
S2.01	5	21 + 78.00	21 + 63.00	
S2.02	1	47 + 97.00	42 + 66.00	
S2.02	2	12 + 83.00	14 + 32.00	
		29 + 17.00	35 + 12.00	
		38 + 73.00	40 + 18.00	
		47 + 35.00	48 + 01.00	
		48 + 30.00	49 + 69.00	
		50 + 82.00	52 + 67.00	
		55 + 35.00	55 + 35.00	
		57 + 35.00	57 + 76.00	
	S2.02	3	35 + 12.00	38 + 73.00
			40 + 18.00	41 + 97.00
		42 + 66.00	44 + 25.37	
		49 + 49.00	50 + 82.00	
		55 + 96.00	57 + 35.00	



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 210.220.1404
 wheron@terradesign.com



APACHE CREEK TRAIL

19th Street to
 Cassiano Park
 San Antonio, Texas

REVISION DATE

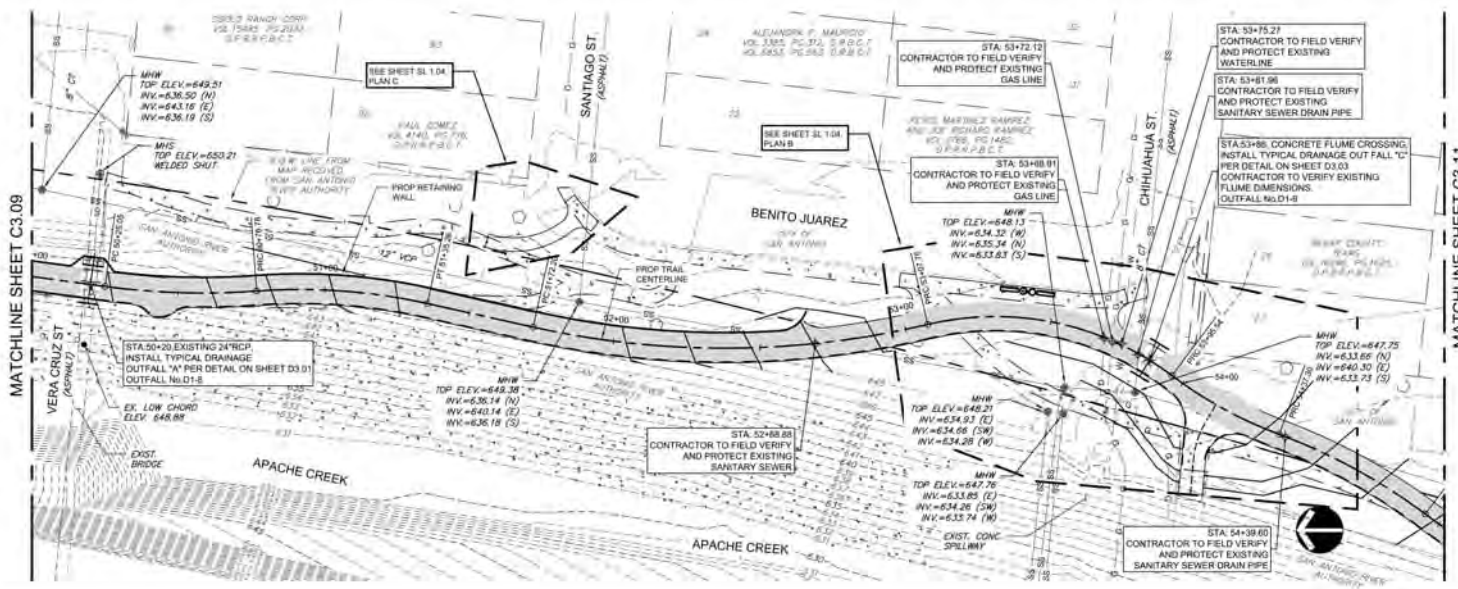
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 Date: 06/13/2014

PLAN AND PROFILE STATION
 45+00 to 50+00

C3.09



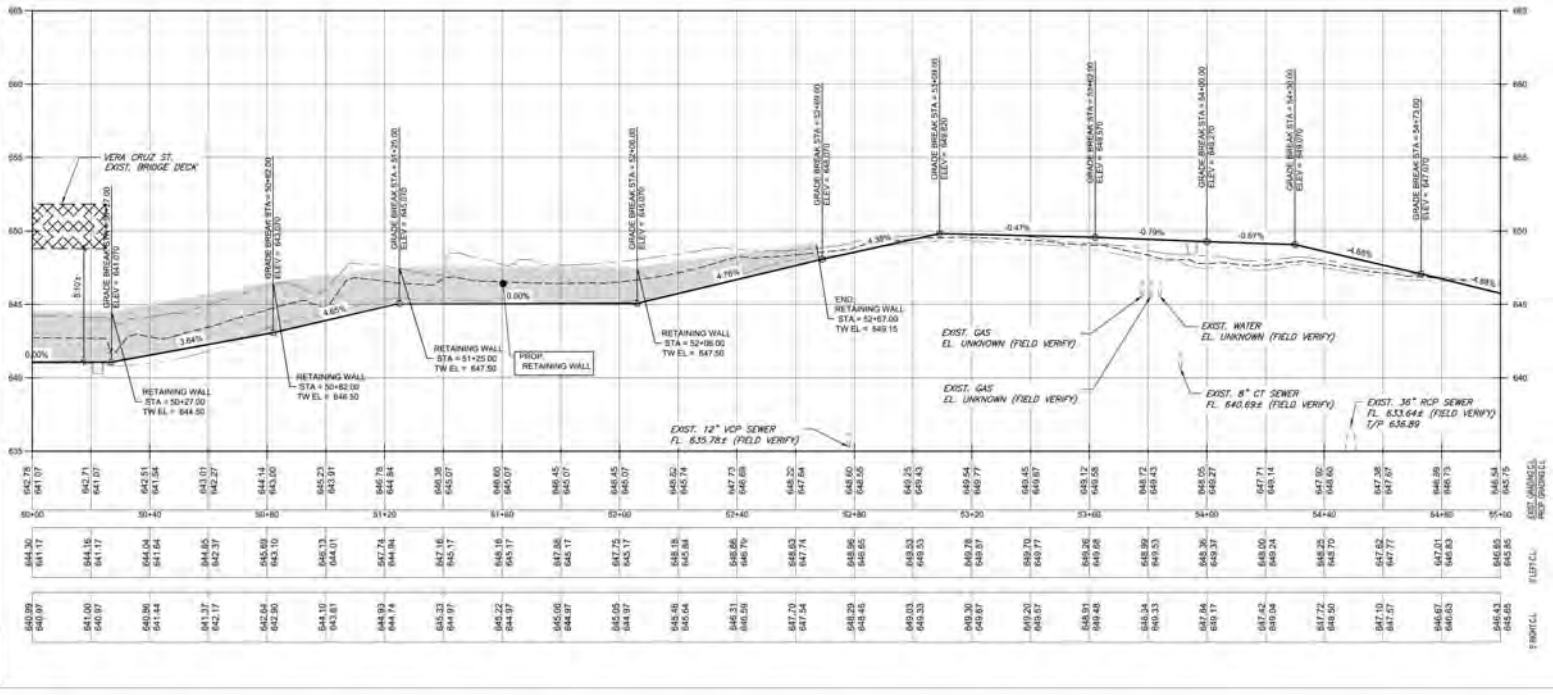
Date: 06/13/2014
 User: jwheron
 Job No: 06350229.0100
 Job Name: Apache Creek Trail
 Job Path: C:\Users\jwheron\Documents\06350229.0100\Apache Creek Trail.dwg
 Job Date: 06/13/2014



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APACHE CREEK TRAIL

PLAN SHEET NO.	DETAIL NO.	BEGINNING STATION	ENDING STATION
S-201	3	46 + 69.93	47 + 35.00
		47 + 95.65	48 + 90.00
		52 + 88.88	55 + 35.00
S-201	5	21 + 75.00	21 + 93.00
S-202	1	47 + 97.00	42 + 66.00
S-202	2	12 + 03.00	14 + 92.00
		29 + 17.00	35 + 12.00
S-202		38 + 73.00	40 + 18.00
		47 + 35.00	46 + 01.00
S-202		48 + 30.00	49 + 49.00
		50 + 02.00	52 + 67.00
S-202		55 + 35.00	55 + 96.00
		57 + 35.00	57 + 76.00
S-202	3	35 + 12.00	38 + 73.00
		40 + 18.00	41 + 97.00
		42 + 66.00	44 + 25.37
		49 + 49.00	50 + 92.00
		55 + 96.00	57 + 35.00



PROFILE LEGEND

EXISTING

- EXISTING C.L.
- - - 5' LEFT OF C.L.
- - - 5' RIGHT OF C.L.

PROPOSED

- PROPOSED CENTER LINE (C.L.)
- GRADE BREAK



Terra design group, inc.
 916 cameron suite 103
 san antonio, texas 78212
 210.221.1400
 210.220.1404
 wterra@terradesign.com



APACHE CREEK TRAIL

19th Street to
 Cassiano Park
 San Antonio, Texas

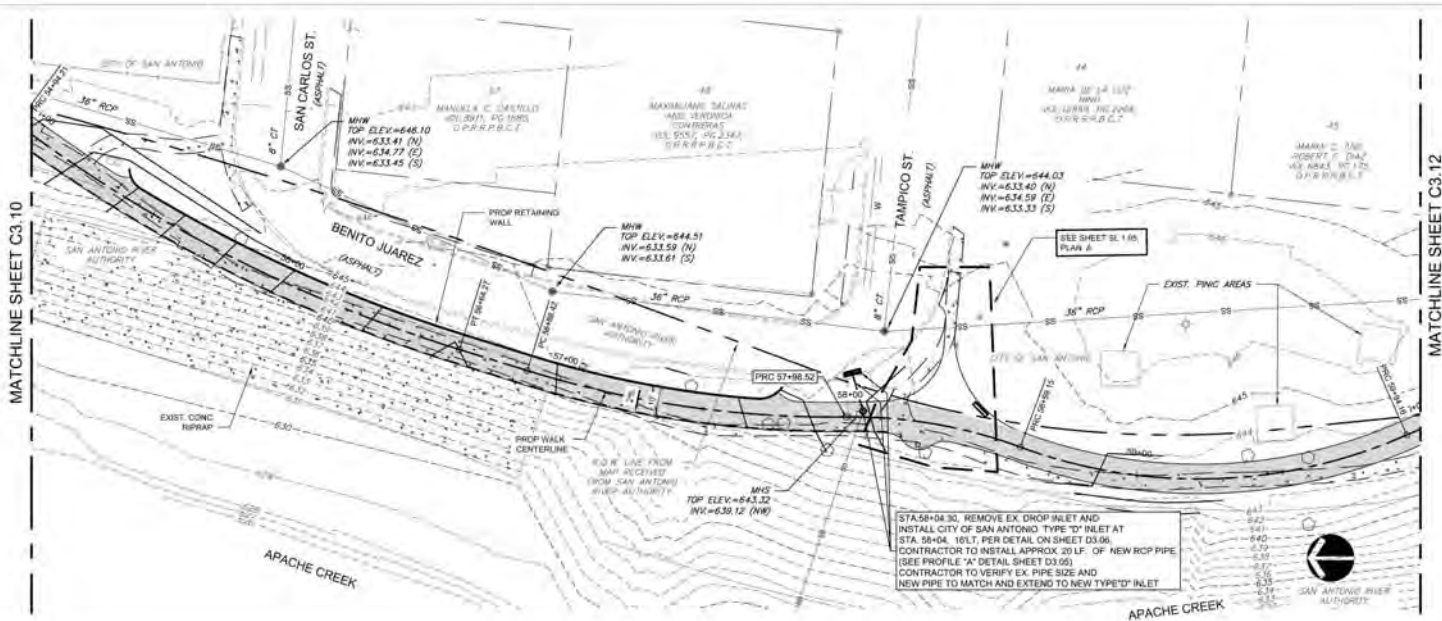
REVISION DATE

Project no: 06353029.0100
 Date: 06/13/2014

PLAN AND PROFILE STATION
 50+00 to 55+00

C3.10

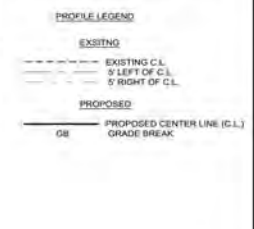
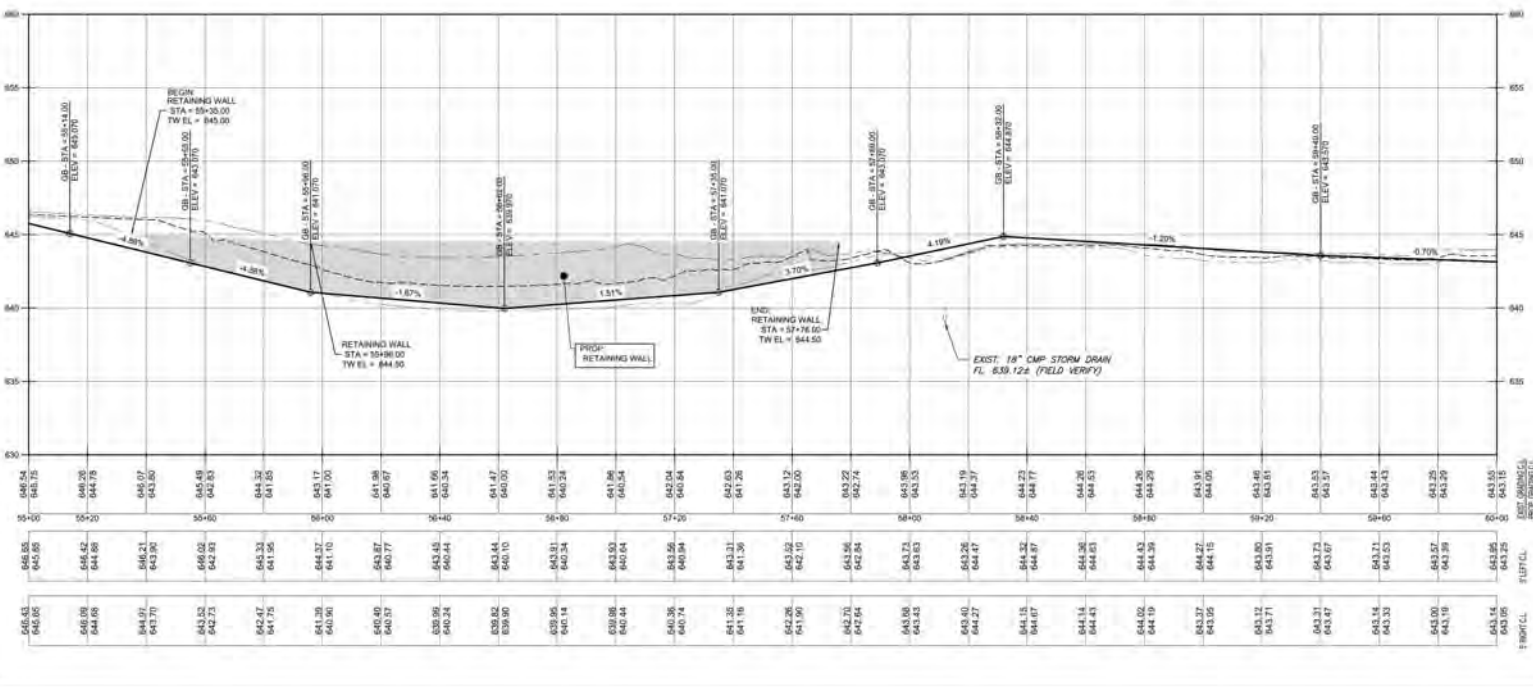




- NOTES:**
1. THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM AVAILABLE RECORDS AND ARE NOT GUARANTEED, BUT SHALL BE INVESTIGATED AND VERIFIED BY THE CONTRACTOR BEFORE STARTING WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGES TO AND FOR THE MAINTENANCE AND PROTECTION OF THE EXISTING UTILITIES EVEN IF THEY ARE NOT SHOWN ON THE PLANS. LOCATION AND DEPTH OF EXISTING UTILITIES SHOWN HERE ARE APPROXIMATE ONLY. ACTUAL LOCATIONS AND DEPTHS MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION AND HE SHALL BE RESPONSIBLE FOR PROTECTION OF THE SAME DURING CONSTRUCTION.
 2. ALL DEMOLITION AND/OR RELOCATION SHALL BE IN ACCORDANCE WITH THE "DEMOLITION LAYOUT" SHEETS.
 3. ALL TREE PRESERVATION SHALL BE IN ACCORDANCE WITH THE "TREE PRESERVATION" SHEETS.
 4. SEE "STRUCTURAL SHEETS" FOR RETAINING WALL AND CONCRETE TRAIL DETAILS.

APACHE CREEK TRAIL

PLAN SHEET NO.	DETAIL NO.	BEGINNING STATION	ENDING STATION
S201	3	46 + 69.93	47 + 35.00
		47 + 95.65	48 + 90.00
		52 + 88.88	55 + 35.00
S201	5	21 + 75.00	21 + 83.00
S202	1	47 + 97.00	42 + 66.00
S202	2	12 + 03.00	14 + 92.00
		29 + 17.00	35 + 12.00
		38 + 73.00	40 + 18.00
		47 + 35.00	48 + 01.00
		48 + 80.00	49 + 49.00
		50 + 82.00	52 + 67.00
		55 + 35.00	55 + 96.00
		57 + 35.00	57 + 76.00
	3	35 + 12.00	38 + 73.00
		40 + 18.00	41 + 97.00
	42 + 66.00	44 + 25.37	
	49 + 49.00	50 + 82.00	
	55 + 96.00	57 + 35.00	



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 918 Cameron Suite 103
 San Antonio, Texas 78212
 210.221.1400
 210.220.1404
 wheron@terradesign.com



APACHE CREEK TRAIL

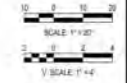
19th Street to
 Cassiano Park
 San Antonio, Texas

REVISION DATE

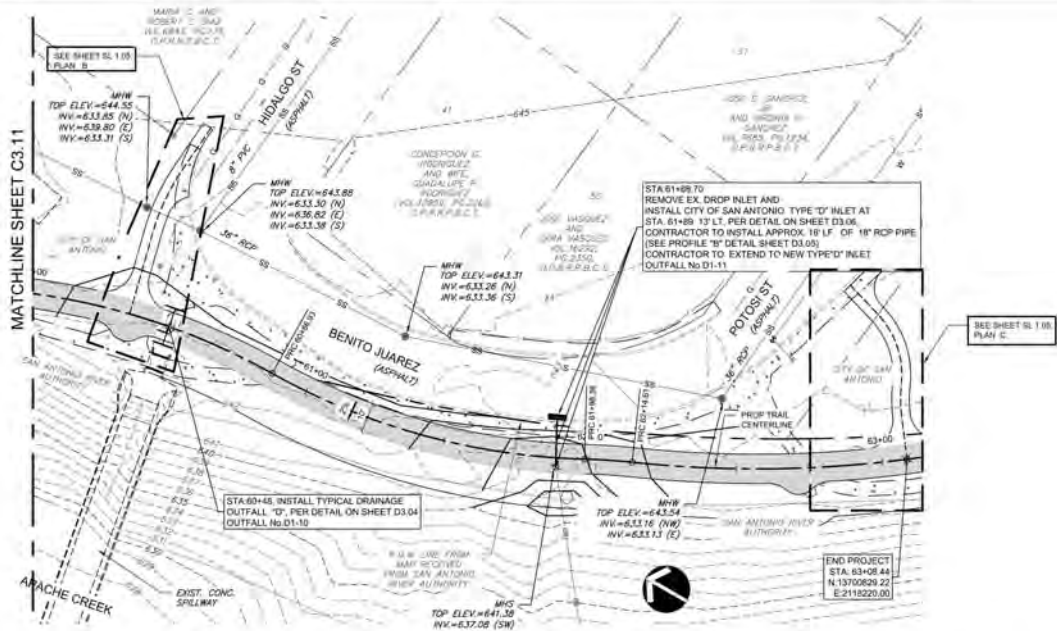
Project no: 06353029.0100
 Date: 06/13/2014
 Sheet: _____ OF _____

PLAN AND PROFILE STATION
 55+00 to 60+00

C3.11



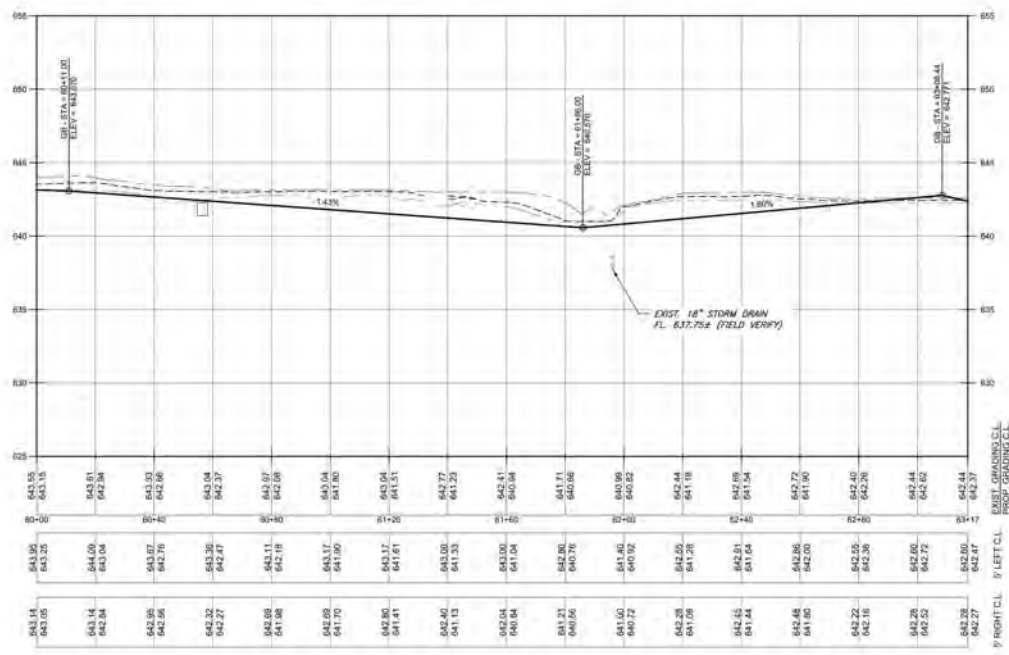
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 Job No: 06353029.0100
 Job Name: Apache Creek Trail
 Job Path: C:\Users\jwheron\Documents\06353029.0100\APACHE CREEK TRAIL.dwg
 Job Title: Engineer
 Job Number: 06353029.0100



- NOTES:**
- THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM AVAILABLE RECORDS AND ARE NOT GUARANTEED, BUT SHALL BE INVESTIGATED AND VERIFIED BY THE CONTRACTOR BEFORE STARTING WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGES TO AND FOR THE MAINTENANCE AND PROTECTION OF THE EXISTING UTILITIES EVEN IF THEY ARE NOT SHOWN ON THE PLANS. LOCATION AND DEPTH OF EXISTING UTILITIES SHOWN HERE ARE APPROXIMATE ONLY. ACTUAL LOCATIONS AND DEPTHS MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION AND HE SHALL BE RESPONSIBLE FOR PROTECTION OF THE SAME DURING CONSTRUCTION.
 - ALL DEMOLITION AND/OR RELOCATION SHALL BE IN ACCORDANCE WITH THE 'DEMOLITION LAYOUT' SHEETS.
 - ALL TREE PRESERVATION SHALL BE IN ACCORDANCE WITH THE 'TREE PRESERVATION' SHEETS.
 - SEE 'STRUCTURAL SHEETS' FOR RETAINING WALL AND CONCRETE TRAIL DETAILS.

APACHE CREEK TRAIL

PLAN SHEET NO.	DETAIL NO.	BEGINNING STATION	ENDING STATION	
S201	3	46 + 69.93	47 + 35.00	
		47 + 35.00	48 + 50.00	
		52 + 88.88	55 + 35.00	
S201	5	21 + 75.00	21 + 83.00	
S202	1	47 + 87.00	42 + 06.00	
S202	2	12 + 83.00	14 + 92.00	
		28 + 17.00	35 + 12.00	
		38 + 73.00	40 + 18.00	
		47 + 35.00	48 + 01.00	
		48 + 30.00	49 + 49.00	
		50 + 02.00	52 + 67.00	
		55 + 35.00	55 + 96.00	
		57 + 35.00	57 + 76.00	
	S202	3	35 + 12.00	38 + 73.00
			40 + 18.00	41 + 97.00
		42 + 86.00	44 + 25.37	
		49 + 49.00	50 + 82.00	
		58 + 96.00	57 + 55.00	



- PROFILE LEGEND**
- EXISTING
 - EXISTING C.L.
 - 5' LEFT OF C.L.
 - 5' RIGHT OF C.L.
 - PROPOSED
 - PROPOSED CENTER LINE (C.L.)
 - GRADE BREAK



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APACHE CREEK TRAIL

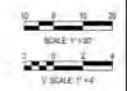
19th Street to
 Cassiano Park
 San Antonio, Texas

REVISION DATE

Project no: 06353029.0100
 Date: 06/13/2014
 Sheet: _____ OF _____

PLAN AND PROFILE STATION
 60+00 to 63+17.12

C3.12



Date: 06/13/2014 10:58 AM
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 Job: Apache Creek Trail
 Job Path: C:\Users\jwheron\Documents\06353029.01\ARCH\PROFILES.dwg
 Job No: 06353029.01
 Job Name: Apache Creek Trail
 Job Path: C:\Users\jwheron\Documents\06353029.01\ARCH\PROFILES.dwg



Stormwater inlets will be protected as per section 5.1.3

- North Apache Creek Trail Project Area
- Construction Entrance
- Silt Fence
- North Apache Creek Trail
- Stormwater Outfall

San Antonio River Authority
 North Apache Creek Trail Project
 Stormwater Pollution Prevention Plan

BMP Placement Map

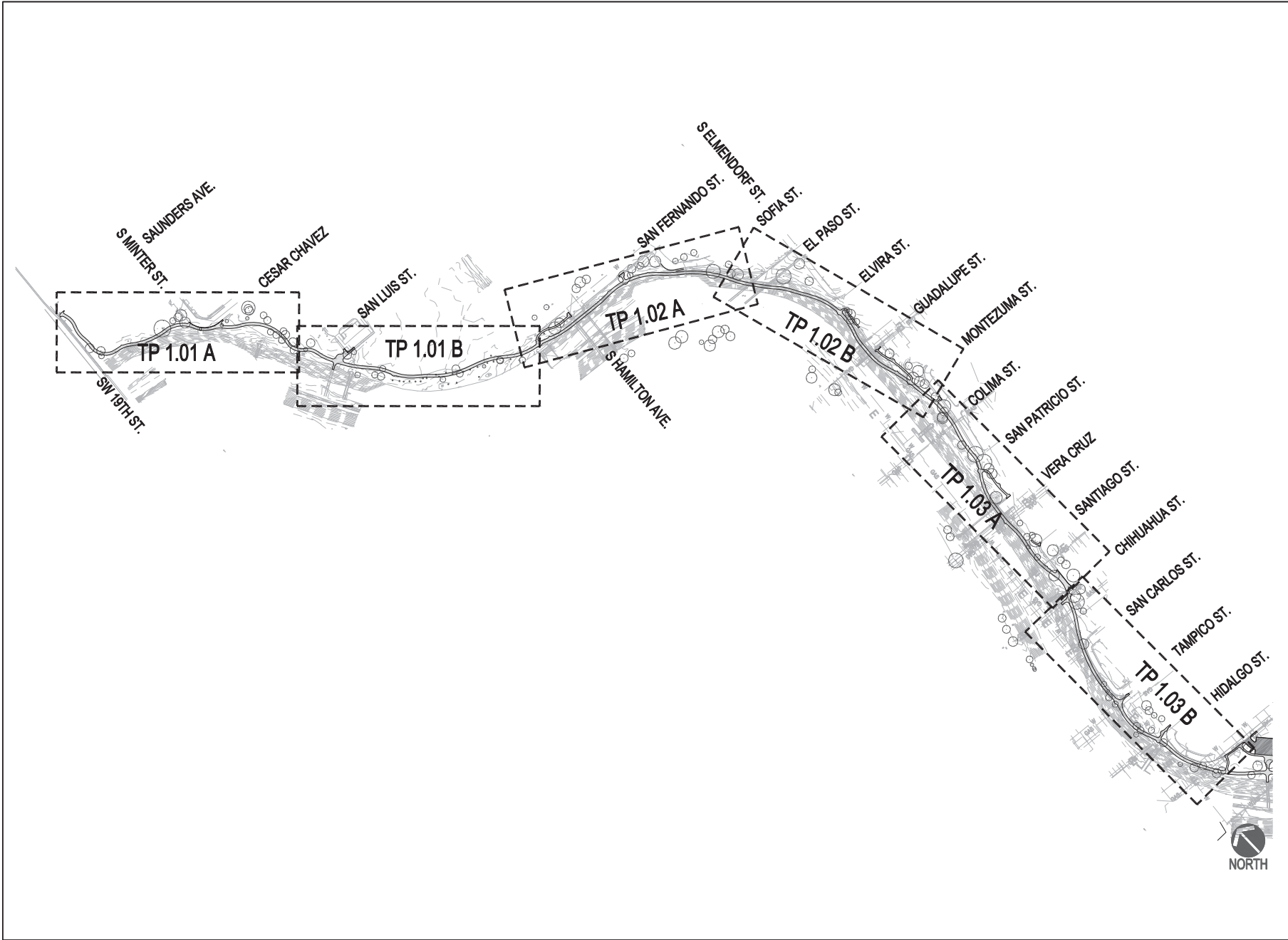
TREE PRESERVATION NOTES:

- EXISTING TREES DENOTED ON THIS PLAN WITHIN THE LIMITS OF CONSTRUCTION ARE TO BE PRESERVED WHERE POSSIBLE. NO TREES ARE TO BE REMOVED PRIOR TO APPROVAL FROM THE LANDSCAPE ARCHITECT. THE CONTRACTOR IS TO STAKE THE PROPOSED IMPROVEMENTS AND TRAIL ALIGNMENT FOR REVIEW BY THE LANDSCAPE ARCHITECT, WHO WILL DETERMINE IF ANY EXISTING TREES ARE TO BE REMOVED. TREES TO REMAIN SHALL BE PROTECTED AS NOTED BELOW. EXISTING TREES OUTSIDE THE LIMITS OF CONSTRUCTION ARE TO BE PRESERVED FROM ANY DAMAGE BY THE CONTRACTOR. ANY TREES DAMAGED BY THE CONTRACTOR WILL BE REPLACED AS DETERMINED BY THE LANDSCAPE ARCHITECT.
- ORANGE MESH BARRIER FENCE SHALL BE ERRECTED AT THE LIMITS OF CONSTRUCTION AND MAINTAINED UNTIL CONSTRUCTION IS COMPLETED. THE FENCING WILL ALSO BE ERRECTED AROUND THE ROOT PROTECTION ZONE (RPZ) OF TREES THAT ARE TO REMAIN WITHIN THE LIMITS OF CONSTRUCTION. THE RPZ SHALL BE DETERMINED BY THE TREE SIZE (RECOMMENDED 12" RADIUS FROM THE TRUNK FOR EVERY 1" DIAMETER OF TRUNK AT 4' ABOVE GROUND) WITH A MINIMUM OF 30" RADIUS. FENCE TREE GROUPS WHERE POSSIBLE.
- NO WORK SHALL BEGIN WHERE THE TREE PROTECTION FENCING HAS NOT BEEN COMPLETED AND APPROVED. TREE PROTECTION FENCING SHALL BE INSTALLED, MAINTAINED AND REPAIRED BY THE CONTRACTOR DURING CONSTRUCTION. THE FENCING WILL BE A MINIMUM OF 4' HEIGHT.
- RPZ SHALL BE SUSTAINED IN A NATURAL STATE AND SHALL BE FREE FROM VEHICULAR OR MECHANICAL TRAFFIC. NO FILL, EQUIPMENT, LIQUIDS OR CONSTRUCTION DEBRIS SHALL BE PLACED INSIDE THE PROTECTION BARRIER.
- THE RPZ SHALL BE COVERED WITH MULCH TO REDUCE MOISTURE STRESS.
- ANY DAMAGE DONE TO EXISTING TREE CROWNS OR ROOT SYSTEMS SHALL BE REPAIRED IMMEDIATELY. ALL WOUNDS TO LIVE OAKS WILL BE PAINTED WITH PRUNING PAINT WITHIN MINUTES AFTER DAMAGE. ROOTS EXPOSED DURING CONSTRUCTION OPERATIONS WILL BE CUT CLEANLY AND PAINTED.
- EXPOSED ROOTS SHALL BE COVERED AT THE END OF THE WORK DAY USING TECHNIQUES SUCH AS COVERING WITH SOIL, MULCH OR WET BURLAP.
- THE PROPOSED FINISHED GRADE AND ELEVATION OF LAND WITHIN THE ROOT PROTECTION ZONE OF ANY TREE TO BE PRESERVED SHALL NOT BE RAISED OR LOWERED MORE THAN 9". WELLING AND RETAINING METHODS ARE ALLOWED OUTSIDE THE RPZ.
- THE RPZ SHALL REMAIN PERVIOUS, I.E. GROUND COVER OR TURF AT COMPLETION OF LANDSCAPE DESIGN.
- ALL TREES CLEARED FOR CONSTRUCTION WILL BE CHIPPED ON SITE AND THE CHIPPED MATERIAL WILL BE PLACED IN A 2" THICK LAYER OVER BARE SOIL ADJACENT TO THE IMPROVEMENT AS DIRECTED BY THE LANDSCAPE ARCHITECT.
- ALL DEBRIS GENERATED BY THE PRUNING AND TRIMMING OF THE TREE AND/OR BUSHES SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED PROPERLY.
- EXISTING UNDERSTORY VEGETATION IS TO BE PRESERVED WHEREVER POSSIBLE.
- NO EXCESSIVE TREE TRIMMING WILL BE PERMITTED.
- TREES WHICH ARE DAMAGED OR LOST DUE TO THE CONTRACTOR'S NEGLIGENCE DURING CONSTRUCTION SHALL BE MITIGATED TO THE LANDSCAPE ARCHITECT'S SPECIFICATIONS.
- TREES MUST BE MAINTAINED IN GOOD HEALTH THROUGHOUT THE CONSTRUCTION PROCESS. MAINTENANCE MAY INCLUDE WATERING THE ROOT PROTECTION ZONE, WASHING FOLIAGE, FERTILIZATION, PRUNING, ADDITIONAL MULCH APPLICATIONS AND OTHER MAINTENANCE AS NEEDED ON THE PROJECT.
- NO WIRES, NAILS OR OTHER MATERIALS MAY BE ATTACHED TO PROTECTED TREES.
- ACCESS TO FENCED AREAS WILL ONLY BE PERMITTED WITH APPROVAL OF LANDSCAPE ARCHITECT OR CITY INSPECTOR.
- THE CONTRACTOR SHALL AVOID CUTTING ROOTS LARGER THAN ONE INCH IN DIAMETER WHEN EXCAVATING NEAR EXISTING TREES. EXCAVATION IN THE VICINITY OF TREES SHALL PROCEED WITH CAUTION. THE CONTRACTOR SHALL CONTACT THE CITY INSPECTOR FOR GUIDANCE.
- ROOTS WILL BE CUT WITH A ROCK SAW OR BY HAND, NOT BY AN EXCAVATOR OR OTHER ROAD CONSTRUCTION EQUIPMENT.
- ALL CURB AND SIDEWALK WORK SHALL USE ALTERNATIVE CONSTRUCTION METHODS TO MINIMIZE EXTENSIVE ROOT DAMAGE TO TREES (REFER TO DETAILS).
- SAPLINGS, SHRUBS OR BUSHES TO BE CLEARED FROM THE PROTECTED ROOT ZONE AREA OF A LARGE TREE SHALL BE REMOVED BY HAND AS DESIGNATED BY THE INSPECTOR.
- TREES, TREE LIMBS, BUSHES AND SHRUBS LOCATED IN THE CITY STREET OR ALLEY RIGHT-OF-WAY OR PERMANENT EASEMENTS WHICH INTERFERE WITH PROPOSED CONSTRUCTION ACTIVITIES SHALL BE PROPERLY PRUNED FOLLOWING THE ANSI A300 STANDARDS FOR PRUNING. ALL TREE PRUNING SHALL BE COMPLETED BY A CITY OF SAN ANTONIO TREE MAINTENANCE LICENSED CONTRACTOR (ARTICLE 21-171, CITY CODE) ONLY AFTER APPROVAL FROM THE CAPITAL PROJECTS MANAGEMENT THROUGH THE INSPECTOR.
- TREE PLANTING FOR MITIGATION OR ENHANCEMENT: ALL PLANTED TREES SHALL BE MAINTAINED IN A HEALTHY CONDITION AT ALL TIMES. THIS INCLUDES IRRIGATION, FERTILIZING, PRUNING AND OTHER MAINTENANCE AS NEEDED ON THE PROJECT. TREES THAT DIE WITHIN TWELVE (12) MONTHS SHALL BE REPLACED WITH A TREE OF EQUAL SIZE AND SPECIES.

TREE INVENTORY - APACHE CREEK TRAIL										
2010 Tree Preservation Ordinance										
Location	Species	Understory Species			Significant Trees		Heritage Trees		Protection Level	
		NA	NA	NA	6" - 23.99"	24" & up	Heritage	Land	Level	Level
0400	Oak									Level 1B
0401	Oak									Level 1B
0402	Oak									Level 1B
0403	Oak									Level 1B
0404	Oak									Level 1B
0405	Oak									Level 1B
0406	Oak									Level 1B
0407	Oak									Level 1B
0408	Oak									Level 1B
0409	Oak									Level 1B
0410	Oak									Level 1B
0411	Oak									Level 1B
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0569	Oak									Level 1B
0570	Oak									Level 1B
0571	Oak									Level 1B
0572	Oak									Level 1B
0573	Oak									Level



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 210.220.1404
 wheard@terradesign.com



APACHE CREEK TRAIL

19TH STREET
 TO CASSIANO PARK
 San Antonio, Texas

REVISION _____ DATE _____



Project no: _____
 Date: JUNE 20, 2014
 Sheet: _____

OVERALL TREE PRESERVATION TP 1.00

CONSTRUCTION DOCUMENTS

Date: 06.20.2014, 1:24:00 PM
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 Drawing Path: P:\2014\19TH STREET TO CASSIANO PARK\19TH STREET TO CASSIANO PARK.dwg
 User: wheard
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 210.220.1400
 wheard@terradesign.com

APACHE CREEK TRAIL

19TH STREET
 TO CASSIANO PARK
 San Antonio, Texas

REVISION	DATE

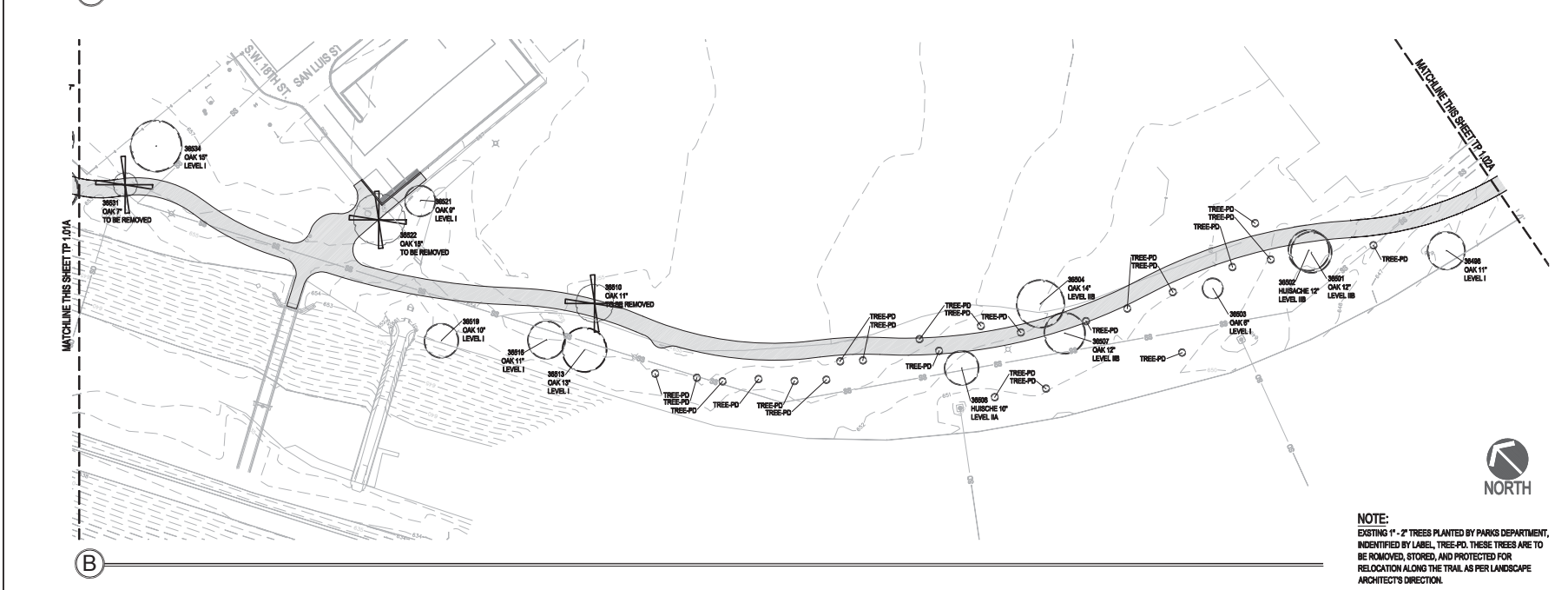
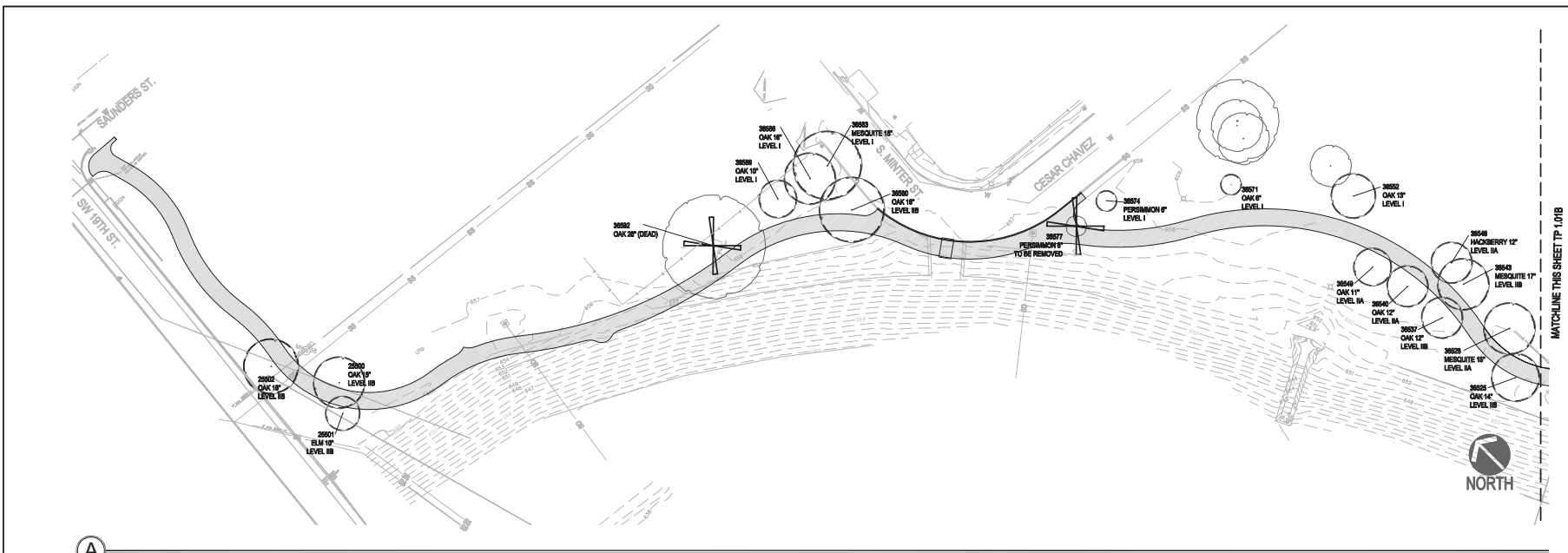


Project no: _____
 Date: JUNE 20, 2014
 Sheet: _____

TREE PRESERVATION

TP 1.01

CONSTRUCTION DOCUMENTS



NOTE:
 EXISTING 1" - 2" TREES PLANTED BY PARKS DEPARTMENT, INDENTIFIED BY LABEL, TREE-PD. THESE TREES ARE TO BE REMOVED, STORED, AND PROTECTED FOR RELOCATION ALONG THE TRAIL AS PER LANDSCAPE ARCHITECT'S DIRECTION.

Date: 06.20.14, 10:45 AM
 Drawing Title: 19TH STREET TO CASSIANO PARK
 Drawing No: 19TH STREET TO CASSIANO PARK
 Drawing Scale: 1" = 30'
 Drawing Author: W.H.
 Drawing Checker: W.H.



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 210.220.1404
 wheard@terradesign.com

APACHE CREEK TRAIL

19TH STREET
 TO CASSIANO PARK
 San Antonio, Texas

REVISION DATE

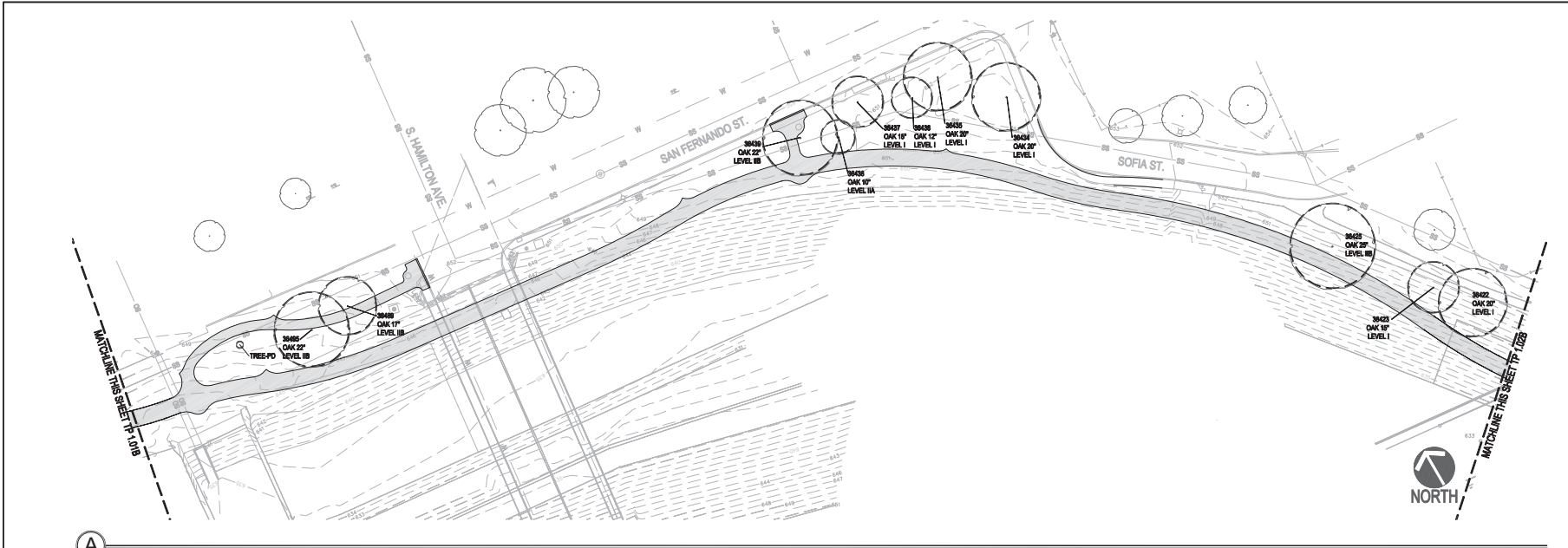


Project no:
 Date: JUNE 20, 2014
 Sheet:

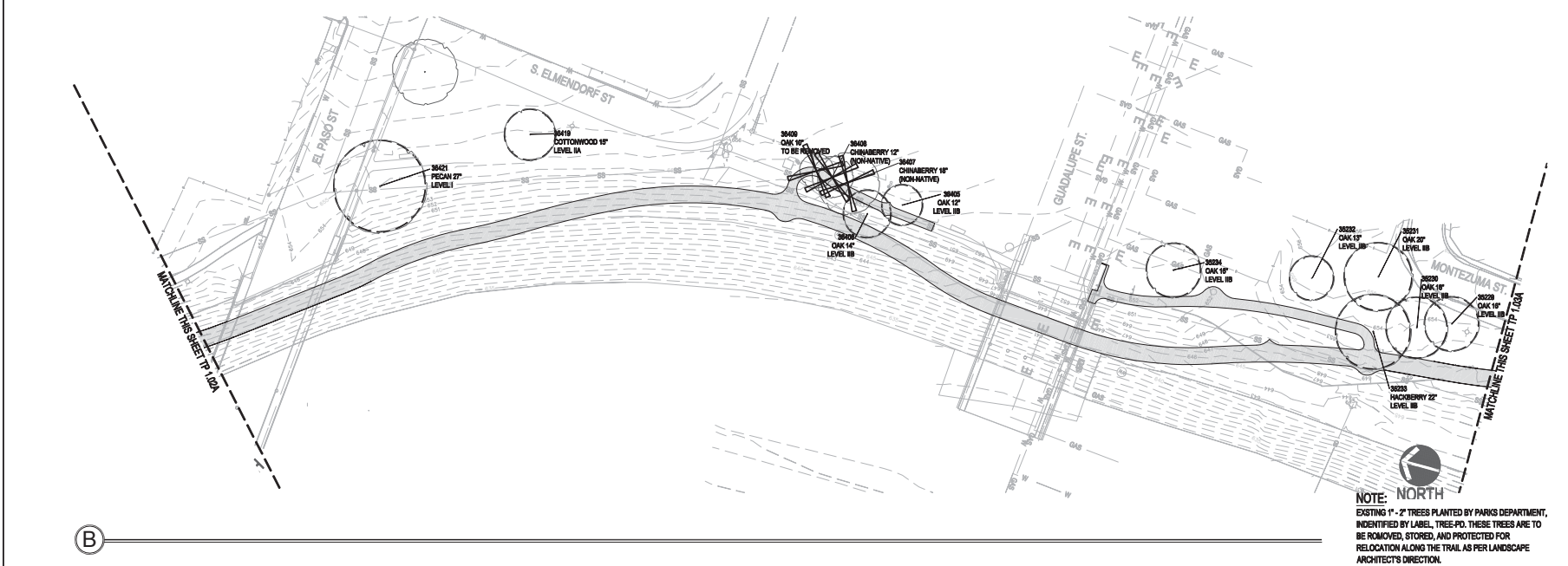
TREE PRESERVATION

TP 1.02

CONSTRUCTION DOCUMENTS



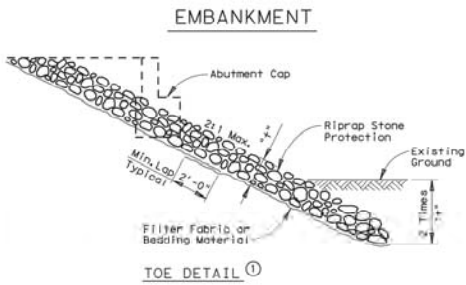
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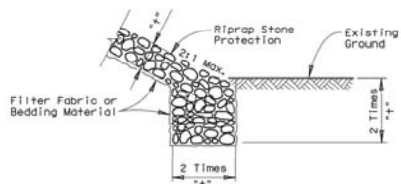
B

NOTE: NORTH
 EXISTING 1" - 2" TREES PLANTED BY PARKS DEPARTMENT, IDENTIFIED BY LABEL, TREE-PD. THESE TREES ARE TO BE REMOVED, STORED, AND PROTECTED FOR RELOCATION ALONG THE TRAIL AS PER LANDSCAPE ARCHITECT'S DIRECTION.

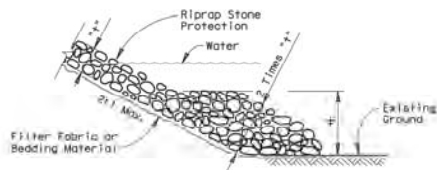
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 Drawing No.: TP 1.02
 Project Name: Apache Creek Trail
 Project Location: 19th Street to Cassiano Park
 Project No.: 14-00000
 Drawing No.: TP 1.02
 Scale: As Shown
 Author: W. Heard
 Checker: W. Heard
 Date: 06.20.14



TOE DETAIL ①

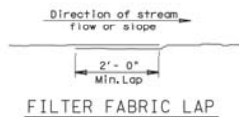


TOE DETAIL ① (ALTERNATE)

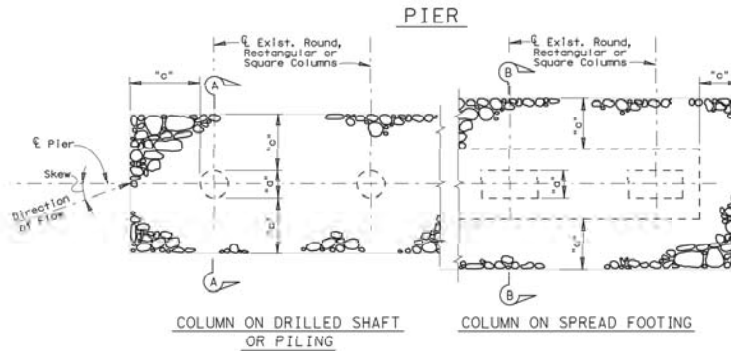


TOE DETAIL ① UNDER WATER

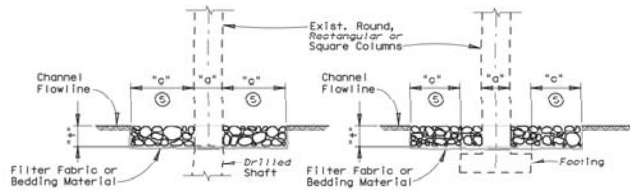
‡ 2 times the thickness (**) or maximum expected scour considering site history if available.



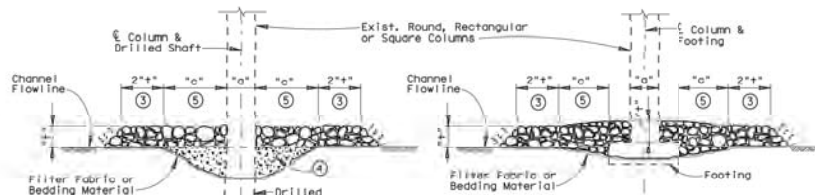
FILTER FABRIC LAP



PLAN VIEW



ELEVATION



SECTION A-A SECTION B-B
ELEVATION UNDER WATER OR SCOUR CRITICAL

NOTES:

- ① Toe required at all boundaries of stone protection except where placed next to a structure such as an abutment or pier.
- ② Bedding material is not required if filter fabric is used. Filter fabric will be Type 2 (6 oz/sy) as per DMS 6200.
- ③ In areas where excavation in the channel will exacerbate scour, an additional width of stone protection is required as shown.
- ④ Scour damage may be filled with a material having a gradation equal to the bedding material but will not be more coarse than stone protection being placed, as specified in item 432 "RIPRAP", approval of the engineer is required.
- ⑤ Surface of stone protection will slope away from the pier, but not exceed 2:1.

GENERAL NOTES:

Refer to item 432 for the gradation of stone protection and bedding material, alternate gradations are not permitted. Placement of stone protection will not be performed in a manner that will cause segregation such as dumping or pushing material in place.

See Layout for limits and thickness of riprap specified, design table provided below is a guide for the designer. All work will be performed in accordance with item 432.

DESIGN TABLE:

Minimum specific gravity for stone protection is 2.40
Minimum thickness permissible is 12 inches, channel velocities (V) for a given thickness and gradation will not exceed the limits indicated in the table below.

- ** = Thickness of revetment
- *a = Column width
- Skew = Angle between direction of flow and center of pier
- *c = $2^*a / \cos(\text{skew})$
- *v = Stream velocity

ABUTMENT OR CHANNEL BANK	REVETMENT TYPE		
	RECT. NOSE	PIER RECT. NOSE	PIER ROUND NOSE
"+" in.	"v" (max.) ft/s	"v" (max.) ft/s	"v" (max.) ft/s
12	5.8	6.0	6.8
15	6.5	6.8	7.7
18	7.1	7.2	8.2
21	7.7	7.7	8.7
24	8.2	7.8	8.8
30	9.2	9.1	10.3

SAN ANTONIO DISTRICT STANDARD

Texas Department of Transportation
San Antonio District Structural Design

FLEXIBLE RIPRAP STONE PROTECTION EMBANKMENTS AND PIERS

FRR (SP)

PREPARED BY AND FOR USE OF: TxDOT

ORIGINAL DRAWING DATE: SEPT. 2007

DESIGNER: S.A.T. G.

DATE: 06-13-2014

PROJECT: 06353029.0100

SHEET: 1 OF 1

PROJECT NO: 06353029.0100
DATE: 06/13/2014
SHEET: 1 OF 1



Terra design group, inc.
818 cameron, suite 103
san antonio, texas 78212
210.220.1400
210.220.1404
wherr@terradesigns.com

Figure 5:
North Apache
Creek Trail
Riprap and
Outfall Details



APACHE CREEK TRAIL

19th Street to
Cassiano Park
San Antonio, Texas

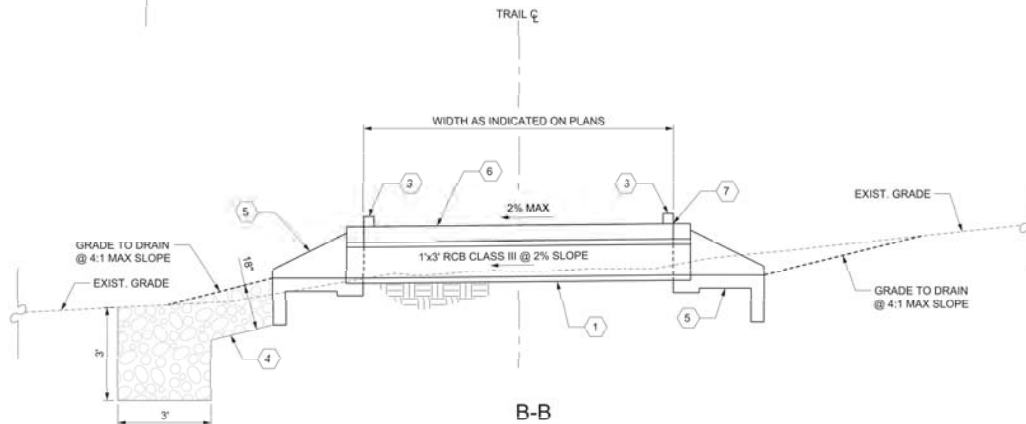
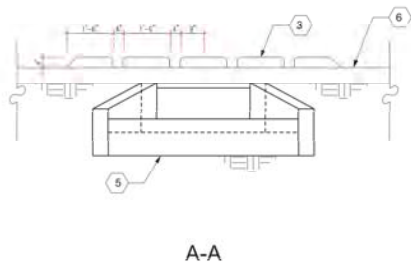
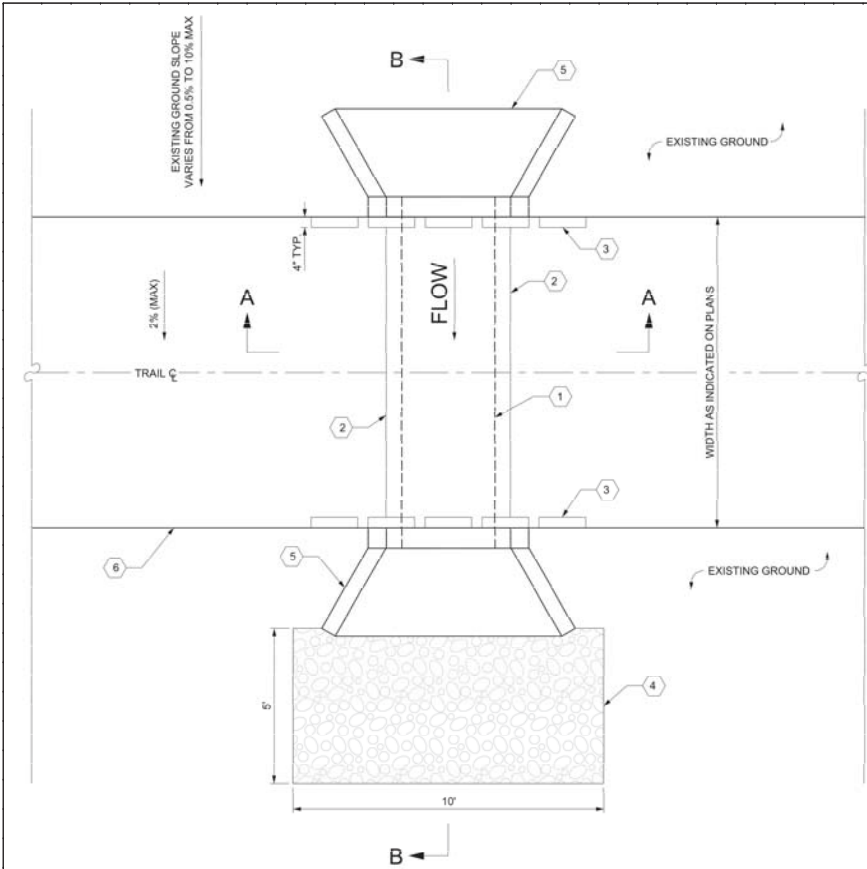
REVISION DATE

Project no: 06353029.0100
Date: 06/13/2014
Sheet: 1 OF 1

Txdot Detail

D3.11

Date: Jan 10, 2014 4:04pm User: B030366
Last Saved: 01/10/2014 4:04pm
Last Saved By: B030366
User: B030366
User: B030366
User: B030366



NOTES BY SYMBOL

- 1 - PRECAST 1'X3' REINFORCED CONCRETE BOX CULVERT TYPE "BC-TYP1" AS MANUFACTURED BY OLD CASTLE PRECAST® (www.oldcastlesanantonio.com) OR APPROVED EQUAL.
- 2 CRACK CONTROL JOINT (SEE STRUCTURAL SHEETS)
- 3 4"X4" SLOTTED CONCRETE CURB, TYP.
- 4 10'X5' ROCK RIPRAP APRON, D50 = 18" DIA. ROCK SEE TXDOT DETAIL FOR FLEXIBLE RIPRAP
- 5 CONCRETE WINGWALL WITH FLARED WINGS SEE TXDOT DETAIL FW-0
- 6 PROPOSED CONCRETE WALK. REF. CONCRETE WALK/PAD DETAIL FOR STEEL AND CONCRETE SPECIFICATIONS.
- 7 FILL VOIDS WITH NON-SHRINK GROUT, TYP.

ADDITIONAL NOTES:

1. CONTRACTOR TO FIELD VERIFY EXISTING DRAINAGE STRUCTURE DIMENSIONS PRIOR TO CONSTRUCTION OF PROPOSED DRAINAGE STRUCTURES.
2. ALL CAST-IN-PLACE CONCRETE STRUCTURES INCLUDING, BUT NOT LIMITED TO, RETAINING WALLS, CONCRETE WALKS, AND DRAINAGE STRUCTURES SHALL BE IN ACCORDANCE WITH THE 'STRUCTURAL SHEETS'.
3. ALL SUBGRADE PREPARATION, BEDDING, AND BACKFILL SHALL BE IN ACCORDANCE WITH THE 'STRUCTURAL SHEETS'.

DRAINAGE STRUCTURE DETAIL: TYPE "D"
NOT TO SCALE



Terra design group, inc.
818 cameron, suite 103
san antonio, texas 78212
210.220.1400
210.220.1404
whierd@terradesignsa.com



APACHE CREEK TRAIL

19th Street to
Cassiano Park
San Antonio, Texas

REVISION	DATE

Project no: 06353029.0100
Date: 06/13/2014
Sheet: ___ OF ___

Detail Sheet

D3.04



Stormwater Pollution Prevention Plan

North Apache Creek Trail

APPENDIX A: Copy of BMP Placement Plan



Stormwater inlets will be protected as per section 5.1.3

- North Apache Creek Trail Project Area
- Construction Entrance
- Silt Fence
- North Apache Creek Trail
- Stormwater Outfall

San Antonio River Authority
 North Apache Creek Trail Project
 Stormwater Pollution Prevention Plan

BMP Placement Map



Stormwater Pollution Prevention Plan

North Apache Creek Trail

APPENDIX B: SWPPP Inspection Checklist

Instructions

This sample inspection report has been developed as a helpful tool to aid you in completing your site inspections. This sample inspection report was created consistent with EPA's Developing Your Stormwater Pollution Prevention Plan. You can find both the guide and the sample inspection report (formatted in Microsoft Word) at www.epa.gov/npdes/swpppguide

This inspection report is provided in Microsoft Word format to allow you to easily customize it for your use and the conditions at your site. You should also customize this form to help you meet the requirements in your construction general permit related to inspections. **If your permitting authority provides you with an inspection report, please use that form.**

For more information on inspections, please see Developing Your Stormwater Pollution Plan Chapters 6 and 8.

Using the Inspection Report

This inspection report is designed to be customized according to the BMPs and conditions at your site. For ease of use, you should take a copy of your site plan and number all of the stormwater BMPs and areas of your site that will be inspected. A brief description of the BMP or area should then be listed in the site-specific section of the inspection report. For example, specific structural BMPs such as construction site entrances, sediment ponds, or specific areas with silt fence (e.g., silt fence along Main Street; silt fence along slope in NW corner, etc.) should be numbered and listed. You should also number specific non-structural BMPs or areas that will be inspected (such as trash areas, material storage areas, temporary sanitary waste areas, etc).

You can complete the items in the "General Information" section that will remain constant, such as the project name, NPDES tracking number, and inspector (if you only use one inspector). Print out multiple copies of this customized inspection report to use during your inspections.

When conducting the inspection, walk the site by following your site map and numbered BMPs/areas for inspection. Also note whether the overall site issues have been addressed (customize this list according to the conditions at your site). Note any required corrective actions and the date and responsible person for the correction in the Corrective Action Log.

Stormwater Construction Site Inspection Report

General Information			
Project Name			
NPDES Tracking No.		Location	
Date of Inspection		Start/End Time	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications	Insert qualifications or add reference to the SWPPP. (See Section 5 of the SWPPP Template)		
Describe present phase of construction			
Type of Inspection: <input type="checkbox"/> Regular <input type="checkbox"/> Pre-storm event <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, provide: Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? <input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds <input type="checkbox"/> Other: Temperature:			
Have any discharges occurred since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			
Are there any discharges at the time of inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			

Site-specific BMPs

- Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.
- Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
12		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
16		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
17		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
18		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
19		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
20		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Are discharge points and receiving waters free of any sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Is the construction exit preventing sediment from being tracked into the street?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12	(Other)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Print name and title: _____

Signature: _____ **Date:** _____



Stormwater Pollution Prevention Plan

North Apache Creek Trail

APPENDIX C: Notice of Intent

RESET FORM



TCEQ Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity under TPDES General Permit (TXR150000)

IMPORTANT:

- Use the [INSTRUCTIONS](#) to fill out each question in this form.
- Use the [CHECKLIST](#) to make certain all you filled out all required information. Incomplete applications **WILL** delay approval or result in automatic denial.
- Once processed your permit can be viewed at:
http://www2.tceq.texas.gov/wq_dpa/index.cfm

ePERMITS: Sign up now for online NOI: <https://www3.tceq.texas.gov/steers/index.cfm>
Pay a \$225 reduced application fee by using ePermits.

APPLICATION FEE:

- You must pay the **\$325** Application Fee to TCEQ for the paper application to be complete.
 - Payment and NOI must be mailed to separate addresses.
 - Did you know you can pay on line?
 - Go to <https://www3.tceq.texas.gov/epay/index.cfm>
 - Select Fee Type: GENERAL PERMIT CONSTRUCTION STORM WATER DISCHARGE NOI APPLICATION
 - **Provide your payment information below, for verification of payment:**
 - Mailed Check/Money Order No.: _____
Name Printed on Check: _____
 - EPAY Voucher No.: _____
- Is the Payment Voucher copy attached? Yes

RENEWAL: Is this NOI a Renewal of an existing General Permit Authorization?
(Note: A permit cannot be renewed after June 3, 2013.)

- Yes The Permit number is: TXR15_____
- (If a permit number is not provided, a new number will be assigned.)**
- No

1) OPERATOR (Applicant)

a) If the applicant is currently a customer with TCEQ, what is the Customer Number (CN) issued to this entity? You may search for your CN at:
<http://www12.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch>

CN 600790620

b) What is the Legal Name of the entity (applicant) applying for this permit?
San Antonio River Authority
(The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.)

c) What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in TAC 305.44(a).
Prefix (Mr. Ms. Miss): Mr.
First/Last Name: Jeff Tyler Suffix: _____
Title: Project Manager Credential: PE, CFM, PMP

d) What is the Operator Contact's (Responsible Authority) contact information and mailing address as recognized by the US Postal Service (USPS)? You may verify the address at: <http://zip4.usps.com/zip4/welcome.jsp>
Phone #: (210) 302-3621 ext: _____ Fax #: _____
E-mail: jtyler@sara-tx.org
Mailing Address: 600 East Euclid
Internal Routing (Mail Code, Etc.): _____
City: San Antonio State: Texas ZIP Code: 78024
If outside USA: Territory: _____ Country Code: _____ Postal Code: _____

e) Indicate the type of Customer (The instructions will help determine your customer type):
 Individual Limited Partnership Sole Proprietorship-DBA
 Joint Venture General Partnership Corporation
 Trust Estate Federal Government
 State Government County Government City Government
 Other Government

f) Independent Operator? Yes No
(If governmental entity, subsidiary, or part of a larger corporation, check "No".)

g) Number of Employees: 0-20; 21-100; 101-250; 251-500; or 501 or higher

h) Customer Business Tax and Filing Numbers:
(REQUIRED for Corporations and Limited Partnerships. Not Required for Individuals, Government, or Sole Proprietors)
State Franchise Tax ID Number: _____
Federal Tax ID: _____
Texas Secretary of State Charter (filing) Number: _____
DUNS Number (if known): _____

2) APPLICATION CONTACT

If TCEQ needs additional information regarding this application, who should be contacted?

Is the application contact the same as the applicant identified above?

Yes, go to Section 3). No, complete section below.

Prefix (Mr. Ms. Miss): Mr.
First/Last Name: Scott Walker Suffix: _____
Title: Principal Ecologist Credential: _____

Organization Name: ARCADIS-US
 Phone No.: (512) 527-6076 ext: _____ Fax Number: _____
 E-mail: Scott.Walker@arcadis-us.com
 Mailing Address: 1717 W 6th Street, Suite 210
 Internal Routing (Mail Code, Etc.): _____
 City: Austin State: Texas ZIP Code: 78703
 Mailing Information if outside USA:
 Territory: _____ Country Code: _____ Postal Code: _____

3) REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

If the site of your business is part of a larger business site or if other businesses were located at this site before yours, a Regulated Entity Number (RN) may already be assigned for the larger site. Use the RN assigned for the larger site. Search TCEQ's Central Registry to see if the larger site may already be registered as a regulated site at:

<http://www12.tceq.texas.gov/crpub/index.cfm?fuseaction=regent.RNSearch>.

If the site is found, provide the assigned Regulated Entity Reference Number and provide the information for the site to be authorized through this application below. The site information for this authorization may vary from the larger site information.

- a) TCEQ issued RE Reference Number (RN): RN _____
- b) Name of project or site (the name known by the community where located):
Westside Creeks Project - Apache Creek Trail
- c) In your own words, briefly describe the primary business of the Regulated Entity: (Do not repeat the SIC and NAICS code):
River authority
- d) County (or counties if > 1) Bexar
- e) Latitude: 29°25'15.62" N Longitude: 98°31'50.94" W
- f) Does the site have a physical address?
 Yes, complete Section A for a physical address.
 No, complete Section B for site location information.

Section A: Enter the physical address for the site.

Verify the address with USPS. If the address is not recognized as a delivery address, provide the address as identified for overnight mail delivery, 911 emergency or other online map tools to confirm an address.

Physical Address of Project or Site:
 Street Number: _____ Street Name: _____
 City: _____ State: _____ ZIP Code: _____

Section B: Enter the site location information.

If no physical address (Street Number & Street Name), provide a written location access description to the site. (Ex.: located 2 miles west from intersection of Hwy 290 & IH35 accessible on Hwy 290 South)

Along east side of Apache Creek from Elmendorf Lake to Cassiano Park.

City where the site is located or, if not in a city, what is the nearest city:
San Antonio

State: Texas ZIP Code where the site is located: 78207

4) GENERAL CHARACTERISTICS

a) Is the project/site located on Indian Country Lands?

Yes - If the answer is Yes, you must obtain authorization through EPA, Region 6.

No

b) Is your construction activity associated with a facility that, when completed, would be associated with the exploration, development, or production of oil or gas or geothermal resources?

Yes - If the answer is Yes, you may be under jurisdiction of the Railroad Commission of Texas and may need to obtain authorization through EPA, Region 6.

No

c) What is the Primary Standard Industrial Classification (SIC) Code that best describes the construction activity being conducted at the site?

Primary SIC Code: 162

d) If applicable, what is the Secondary SIC Code(s): _____

e) What is the total number of acres disturbed? 3 acres

f) Is the project site part of a larger common plan of development or sale?

Yes - If the answer is Yes, the total number of acres disturbed can be less than 5 acres.

No - If the answer is No, the total number of acres disturbed must be 5 or more. If the total number of acres disturbed is less than 5 then the project site does not qualify for coverage through this Notice of Intent. Coverage will be denied. See the requirements in the general permit for small construction sites.

g) What is the name of the first water body(s) to receive the stormwater runoff or potential runoff from the site?

Apache Creek

h) What is the segment number(s) of the classified water body(s) that the discharge will eventually reach?

TX-1911B_01

i) Is the discharge into an MS4?

Yes - If the answer is Yes, provide the name of the MS4 operator below.

No

If Yes, provide the name of the MS4 operator:

San Antonio Water Systems

Note: The general permit requires you to send a copy of the NOI to the MS4 operator.

j) Are any of the surface water bodies receiving discharges from the construction site on the latest EPA-approved CWA 303(d) List of impaired waters?

Yes - If the answer is Yes, provide the name(s) of the impaired water body(s) below.

No

If Yes, provide the name(s) of the impaired water body(s):

Apache Creek

k) Is the discharge or potential discharge within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer as defined in 30 TAC Chapter 213?

Yes - If the answer is Yes, complete certification below by checking "Yes."

No

I certify that a copy of the TCEQ approved Plan required by the Edwards Aquifer Rule (30 TAC Chapter 213) is either included or referenced in the Stormwater Pollution Prevention Plan.

Yes

5) CERTIFICATION

Check Yes to the certifications below. Failure to indicate Yes to **ALL** items may result in denial of coverage under the general permit.

- a) I certify that I have obtained a copy and understand the terms and conditions of the Construction General Permit (TXR150000). Yes
- b) I certify that the full legal name of the entity applying for this permit has been provided and is legally authorized to do business in Texas. Yes
- c) I understand that a Notice of Termination (NOT) must be submitted when this authorization is no longer needed. Yes
- d) I certify that a Stormwater Pollution Prevention Plan has been developed, will be implemented prior to construction and to the best of my knowledge and belief is compliant with any applicable local sediment and erosion control plans, as required in the general permit TXR150000. Note: For multiple operators who prepare a shared SWP3, the confirmation of an operator may be limited to its obligations under the SWP3 provided all obligations are confirmed by at least one operator. Yes

Operator Certification:

I, Jeff Tyler, PE Project Manager
 Typed or printed name Title

certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code 305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signature: _____ Date: _____
(Use blue ink)



Stormwater Pollution Prevention Plan

North Apache Creek Trail

APPENDIX D: Notice of Termination Form

Notice of Termination (NOT) for Authorizations under TPDES General Permit TXR150000 General Information and Instructions

GENERAL INFORMATION

Where to Send the Notice of Intent (NOI):

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Storm Water Processing Center (MC228)
P.O. Box 13087
Austin, TX 78711-3087

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Storm Water Processing Center (MC228)
12100 Park 35 Circle
Austin, TX 78753

TCEQ Contact list:

Application Processing Questions relating to the status and form requirements:	512/239-4671
Technical Questions relating to the general permit:	512/239-4671
Environmental Law Division:	512/239-0600
Records Management for obtaining copies of forms submitted to TCEQ:	512/239-0900
Information Services for obtaining reports from program data bases (as available):	512/239-DATA (3282)
Financial Administration's Cashier's office:	512/239-0357 or 512/239-0187

Notice of Termination Process:

A Notice of Termination is **effective on the date postmarked for delivery to TCEQ**.

When your NOT is received by the program, the form will be processed as follows:

1. **Administrative Review:** The form will be reviewed to confirm the following:

- the permit number is provided
- the permit is active and has been approved
- the entity terminating the permit is the current permittee
- the site information matches the original permit record
- the form has the required original signature with title and date

2. **Notice of Deficiency:** If an item is incomplete or not verifiable as indicated above, a phone call will be made to the applicant to clear the deficiency. A letter will not be sent to the permittee if unable to process the form.

3. **Confirmation of Termination:** A Notice of Termination Confirmation letter will be mailed to the operator.

General Permit (Your Permit)

Coverage under the general permit begins **48 hours after a completed NOI is postmarked for delivery to the TCEQ**. You should have a copy of your general permit when submitting your application. You may view and print your permit for which you are seeking coverage, on the TCEQ web site www.tceq.texas.gov

General Permit Forms

The Notice of Intent (NOI), Notice of Termination (NOT), and Notice of Change (NOC) with instructions are available in Adobe Acrobat PDF format on the TCEQ web site www.tceq.texas.gov.

Change in Operator

An authorization under the general permit is not transferable. If the operator or owner of the regulated entity changes, the present permittee must submit a Notice of Termination and the new operator must submit a Notice of Intent. The NOT and NOI must be submitted not later than 10 days prior to the change in Operator status.

TCEQ Central Registry Core Data Form

The Core Data Form has been incorporated into this form. **Do not send a core data form to TCEQ.**

After final acknowledgment of coverage under the general permit, the program will assign a Customer Number (CN) and Regulated Entity Number (RN). For Construction Permits, a new RN will be assigned for each Notice of Intent filed with TCEQ, since construction project sites can overlap with other Customers. The RN assigned to your construction project will not be assigned to any other TCEQ authorization.

You can find the information on the Central Registry web site at www12.tceq.texas.gov/crpub/. You can search by the Regulated Entity (RN), Customer Number (CN) or Name (Permittee), or by your permit number under the search field labeled "Additional ID". Capitalize all letters in the permit number.

The Customer (Permittee) is responsible for providing consistent information to the TCEQ, and for updating all CN and RN data for all authorizations as changes occur. For General Permits, a Notice of Change form must be submitted to the program area.

Annual Water Quality Fee: This fee is assessed to operators with an active authorization under the general permit on September 1 of each year. The operator will receive an invoice for payment of the annual fee in November of each year. The payment will be due 30 days from the invoice date. A 5% penalty will be assessed if the payment is received by TCEQ after the due date. Annual fee assessments cannot be waived as long as the authorization under the general permit is active on September 1.

It's important for the operator to submit a **Notice of Termination (NOT)** when coverage under the general permit is no longer required. A NOT is effective on the postmarked date of mailing the form to TCEQ. It is recommended that the NOT be mailed using a method that documents the date mailed and received by TCEQ.

- **Mailed Payments:**

You must return your payment with the billing coupon provided with the billing statement.

- **ePAY Electronic Payment:**

Go to www6.tceq.state.tx.us/epay/

You must enter your account number provided at the top portion of your billing statement. Payment methods include Mastercard, Visa, and electronic check payment (ACH). A transaction over \$500 can only be made by ACH.

INSTRUCTIONS FOR FILLING OUT THE NOT FORM

A. OPERATOR (current permittee.)

1. TCEQ Issued Customer Number (CN)

2. Legal Name of Operator

The operator must be the same entity as previously submitted on the original Notice of Intent for the permit number provided.

3. Operator Mailing Address

Provide a complete mailing address for receiving mail from the TCEQ. Update the address if different than previously submitted in the Notice of Intent or Notice of Change.

4. Phone Number, Fax Number, and E-mail Address

Provide updated contact information.

B. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

1. Regulated Entity Reference Number (RN)

2. Site/Project Name/Regulated Entity

Provide the name of the site as previously submitted in the Notice of Intent for the permit number provided.

3. Site/Project (RE) Physical Address

Provide the physical address or location access description as previously submitted for the permit number provided.

C. REASON FOR TERMINATION

Indicate the reason for terminating the permit by checking one of the options. If the reason is not listed then provide an attachment that explains the reason for termination.

Please read your general permit carefully to determine when to terminate your permit. Permits will not be reactivated after submitting a termination form. The termination is effective on the date postmarked for delivery to TCEQ.

D. CERTIFICATIONS

The certification must bear an original signature of a person meeting the signatory requirements specified under [30 Texas Administrative Code \(TAC\) §305.44](#).

IF YOU ARE A CORPORATION:

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a)(1) (see below). According to this code provision, any corporate representative may sign an NOI or similar form so long as the authority to sign such a document has been delegated to that person in accordance with corporate procedures. By signing the NOI or similar form, you are certifying that such authority has been delegated to you. The TCEQ may request documentation evidencing such authority.

IF YOU ARE A MUNICIPALITY OR OTHER GOVERNMENT ENTITY:

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a)(3) (see below). According to this code provision, only a ranking elected official or principal executive officer may sign an NOI or similar form. Persons such as the City Mayor or County Commissioner will be considered ranking elected officials. In order to identify the principal executive officer of your government entity, it may be beneficial to consult your city charter, county or city ordinances, or the Texas statute(s) under which your government entity was formed. An NOI or similar document that is signed by a government official who is not a ranking elected official or principal executive officer does not conform to

§305.44(a)(3). The signatory requirement may not be delegated to a government representative other than those identified in the regulation. By signing the NOI or similar form, you are certifying that you are either a ranking elected official or principal executive officer as required by the administrative code. Documentation demonstrating your position as a ranking elected official or principal executive officer may be requested by the TCEQ.

If you have any questions or need additional information concerning the signatory requirements discussed above, please contact the Texas Commission on Environmental Quality's Environmental Law Division at 512/239-0600.

30 Texas Administrative Code

§305.44. Signatories to Applications.

(a) All applications shall be signed as follows.

(1) For a corporation, the application shall be signed by a responsible corporate officer. For purposes of this paragraph, a responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. Corporate procedures governing authority to sign permit or post-closure order applications may provide for assignment or delegation to applicable corporate positions rather than to specific individuals.

(2) For a partnership or sole proprietorship, the application shall be signed by a general partner or the proprietor, respectively.

(3) For a municipality, state, federal, or other public agency, the application shall be signed by either a principal executive officer or a ranking elected official. For purposes of this paragraph, a principal executive officer of a federal agency includes the chief executive officer of the agency, or a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., regional administrator of the EPA).



Stormwater Pollution Prevention Plan

North Apache Creek Trail

APPENDIX E: Example Monthly Stormwater Report

FORMAT OF MONTHLY STORM WATER SUMMARY REPORT

Pursuant to the General Permit For Storm Water Discharges From Construction Activity

Contract Number: D123456

Contract Description: Rte 123 over Hudson River

County: Anywhere

Report Period: August 2010

The following periodic site inspections were conducted:

Date of Inspection: August 11, 2010

- Inspected 12 stone check dams-all in good condition, minimal sediment accumulation, and required no maintenance.
- Inspected 8 separate silt fence installations. Silt fences in from of #3874 and #4123 Main Street were restaked. Remaining silt fences were in good condition and required no maintenance.
- Inspected all seeded and mulched areas. All areas were in good condition and required no maintenance.

Date of Inspection: August 18, 2010

- Inspected 12 stone check dams. Three check dams has accumulated sediment removed. Remaining check dams were in good condition, averaged 10 percent sediment accumulation, and required no maintenance.
- Inspected 8 separate silt fence installations. Silt fence in from of \$4198 was restaked and accumulated sediment removed. Remaining silt fences were in good condition and required no maintenance.
- Inspected all seeded and mulched areas. All areas were in good condition and required no maintenance.

Date of Inspection: August 30, 2010

- Inspected 12 stone check dams. Three check dams had accumulated sediment removed. Remaining check dams were in good condition, averaged 10 percent sediment accumulation, and required no maintenance.
- Inspected 8 separate silt fence installations. Silt fences in from of #3989 and #4214 Main Street were restaked. Remaining silt fences were in good condition and required no maintenance.
- Inspected all seeded and mulched areas. All areas were in good condition and required no maintenance.

The following site inspections were conducted as a result of a rainfall event:

Date of Inspection: August 4, 2010 – Received ¾-inch of rainfall overnight

- Inspected 12 stone check dams. Six check dams had accumulated sediment removed. Remaining check dams were in good condition, had minimal sediment accumulation, and required o maintenance.
- Inspected 8 separate silt fence installations. Silt fences in front of Library and Mobil gas station were restaked and accumulated sediment removed. Other silt fences were in good condition and required no maintenance.
- Inspected all seeded and mulched areas. All areas were in good condition and required no maintenance.

Date of Inspection: August 23, 2010 – Received 1-inch of rainfall during day

- Inspected 12 stone check dams. Seven check dams had accumulated sediment removed. Remaining check dams were in good condition, averaged 15 percent sediment accumulations, and required not maintenance.
- Inspected 8 separate silt fence installations. Silt fences in from of #3989 and #4076 Main Street were restaked and accumulated sediment removed. Other silt fences were in good condition and required no maintenance.
- Inspected all seeded and mulched areas. Mulch in front of #3827 Main Street washed away and was replaced. Remaining areas were in good condition and required no maintenance.

Signature: _____

Date _____

Engineer Name/Title: ARCADIS, Inc.

Example



Stormwater Pollution Prevention Plan

North Apache Creek Trail

APPENDIX F: SWPPP Revision Form

**APPENDIX G: Texas Commission on Environmental
Quality General Permit to Discharge
Under the Texas Pollutant Discharge
Elimination System
(TPDES General Permit No. TXR150000)**

Texas Commission on Environmental Quality

P.O. Box 13087, Austin, Texas 78711-3087



GENERAL PERMIT TO DISCHARGE UNDER THE TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM

under provisions of
Section 402 of the Clean Water Act
and Chapter 26 of the Texas Water Code

This permit supersedes and replaces
TPDES General Permit No. TXR150000, issued March 5, 2008

Construction sites that discharge stormwater associated with construction activity
located in the state of Texas
may discharge to surface water in the state

only according to monitoring requirements and other conditions set forth in this general permit, as well as the rules of the Texas Commission on Environmental Quality (TCEQ or Commission), the laws of the State of Texas, and other orders of the Commission of the TCEQ. The issuance of this general permit does not grant to the permittee the right to use private or public property for conveyance of stormwater and certain non-stormwater discharges along the discharge route. This includes property belonging to but not limited to any individual, partnership, corporation or other entity. Neither does this general permit authorize any invasion of personal rights nor any violation of federal, state, or local laws or regulations. It is the responsibility of the permittee to acquire property rights as may be necessary to use the discharge route.

This general permit and the authorization contained herein shall expire at midnight, five years from the permit effective date.

EFFECTIVE DATE: March 5, 2013

ISSUED DATE: FEB 19 2013



For the Commission

**TPDES GENERAL PERMIT NUMBER TXR150000 RELATING TO
STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION
ACTIVITIES**

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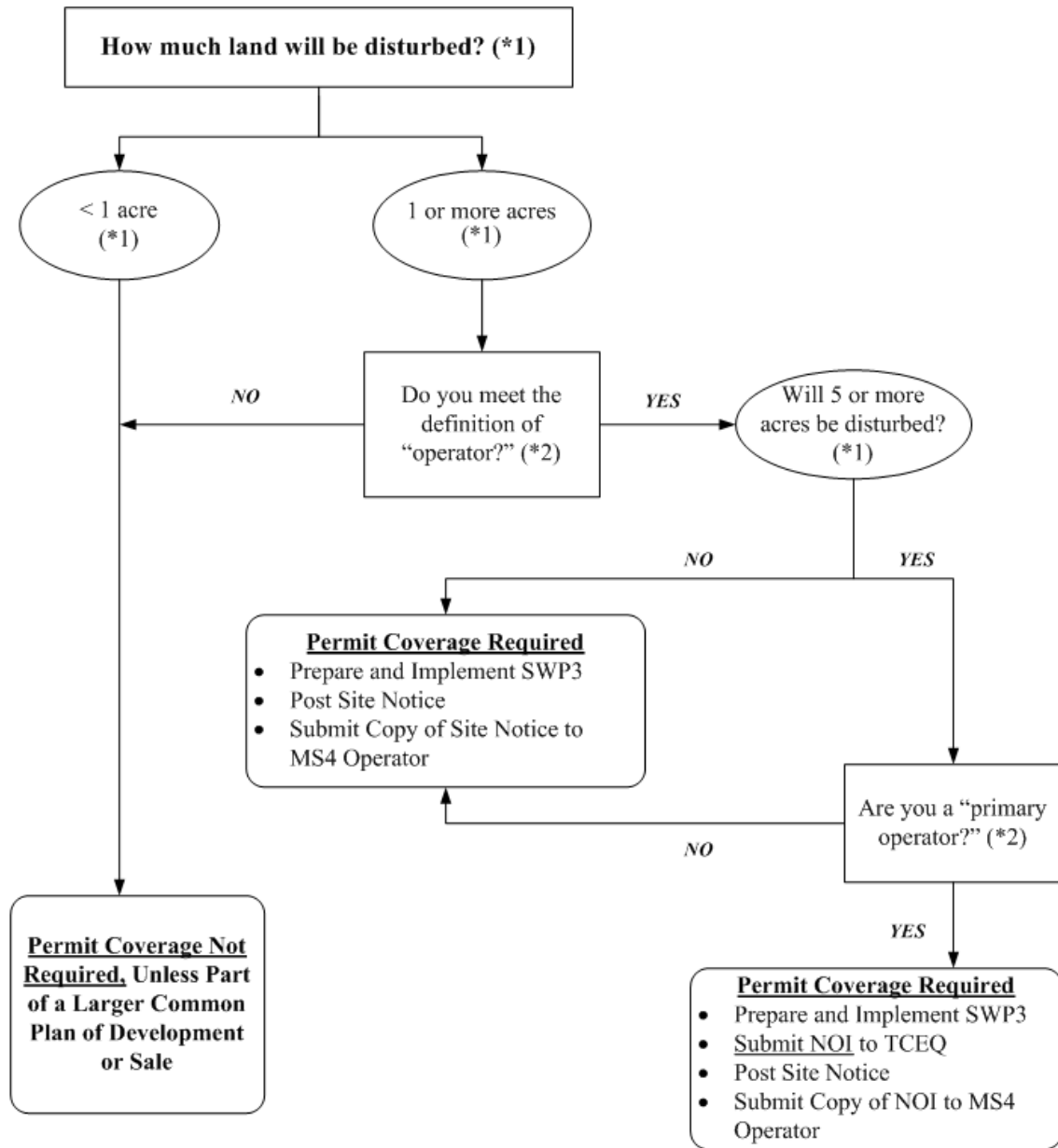
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Part I. Flow Chart and Definitions

Section A. Flow Chart to Determine Whether Coverage is Required



(*1) To determine the size of the construction project, use the size of the entire area to be disturbed, and include the size of the larger common plan of development or sale, if the project is part of a larger project (refer to Part I.B., "Definitions," for an explanation of "common plan of development or sale").

(*2) Refer to the definitions for "operator," "primary operator," and "secondary operator" in Part I., Section B. of this permit.

Section B. Definitions

Arid Areas - Areas with an average annual rainfall of 0 to 10 inches.

Best Management Practices (BMPs) - Schedules of activities, prohibitions of practices, maintenance procedures, structural controls, local ordinances, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control construction site runoff, spills or leaks, waste disposal, or drainage from raw material storage areas.

Commencement of Construction - The initial disturbance of soils associated with clearing, grading, or excavation activities, as well as other construction-related activities (e.g., stockpiling of fill material, demolition).

Common Plan of Development - A construction activity that is completed in separate stages, separate phases, or in combination with other construction activities. A common plan of development (also known as a “common plan of development or sale”) is identified by the documentation for the construction project that identifies the scope of the project, and may include plats, blueprints, marketing plans, contracts, building permits, a public notice or hearing, zoning requests, or other similar documentation and activities. A common plan of development does not necessarily include all construction projects within the jurisdiction of a public entity (e.g., a city or university). Construction of roads or buildings in different parts of the jurisdiction would be considered separate “common plans,” with only the interconnected parts of a project being considered part of a “common plan” (e.g., a building and its associated parking lot and driveways, airport runway and associated taxiways, a building complex, etc.). Where discrete construction projects occur within a larger common plan of development or sale but are located ¼ mile or more apart, and the area between the projects is not being disturbed, each individual project can be treated as a separate plan of development or sale, provided that any interconnecting road, pipeline or utility project that is part of the same “common plan” is not included in the area to be disturbed.

Construction Activity - Includes soil disturbance activities, including clearing, grading, and excavating; and does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site (e.g., the routine grading of existing dirt roads, asphalt overlays of existing roads, the routine clearing of existing right-of-ways, and similar maintenance activities). Regulated construction activity is defined in terms of small and large construction activity.

Dewatering – The act of draining rainwater or groundwater from building foundations, vaults, and trenches.

Discharge – For the purposes of this permit, the drainage, release, or disposal of pollutants in stormwater and certain non-stormwater from areas where soil disturbing activities (e.g., clearing, grading, excavation, stockpiling of fill material, and demolition), construction materials or equipment storage or maintenance (e.g., fill piles, borrow area, concrete truck wash out, fueling), or other industrial stormwater directly related to the construction process (e.g., concrete or asphalt batch plants) are located.

Drought-Stricken Area – For the purposes of this permit, an area in which the National Oceanic and Atmospheric Administration’s U.S. Seasonal Drought Outlook indicates for the period during which the construction will occur that any of the following conditions are likely: (1) “Drought to persist or intensify”, (2) “Drought ongoing, some improvement”, (3) “Drought likely to improve, impacts ease”, or (4) “Drought development likely”. See http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html.

Edwards Aquifer - As defined under Texas Administrative Code (TAC) § 213.3 of this title (relating to the Edwards Aquifer), that portion of an arcuate belt of porous, water-bearing, predominantly carbonate rocks known as the Edwards and Associated Limestones in the Balcones Fault Zone trending from west to east to northeast in Kinney, Uvalde, Medina, Bexar, Comal, Hays, Travis, and Williamson Counties; and composed of the Salmon Peak

Limestone, McKnight Formation, West Nueces Formation, Devil's River Limestone, Person Formation, Kainer Formation, Edwards Formation, and Georgetown Formation. The permeable aquifer units generally overlie the less-permeable Glen Rose Formation to the south, overlie the less-permeable Comanche Peak and Walnut Formations north of the Colorado River, and underlie the less-permeable Del Rio Clay regionally.

Edwards Aquifer Recharge Zone - Generally, that area where the stratigraphic units constituting the Edwards Aquifer crop out, including the outcrops of other geologic formations in proximity to the Edwards Aquifer, where caves, sinkholes, faults, fractures, or other permeable features would create a potential for recharge of surface waters into the Edwards Aquifer. The recharge zone is identified as that area designated as such on official maps located in the offices of the Texas Commission on Environmental Quality (TCEQ) and the appropriate regional office. The Edwards Aquifer Map Viewer, located at http://www.tceq.texas.gov/compliance/field_ops/eapp/mapdisclaimer.html, can be used to determine where the recharge zone is located.

Edwards Aquifer Contributing Zone - The area or watershed where runoff from precipitation flows downgradient to the recharge zone of the Edwards Aquifer. The contributing zone is located upstream (upgradient) and generally north and northwest of the recharge zone for the following counties: all areas within Kinney County, except the area within the watershed draining to Segment No. 2304 of the Rio Grande Basin; all areas within Uvalde, Medina, Bexar, and Comal Counties; all areas within Hays and Travis Counties, except the area within the watersheds draining to the Colorado River above a point 1.3 miles upstream from Tom Miller Dam, Lake Austin at the confluence of Barrow Brook Cove, Segment No. 1403 of the Colorado River Basin; and all areas within Williamson County, except the area within the watersheds draining to the Lampasas River above the dam at Stillhouse Hollow reservoir, Segment No. 1216 of the Brazos River Basin. The contributing zone is illustrated on the Edwards Aquifer map viewer at http://www.tceq.texas.gov/compliance/field_ops/eapp/mapdisclaimer.html.

Effluent Limitations Guideline (ELG) – Defined in 40 Code of Federal Regulations (CFR) § 122.2 as a regulation published by the Administrator under § 304(b) of the Clean Water Act (CWA) to adopt or revise effluent limitations.

Facility or Activity – For the purpose of this permit, a construction site or construction support activity that is regulated under this general permit, including all contiguous land and fixtures (for example, ponds and materials stockpiles), structures, or appurtenances used at a construction site or industrial site described by this general permit.

Final Stabilization - A construction site status where any of the following conditions are met:

- A. All soil disturbing activities at the site have been completed and a uniform (that is, evenly distributed, without large bare areas) perennial vegetative cover with a density of at least 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.
- B. For individual lots in a residential construction site by either:
 - (1) the homebuilder completing final stabilization as specified in condition (a) above; or
 - (2) the homebuilder establishing temporary stabilization for an individual lot prior to the time of transfer of the ownership of the home to the buyer and after informing the homeowner of the need for, and benefits of, final stabilization. If temporary stabilization is not feasible, then the homebuilder may fulfill this requirement by retaining perimeter controls or BMPs, and informing the homeowner of the need for removal of temporary controls and the establishment of final stabilization.

Fullfillment of this requirement must be documented in the homebuilder's stormwater pollution prevention plan (SWP3).

- C. For construction activities on land used for agricultural purposes (such as pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to surface water and areas that are not being returned to their preconstruction agricultural use must meet the final stabilization conditions of condition (a) above.
- D. In arid, semi-arid, and drought-stricken areas only, all soil disturbing activities at the site have been completed and both of the following criteria have been met:
- (1) Temporary erosion control measures (for example, degradable rolled erosion control product) are selected, designed, and installed along with an appropriate seed base to provide erosion control for at least three years without active maintenance by the operator, and
 - (2) The temporary erosion control measures are selected, designed, and installed to achieve 70% of the native background vegetative coverage within three years.

Hyperchlorination of Waterlines – Treatment of potable water lines or tanks with chlorine for disinfection purposes, typically following repair or partial replacement of the waterline or tank, and subsequently flushing the contents.

Impaired Water - A surface water body that is identified on the latest approved CWA §303(d) List as not meeting applicable state water quality standards. Impaired waters include waters with approved or established total maximum daily loads (TMDLs), and those where a TMDL has been proposed by TCEQ but has not yet been approved or established.

Indian Country Land – (from 40 CFR §122.2) (1) all land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation; (2) all dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and (3) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

Indian Tribe - (from 40 CFR §122.2) any Indian Tribe, band, group, or community recognized by the Secretary of the Interior and exercising governmental authority over a Federal Indian Reservation.

Large Construction Activity - Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than five (5) acres of land. Large construction activity also includes the disturbance of less than five (5) acres of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than five (5) acres of land. Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site (for example, the routine grading of existing dirt roads, asphalt overlays of existing roads, the routine clearing of existing right-of-ways, and similar maintenance activities.)

Linear Project – Includes the construction of roads, bridges, conduits, substructures, pipelines, sewer lines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities in a long, narrow area.

Minimize - To reduce or eliminate to the extent achievable using stormwater controls that are technologically available and economically practicable and achievable in light of best industry practices.

Municipal Separate Storm Sewer System (MS4) - A separate storm sewer system owned or operated by the United States, a state, city, town, county, district, association, or other public body (created by or pursuant to state law) having jurisdiction over the disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, that discharges to surface water in the state.

Notice of Change (NOC) – Written notification to the executive director from a discharger authorized under this permit, providing changes to information that was previously provided to the agency in a notice of intent form.

Notice of Intent (NOI) - A written submission to the executive director from an applicant requesting coverage under this general permit.

Notice of Termination (NOT) - A written submission to the executive director from a discharger authorized under a general permit requesting termination of coverage.

Operator - The person or persons associated with a large or small construction activity that is either a primary or secondary operator as defined below:

Primary Operator – the person or persons associated with a large or small construction activity that meets either of the following two criteria:

- (a) the person or persons have on-site operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
- (b) the person or persons have day-to-day operational control of those activities at a construction site that are necessary to ensure compliance with a Storm Water Pollution Prevention Plan (SWP3) for the site or other permit conditions (for example, they are authorized to direct workers at a site to carry out activities required by the SWP3 or comply with other permit conditions).

Secondary Operator – The person or entity, often the property owner, whose operational control is limited to:

- (a) the employment of other operators, such as a general contractor, to perform or supervise construction activities; or
- (b) the ability to approve or disapprove changes to construction plans and specifications, but who does not have day-to-day on-site operational control over construction activities at the site.

Secondary operators must either prepare their own SWP3 or participate in a shared SWP3 that covers the areas of the construction site where they have control over the plans and specifications.

If there is not a primary operator at the construction site, then the secondary operator is defined as the primary operator and must comply with the requirements for primary operators.

Outfall - For the purpose of this permit, a point source at the point where stormwater runoff associated with construction activity discharges to surface water in the state and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances that connect segments of the same stream or other water of the U.S. and are used to convey waters of the U.S.

Permittee - An operator authorized under this general permit. The authorization may be gained through submission of a notice of intent, by waiver, or by meeting the requirements for automatic coverage to discharge stormwater runoff and certain non-stormwater discharges.

Point Source – (from 40 CFR §122.2) Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are, or may be, discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

Pollutant - Dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, filter backwash, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into any surface water in the state. The term "pollutant" does not include tail water or runoff water from irrigation or rainwater runoff from cultivated or uncultivated rangeland, pastureland, and farmland. For the purpose of this permit, the term "pollutant" includes sediment.

Pollution - (from Texas Water Code (TWC) §26.001(14)) The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any surface water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property or to public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

Rainfall Erosivity Factor (R factor) - the total annual erosive potential that is due to climatic effects, and is part of the Revised Universal Soil Loss Equation (RUSLE).

Receiving Water - A "Water of the United States" as defined in 40 CFR §122.2 into which the regulated stormwater discharges.

Semiarid Areas - areas with an average annual rainfall of 10 to 20 inches

Separate Storm Sewer System - A conveyance or system of conveyances (including roads with drainage systems, streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), designed or used for collecting or conveying stormwater; that is not a combined sewer, and that is not part of a publicly owned treatment works (POTW).

Small Construction Activity - Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one (1) acre and less than five (5) acres of land. Small construction activity also includes the disturbance of less than one (1) acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one (1) and less than five (5) acres of land. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site (for example, the routine grading of existing dirt roads, asphalt overlays of existing roads, the routine clearing of existing right-of-ways, and similar maintenance activities.)

Steep Slopes – Where a state, Tribe, local government, or industry technical manual (e.g. stormwater BMP manual) has defined what is to be considered a "steep slope", this permit's definition automatically adopts that definition. Where no such definition exists, steep slopes are automatically defined as those that are 15 percent or greater in grade.

Stormwater (or Stormwater Runoff) - Rainfall runoff, snow melt runoff, and surface runoff and drainage.

Stormwater Associated with Construction Activity - Stormwater runoff from a construction activity where soil disturbing activities (including clearing, grading, excavating) result in the disturbance of one (1) or more acres of total land area, or are part of a larger common plan of development or sale that will result in disturbance of one (1) or more acres of total land area.

Structural Control (or Practice) - A pollution prevention practice that requires the construction of a device, or the use of a device, to reduce or prevent pollution in stormwater

runoff. Structural controls and practices may include but are not limited to: silt fences, earthen dikes, drainage swales, sediment traps, check dams, subsurface drains, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins.

Surface Water in the State - Lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, wetlands, marshes, inlets, canals, the Gulf of Mexico inside the territorial limits of the state (from the mean high water mark (MHW) out 10.36 miles into the Gulf), and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, navigable or nonnavigable, and including the beds and banks of all water-courses and bodies of surface water, that are wholly or partially inside or bordering the state or subject to the jurisdiction of the state; except that waters in treatment systems which are authorized by state or federal law, regulation, or permit, and which are created for the purpose of waste treatment are not considered to be water in the state.

Temporary Stabilization - A condition where exposed soils or disturbed areas are provided a protective cover or other structural control to prevent the migration of pollutants. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either permanent stabilization can be achieved or until further construction activities take place.

Total Maximum Daily Load (TMDL) - The total amount of a pollutant that a water body can assimilate and still meet the Texas Surface Water Quality Standards.

Turbidity – A condition of water quality characterized by the presence of suspended solids and/or organic material.

Waters of the United States - (from 40 CFR §122.2) Waters of the United States or waters of the U.S. means:

- (a) all waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- (b) all interstate waters, including interstate wetlands;
- (c) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds that the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
 - (1) which are or could be used by interstate or foreign travelers for recreational or other purposes;
 - (2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
 - (3) which are used or could be used for industrial purposes by industries in interstate commerce;
- (d) all impoundments of waters otherwise defined as waters of the United States under this definition;
- (e) tributaries of waters identified in paragraphs (a) through (d) of this definition;
- (f) the territorial sea; and
- (g) wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR §423.11(m) which also meet the criteria of this definition) are not waters of the U.S. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the U.S. (such as

disposal area in wetlands) nor resulted from the impoundment of waters of the U.S. Waters of the U.S. do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with EPA.

Part II. Permit Applicability and Coverage

Section A. Discharges Eligible for Authorization

1. Stormwater Associated with Construction Activity

Discharges of stormwater runoff from small and large construction activities may be authorized under this general permit.

2. Discharges of Stormwater Associated with Construction Support Activities

Examples of construction support activities include, but are not limited to, concrete batch plants, rock crushers, asphalt batch plants, equipment staging areas, material storage yards, material borrow areas, and excavated material disposal areas.

Construction support activities authorized under this general permit are not commercial operations, and do not serve multiple unrelated construction projects. Discharges of stormwater runoff from construction support activities may be authorized under this general permit, provided that the following conditions are met:

- (a) the activities are located within one (1) mile from the boundary of the permitted construction site and directly support the construction activity;
- (b) an SWP3 is developed for the permitted construction site according to the provisions of this general permit, and includes appropriate controls and measures to reduce erosion and discharge of pollutants in stormwater runoff from the construction support activities; and
- (c) the construction support activities either do not operate beyond the completion date of the construction activity or, at the time that they do, are authorized under separate Texas Pollutant Discharge Elimination System (TPDES) authorization. Separate TPDES authorization may include the TPDES Multi Sector General Permit (MSGP), TXR050000 (related to stormwater discharges associated with industrial activity), separate authorization under this general permit if applicable, coverage under an alternative general permit if available, or authorization under an individual water quality permit.

3. Non-Stormwater Discharges

The following non-stormwater discharges from sites authorized under this general permit are also eligible for authorization under this general permit:

- (a) discharges from fire fighting activities (fire fighting activities do not include washing of trucks, run-off water from training activities, test water from fire suppression systems, or similar activities);
- (b) uncontaminated fire hydrant flushings (excluding discharges of hyperchlorinated water, unless the water is first dechlorinated and discharges are not expected to adversely affect aquatic life), which include flushings from systems that utilize potable water, surface water, or groundwater that does not contain additional pollutants (uncontaminated fire hydrant flushings do not include systems utilizing reclaimed wastewater as a source water);
- (c) water from the routine external washing of vehicles, the external portion of buildings or structures, and pavement, where detergents and soaps are not used, where spills or leaks of toxic or hazardous materials have not occurred (unless spilled materials

have been removed; and if local state, or federal regulations are applicable, the materials are removed according to those regulations), and where the purpose is to remove mud, dirt, or dust;

- (d) uncontaminated water used to control dust;
- (e) potable water sources, including waterline flushings, but excluding discharges of hyperchlorinated water, unless the water is first dechlorinated and discharges are not expected to adversely affect aquatic life;
- (f) uncontaminated air conditioning condensate;
- (g) uncontaminated ground water or spring water, including foundation or footing drains where flows are not contaminated with industrial materials such as solvents; and
- (h) lawn watering and similar irrigation drainage.

4. Other Permitted Discharges

Any discharge authorized under a separate National Pollutant Discharge Elimination System (NPDES), TPDES, or TCEQ permit may be combined with discharges authorized by this general permit, provided those discharges comply with the associated permit.

Section B. Concrete Truck Wash Out

The wash out of concrete trucks at regulated construction sites must be performed in accordance with the requirements of Part V of this general permit.

Section C. Limitations on Permit Coverage

1. Post Construction Discharges

Discharges that occur after construction activities have been completed, and after the construction site and any supporting activity site have undergone final stabilization, are not eligible for coverage under this general permit. Discharges originating from the sites are not authorized under this general permit following the submission of the notice of termination (NOT) or removal of the appropriate site notice, as applicable, for the regulated construction activity.

2. Prohibition of Non-Stormwater Discharges

Except as otherwise provided in Part II.A. of this general permit, only discharges that are composed entirely of stormwater associated with construction activity may be authorized under this general permit.

3. Compliance With Water Quality Standards

Discharges to surface water in the state that would cause, have the reasonable potential to cause, or contribute to a violation of water quality standards or that would fail to protect and maintain existing designated uses are not eligible for coverage under this general permit. The executive director may require an application for an individual permit or alternative general permit (see Parts II.H.2. and 3.) to authorize discharges to surface water in the state if the executive director determines that any activity will cause, has the reasonable potential to cause, or contribute to a violation of water quality standards or is found to cause, has the reasonable potential to cause, or contribute to, the impairment of a designated use. The executive director may also require an application for an individual permit considering factors described in Part II.H.2. of this general permit.

4. Impaired Receiving Waters and Total Maximum Daily Load (TMDL) Requirements

New sources or new discharges of the pollutants of concern to impaired waters are not authorized by this permit unless otherwise allowable under 30 TAC Chapter 305 and applicable state law. Impaired waters are those that do not meet applicable water quality standards and are listed on the EPA approved CWA §303(d) List. Pollutants of concern are those for which the water body is listed as impaired.

Discharges of the pollutants of concern to impaired water bodies for which there is a TMDL are not eligible for this general permit unless they are consistent with the approved TMDL. Permittees must incorporate the conditions and requirements applicable to their discharges into their SWP3, in order to be eligible for coverage under this general permit. For consistency with the construction stormwater-related items in an approved TMDL, the SWP3 must be consistent with any applicable condition, goal, or requirement in the TMDL, TMDL Implementation Plan (I-Plan), or as otherwise directed by the executive director.

5. Discharges to the Edwards Aquifer Recharge or Contributing Zone

Discharges cannot be authorized by this general permit where prohibited by 30 TAC Chapter 213 (relating to Edwards Aquifer). In addition, commencement of construction (i.e., the initial disturbance of soils associated with clearing, grading, or excavating activities, as well as other construction-related activities such as stockpiling of fill material and demolition) at a site regulated under 30 TAC Chapter 213, may not begin until the appropriate Edwards Aquifer Protection Plan (EAPP) has been approved by the TCEQ's Edwards Aquifer Protection Program.

- (a) For new discharges located within the Edwards Aquifer Recharge Zone, or within that area upstream from the recharge zone and defined as the Contributing Zone (CZ), operators must meet all applicable requirements of, and operate according to, 30 TAC Chapter 213 (Edwards Aquifer Rule) in addition to the provisions and requirements of this general permit.
- (b) For existing discharges located within the Edwards Aquifer Recharge Zone, the requirements of the agency-approved Water Pollution Abatement Plan (WPAP) under the Edwards Aquifer Rule is in addition to the requirements of this general permit. BMPs and maintenance schedules for structural stormwater controls, for example, may be required as a provision of the rule. All applicable requirements of the Edwards Aquifer Rule for reductions of suspended solids in stormwater runoff are in addition to the requirements in this general permit for this pollutant.

6. Discharges to Specific Watersheds and Water Quality Areas

Discharges otherwise eligible for coverage cannot be authorized by this general permit where prohibited by 30 TAC Chapter 311 (relating to Watershed Protection) for water quality areas and watersheds.

7. Protection of Streams and Watersheds by Other Governmental Entities

This general permit does not limit the authority or ability of federal, other state, or local governmental entities from placing additional or more stringent requirements on construction activities or discharges from construction activities. For example, this permit does not limit the authority of a home-rule municipality provided by Texas Local Government Code §401.002.

8. Indian Country Lands

Stormwater runoff from construction activities occurring on Indian Country lands are not under the authority of the TCEQ and are not eligible for coverage under this general permit. If discharges of stormwater require authorization under federal NPDES

regulations, authority for these discharges must be obtained from the U.S. Environmental Protection Agency (EPA).

9. Oil and Gas Production

Stormwater runoff from construction activities associated with the exploration, development, or production of oil or gas or geothermal resources, including transportation of crude oil or natural gas by pipeline, are not under the authority of the TCEQ and are not eligible for coverage under this general permit. If discharges of stormwater require authorization under federal NPDES regulations, authority for these discharges must be obtained from the EPA.

10. Stormwater Discharges from Agricultural Activities

Stormwater discharges from agricultural activities that are not point source discharges of stormwater are not subject to TPDES permit requirements. These activities may include clearing and cultivating ground for crops, construction of fences to contain livestock, construction of stock ponds, and other similar agricultural activities. Discharges of stormwater runoff associated with the construction of facilities that are subject to TPDES regulations, such as the construction of concentrated animal feeding operations, would be point sources regulated under this general permit.

11. Endangered Species Act

Discharges that would adversely affect a listed endangered or threatened aquatic or aquatic-dependent species or its critical habitat are not authorized by this permit, unless the requirements of the Endangered Species Act are satisfied. Federal requirements related to endangered species apply to all TPDES permitted discharges and site-specific controls may be required to ensure that protection of endangered or threatened species is achieved. If a permittee has concerns over potential impacts to listed species, the permittee may contact TCEQ for additional information.

12. Other

Nothing in Part II of the general permit is intended to negate any person's ability to assert the force majeure (act of God, war, strike, riot, or other catastrophe) defenses found in 30 TAC §70.7.

Section D. Deadlines for Obtaining Authorization to Discharge

1. Large Construction Activities

- (a) New Construction - Discharges from sites where the commencement of construction occurs on or after the effective date of this general permit must be authorized, either under this general permit or a separate TPDES permit, prior to the commencement of those construction activities.
- (b) Ongoing Construction - Operators of large construction activities continuing to operate after the effective date of this permit, and authorized under TPDES general permit TXR150000 (effective on March 5, 2008), must submit an NOI to renew authorization or a NOT to terminate coverage under this general permit within 90 days of the effective date of this general permit. During this interim period, as a requirement of this TPDES permit, the operator must continue to meet the conditions and requirements of the previous TPDES permit.

2. Small Construction Activities

- (a) New Construction - Discharges from sites where the commencement of construction occurs on or after the effective date of this general permit must be authorized, either

under this general permit or a separate TPDES permit, prior to the commencement of those construction activities.

- (b) Ongoing Construction - Discharges from ongoing small construction activities that commenced prior to the effective date of this general permit, and that would not meet the conditions to qualify for termination of this permit as described in Part II.E. of this general permit, must meet the requirements to be authorized, either under this general permit or a separate TPDES permit, within 90 days of the effective date of this general permit. During this interim period, as a requirement of this TPDES permit, the operator must continue to meet the conditions and requirements of the previous TPDES permit.

Section E. Obtaining Authorization to Discharge

1. Automatic Authorization for Small Construction Activities With Low Potential for Erosion:

If all of the following conditions are met, then a small construction activity is determined to occur during periods of low potential for erosion, and a site operator may be automatically authorized under this general permit without being required to develop an SWP3 or submit an NOI:

- (a) the construction activity occurs in a county listed in Appendix A;
- (b) the construction activity is initiated and completed, including either final or temporary stabilization of all disturbed areas, within the time frame identified in Appendix A for the location of the construction site;
- (c) all temporary stabilization is adequately maintained to effectively reduce or prohibit erosion, permanent stabilization activities have been initiated, and a condition of final stabilization is completed no later than 30 days following the end date of the time frame identified in Appendix A for the location of the construction site;
- (d) the permittee signs a completed TCEQ construction site notice, including the certification statement;
- (e) a signed copy of the construction site notice is posted at the construction site in a location where it is readily available for viewing by the general public, local, state, and federal authorities prior to commencing construction activities, and maintained in that location until completion of the construction activity;
- (f) a copy of the signed and certified construction site notice is provided to the operator of any MS4 receiving the discharge at least two days prior to commencement of construction activities;
- (g) any supporting concrete batch plant or asphalt batch plant is separately authorized for discharges of stormwater runoff or other non-stormwater discharges under an individual TPDES permit, another TPDES general permit, or under an individual TCEQ permit where stormwater and non-stormwater is disposed of by evaporation or irrigation (discharges are adjacent to water in the state); and
- (h) any non-stormwater discharges are either authorized under a separate permit or authorization, or are not considered to be a wastewater.

Part II.G. of this general permit describes how an operator may apply for and obtain a waiver from permitting, for certain small construction activities that occur during a period with a low potential for erosion, where automatic authorization under this section is not available.

2. Automatic Authorization For All Other Small Construction Activities:

Operators of small construction activities not described in Part II.E.1. above may be automatically authorized under this general permit, and operators of these sites shall not be required to submit an NOI, provided that they meet all of the following conditions:

- (a) develop a SWP3 according to the provisions of this general permit, that covers either the entire site or all portions of the site for which the applicant is the operator, and implement that plan prior to commencing construction activities;
- (b) sign and certify a completed TCEQ small construction site notice, post the notice at the construction site in a location where it is safely and readily available for viewing by the general public, local, state, and federal authorities, prior to commencing construction, and maintain the notice in that location until completion of the construction activity (for linear construction activities, e.g. pipeline or highway, the site notice must be placed in a publicly accessible location near where construction is actively underway; notice for these linear sites may be relocated, as necessary, along the length of the project, and the notice must be safely and readily available for viewing by the general public; local, state, and federal authorities); and
- (c) provide a copy of the signed and certified construction site notice to the operator of any municipal separate storm sewer system receiving the discharge prior to commencement of construction activities.

Operators of small construction activities as defined in Part I.B of this general permit shall not submit an NOI for coverage unless otherwise required by the executive director.

As described in Part I (Definitions) of this general permit, large construction activities include those that will disturb less than five (5) acres of land, but that are part of a larger common plan of development or sale that will ultimately disturb five (5) or more acres of land, and must meet the requirements of Part II.E.3. below.

3. Authorization for Large Construction Activities:

Operators of large construction activities that qualify for coverage under this general permit must meet all of the following conditions:

- (a) develop a SWP3 according to the provisions of this general permit that covers either the entire site or all portions of the site for which the applicant is the operator, and implement that plan prior to commencing construction activities;
- (b) primary operators must submit an NOI, using a form provided by the executive director, at least seven (7) days prior to commencing construction activities, or if utilizing electronic submittal, prior to commencing construction activities. If an additional primary operator is added after the initial NOI is submitted, the new primary operator must submit an NOI at least seven (7) days before assuming operational control, or if utilizing electronic NOI submittal, prior to assuming operational control. If the primary operator changes after the initial NOI is submitted, the new primary operator must submit a paper NOI or an electronic NOI at least ten (10) days before assuming operational control;
- (c) all operators of large construction activities must post a site notice in accordance with Part III.D.2. of this permit. The site notice must be located where it is safely and readily available for viewing by the general public, local, state, and federal authorities prior to commencing construction, and must be maintained in that location until completion of the construction activity (for linear construction activities, e.g. pipeline or highway, the site notice must be placed in a publicly accessible location near where construction is actively underway; notice for these linear sites may be relocated, as necessary, along the length of the project, and the notice must be safely and readily available for viewing by the general public; local, state, and federal authorities);

- (d) prior to commencing construction activities, all primary operators must (1) provide a copy of the signed NOI to the operator of any MS4 receiving the discharge and to any secondary construction operator, and (2) list in the SWP3 the names and addresses of all MS4 operators receiving a copy;
- (e) all persons meeting the definition of “secondary operator” in Part I of this permit are hereby notified that they are regulated under this general permit, but are not required to submit an NOI, provided that a primary operator at the site has submitted an NOI, or is required to submit an NOI, and the secondary operator has provided notification to the operator(s) of the need to obtain coverage (with records of notification available upon request). Any secondary operator notified under this provision may alternatively submit an NOI under this general permit, may seek coverage under an alternative TPDES individual permit, or may seek coverage under an alternative TPDES general permit if available; and
- (f) all secondary operators must provide a copy of the signed and certified Secondary Operator construction site notice to the operator of any MS4 receiving the discharge prior to commencement of construction activities.

4. Waivers for Small Construction Activities:

Part II.G. describes how operators of certain small construction activities may obtain a waiver from coverage.

5. Effective Date of Coverage

- (a) Operators of small construction activities as described in either Part II.E.1. or II.E.2. above are authorized immediately following compliance with the applicable conditions of Part II.E.1. or II.E.2. Secondary operators of large construction activities as described in Part II.E.3. above are authorized immediately following compliance with the applicable conditions in Part II.E.3. For activities located in areas regulated by 30 TAC Chapter 213, related to the Edwards Aquifer, this authorization to discharge is separate from the requirements of the operator’s responsibilities under that rule. Construction may not commence for sites regulated under 30 TAC Chapter 213 until all applicable requirements of that rule are met.
- (b) Primary operators of large construction activities as described in Part II.E.3. above are provisionally authorized seven (7) days from the date that a completed NOI is postmarked for delivery to the TCEQ, unless otherwise notified by the executive director. If electronic submission of the NOI is provided, and unless otherwise notified by the executive director, primary operators are authorized immediately following confirmation of receipt of the NOI by the TCEQ. Authorization is non-provisional when the executive director finds the NOI is administratively complete and an authorization number is issued for the activity. For activities located in areas regulated by 30 TAC Chapter 213, related to the Edwards Aquifer, this authorization to discharge is separate from the requirements of the operator’s responsibilities under that rule. Construction may not commence for sites regulated under 30 TAC Chapter 213 until all applicable requirements of that rule are met.
- (c) Operators are not prohibited from submitting late NOIs or posting late notices to obtain authorization under this general permit. The TCEQ reserves the right to take appropriate enforcement actions for any unpermitted activities that may have occurred between the time construction commenced and authorization was obtained.

6. Notice of Change (NOC)

If relevant information provided in the NOI changes, an NOC must be submitted at least 14 days before the change occurs, if possible. Where 14-day advance notice is not possible, the operator must submit an NOC within 14 days of discovery of the change. If

the operator becomes aware that it failed to submit any relevant facts or submitted incorrect information in an NOI, the correct information must be provided to the executive director in an NOC within 14 days after discovery. The NOC shall be submitted on a form provided by the executive director, or by letter if an NOC form is not available. A copy of the NOC must also be provided to the operator of any MS4 receiving the discharge, and a list must be included in the SWP3 that includes the names and addresses of all MS4 operators receiving a copy.

Information that may be included on an NOC includes, but is not limited to, the following: the description of the construction project, an increase in the number of acres disturbed (for increases of one or more acres), or the operator name. A transfer of operational control from one operator to another, including a transfer of the ownership of a company, may not be included in an NOC.

A transfer of ownership of a company includes changes to the structure of a company, such as changing from a partnership to a corporation or changing corporation types, so that the filing number (or charter number) that is on record with the Texas Secretary of State must be changed.

An NOC is not required for notifying TCEQ of a decrease in the number of acres disturbed. This information must be included in the SWP3 and retained on site.

7. Signatory Requirement for NOI Forms, Notice of Termination (NOT) Forms, NOC Letters, and Construction Site Notices

NOI forms, NOT forms, NOC letters, and Construction Site Notices that require a signature must be signed according to 30 TAC § 305.44 (relating to Signatories for Applications).

8. Contents of the NOI

The NOI form shall require, at a minimum, the following information:

- (a) the TPDES CGP authorization number for existing authorizations under this general permit, where the operator submits an NOI to renew coverage within 90 days of the effective date of this general permit;
- (b) the name, address, and telephone number of the operator filing the NOI for permit coverage;
- (c) the name (or other identifier), address, county, and latitude/longitude of the construction project or site;
- (d) the number of acres that will be disturbed by the applicant;
- (e) confirmation that the project or site will not be located on Indian Country lands;
- (f) confirmation that a SWP3 has been developed in accordance with this general permit, that it will be implemented prior to construction, and that it is compliant with any applicable local sediment and erosion control plans; for multiple operators who prepare a shared SWP3, the confirmation for an operator may be limited to its obligations under the SWP3 provided all obligations are confirmed by at least one operator;
- (g) name of the receiving water(s);
- (h) the classified segment number for each classified segment that receives discharges from the regulated construction activity (if the discharge is not directly to a classified segment, then the classified segment number of the first classified segment that those discharges reach); and
- (i) the name of all surface waters receiving discharges from the regulated construction activity that are on the latest EPA-approved CWA § 303(d) List of impaired waters.

Section F. Terminating Coverage

1. Notice of Termination (NOT) Required

Each operator that has submitted an NOI for authorization under this general permit must apply to terminate that authorization following the conditions described in this section of the general permit. Authorization must be terminated by submitting an NOT on a form supplied by the executive director. Authorization to discharge under this general permit terminates at midnight on the day the NOT is postmarked for delivery to the TCEQ. If electronic submission of the NOT is provided, authorization to discharge under this permit terminates immediately following confirmation of receipt of the NOT by the TCEQ. Compliance with the conditions and requirements of this permit is required until an NOT is submitted.

The NOT must be submitted to TCEQ, and a copy of the NOT provided to the operator of any MS4 receiving the discharge (with a list in the SWP3 of the names and addresses of all MS4 operators receiving a copy), within 30 days after any of the following conditions are met:

- (a) final stabilization has been achieved on all portions of the site that are the responsibility of the permittee;
- (b) a transfer of operational control has occurred (See Section II.F.4. below); or
- (c) the operator has obtained alternative authorization under an individual TPDES permit or alternative TPDES general permit.

2. Minimum Contents of the NOT

The NOT form shall require, at a minimum, the following information:

- (a) if authorization was granted following submission of an NOI, the permittee's site-specific TPDES authorization number for the construction site;
- (b) an indication of whether the construction activity is completed or if the permittee is simply no longer an operator at the site;
- (c) the name, address, and telephone number of the permittee submitting the NOT;
- (d) the name (or other identifier), address, county, and location (latitude/longitude) of the construction project or site; and
- (e) a signed certification that either all stormwater discharges requiring authorization under this general permit will no longer occur, or that the applicant is no longer the operator of the facility or construction site, and that all temporary structural erosion controls have either been removed, will be removed on a schedule defined in the SWP3, or have been transferred to a new operator if the new operator has applied for permit coverage. Erosion controls that are designed to remain in place for an indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal.

3. Termination of Coverage for Small Construction Sites and for Secondary Operators at Large Construction Sites

Each operator that has obtained automatic authorization and has not been required to submit an NOI must remove the site notice upon meeting any of the conditions listed below, complete the applicable portion of the site notice related to removal of the site notice, and submit a copy of the completed site notice to the operator of any MS4 receiving the discharge (or provide alternative notification as allowed by the MS4 operator, with documentation of such notification included in the SWP3), within 30 days of meeting any of the following conditions:

- (a) final stabilization has been achieved on all portions of the site that are the responsibility of the permittee;
- (b) a transfer of operational control has occurred (See Section II.F.4. below); or
- (c) the operator has obtained alternative authorization under an individual or general TPDES permit.

Authorization to discharge under this general permit terminates immediately upon removal of the applicable site notice. Compliance with the conditions and requirements of this permit is required until the site notice is removed.

4. Transfer of Operational Control

Coverage under this general permit is not transferable. A transfer of operational control includes changes to the structure of a company, such as changing from a partnership to a corporation, or changing to a different corporation type such that a different filing (or charter) number is established with the Texas Secretary of State.

When the primary operator of a large construction activity changes or operational control is transferred, the original operator must submit an NOT within ten (10) days prior to the date that responsibility for operations terminates, and the new operator must submit an NOI at least ten (10) days prior to the transfer of operational control, in accordance with condition (a) or (b) below. A copy of the NOT must be provided to the operator of any MS4 receiving the discharge in accordance with Section II.F.1. above.

Operators of regulated construction activities who are not required to submit an NOI must remove the original site notice, and the new operator must post the required site notice prior to the transfer of operational control, in accordance with condition (a) or (b) below. A copy of the completed site notice must be provided to the operator of any MS4 receiving the discharge, in accordance with Section II.F.3. above.

A transfer of operational control occurs when either of the following criteria is met:

- (a) Another operator has assumed control over all areas of the site that have not been finally stabilized; and all silt fences and other temporary erosion controls have either been removed, scheduled for removal as defined in the SWP3, or transferred to a new operator, provided that the permitted operator has attempted to notify the new operator in writing of the requirement to obtain permit coverage. Record of this notification (or attempt at notification) shall be retained by the operator in accordance with Part VI of this permit. Erosion controls that are designed to remain in place for an indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal.
- (b) A homebuilder has purchased one or more lots from an operator who obtained coverage under this general permit for a common plan of development or sale. The homebuilder is considered a new operator and shall comply with the requirements listed above, including the development of a SWP3 if necessary. Under these circumstances, the homebuilder is only responsible for compliance with the general permit requirements as they apply to lot(s) it has operational control over, and the original operator remains responsible for common controls or discharges, and must amend its SWP3 to remove the lot(s) transferred to the homebuilder.

Section G. Waivers from Coverage

The executive director may waive the otherwise applicable requirements of this general permit for stormwater discharges from small construction activities under the terms and conditions described in this section.

1. Waiver Applicability and Coverage

Operators of small construction activities may apply for and receive a waiver from the requirements to obtain authorization under this general permit, where all of the following conditions are met. This waiver from coverage does not apply to non-stormwater discharges. The operator must insure that any non-stormwater discharges are either authorized under a separate permit or authorization, or are not considered to be a wastewater.

- (a) the calculated rainfall erosivity (R) factor for the entire period of the construction project is less than five (5);
- (b) the operator submits to the TCEQ a signed waiver certification form, supplied by the executive director, certifying that the construction activity will commence and be completed within a period when the value of the calculated R factor is less than five (5); and
- (c) the waiver certification form is postmarked for delivery to the TCEQ at least seven (7) days before construction activity begins or, if electronic filing is available, then any time following the receipt of written confirmation from TCEQ that a complete electronic application was submitted and acknowledged.

2. Steps to Obtaining a Waiver

The construction site operator may calculate the R factor to request a waiver using the following steps:

- (a) Estimate the construction start date and the construction end date. The construction end date is the date that final stabilization will be achieved.
- (b) Find the appropriate Erosivity Index (EI) zone in Appendix B of this permit.
- (c) Find the EI percentage for the project period by adding the results for each period of the project using the table provided in Appendix D of this permit, in EPA Fact Sheet 2.1, or in USDA Handbook 703, by subtracting the start value from the end value to find the percent EI for the site.
- (d) Refer to the Isoerodent Map (Appendix C of this permit) and interpolate the annual isoerodent value for the proposed construction location.
- (e) Multiply the percent value obtained in Step (c) above by the annual isoerodent value obtained in Step (d). This is the R factor for the proposed project. If the value is less than 5, then a waiver may be obtained. If the value is five (5) or more, then a waiver may not be obtained, and the operator must obtain coverage under Part II.E.2. of this permit.

Alternatively, the operator may calculate a site-specific R factor utilizing the following online calculator: <http://ei.tamu.edu/index.html>, or using another available resource.

The waiver certification form is not required to be posted at the small construction site.

3. Effective Date of Waiver

Operators of small construction activities are provisionally waived from the otherwise applicable requirements of this general permit seven (7) days from the date that a completed waiver certification form is postmarked for delivery to TCEQ, or immediately upon receiving confirmation of approval of an electronic submittal, if electronic form submittals are available.

4. Activities Extending Beyond the Waiver Period

If a construction activity extends beyond the approved waiver period due to circumstances beyond the control of the operator, the operator must either:

- (a) recalculate the R factor using the original start date and a new projected ending date, and if the R factor is still under five (5), submit a new waiver certification form at least two (2) days before the end of the original waiver period; or
- (b) obtain authorization under this general permit according to the requirements delineated in either Part II.E.2. or Part II.E.3. before the end of the approved waiver period.

Section H. Alternative TPDES Permit Coverage

1. Individual Permit Alternative

Any discharge eligible for coverage under this general permit may alternatively be authorized under an individual TPDES permit according to 30 TAC §305 (relating to Consolidated Permits). Applications for individual permit coverage should be submitted at least three hundred and thirty (330) days prior to commencement of construction activities to ensure timely authorization.

2. Individual Permit Required

The executive director may suspend an authorization or deny an NOI in accordance with the procedures set forth in 30 TAC §205 (relating to General Permits for Waste Discharges), including the requirement that the executive director provide written notice to the permittee. The executive director may require an operator of a construction site, otherwise eligible for authorization under this general permit, to apply for an individual TPDES permit in the following circumstances:

- (a) the conditions of an approved TMDL or TMDL I-Plan on the receiving water;
- (b) the activity being determined to cause a violation of water quality standards or being found to cause, or contribute to, the loss of a designated use of surface water in the state; and
- (c) any other consideration defined in 30 TAC Chapter 205 (relating to General Permits for Waste Discharges) including 30 TAC Chapter 205.4(c)(3)(D), which allows the commission to deny authorization under the general permit and require an individual permit if a discharger “has been determined by the executive director to have been out of compliance with any rule, order, or permit of the commission, including non-payment of fees assessed by the executive director.”

Additionally, the executive director may cancel, revoke, or suspend authorization to discharge under this general permit based on a finding of historical and significant noncompliance with the provisions of this general permit, relating to 30 TAC §60.3 (Use of Compliance History). Denial of authorization to discharge under this general permit or suspension of a permittee’s authorization under this general permit shall be done according to commission rules in 30 TAC Chapter 205 (relating to General Permits for Waste Discharges).

3. Alternative Discharge Authorization

Any discharge eligible for authorization under this general permit may alternatively be authorized under a separate general permit according to 30 TAC Chapter 205 (relating to General Permits for Waste Discharges), if applicable.

Section I. Permit Expiration

1. This general permit is effective for a term not to exceed five (5) years. All active discharge authorizations expire on the date provided on page one (1) of this permit. Following public notice and comment, as provided by 30 TAC §205.3 (relating to

Public Notice, Public Meetings, and Public Comment), the commission may amend, revoke, cancel, or renew this general permit.

2. If the executive director publishes a notice of the intent to renew or amend this general permit before the expiration date, the permit will remain in effect for existing, authorized discharges until the commission takes final action on the permit. Upon issuance of a renewed or amended permit, permittees may be required to submit an NOI within 90 days following the effective date of the renewed or amended permit, unless that permit provides for an alternative method for obtaining authorization.
3. If the commission does not propose to reissue this general permit within 90 days before the expiration date, permittees shall apply for authorization under an individual permit or an alternative general permit. If the application for an individual permit is submitted before the expiration date, authorization under this expiring general permit remains in effect until the issuance or denial of an individual permit. No new NOIs will be accepted nor new authorizations honored under the general permit after the expiration date.

Part III. Stormwater Pollution Prevention Plans (SWP3)

All regulated construction site operators shall prepare an SWP3, prior to submittal of an NOI, to address discharges authorized under Parts II.E.2. and II.E.3. of this general permit that will reach Waters of the U.S., including discharges to MS4s and privately owned separate storm sewer systems that drain to Waters of the U.S., to identify and address potential sources of pollution that are reasonably expected to affect the quality of discharges from the construction site, including off-site material storage areas, overburden and stockpiles of dirt, borrow areas, equipment staging areas, vehicle repair areas, fueling areas, etc., used solely by the permitted project. The SWP3 must describe the implementation of practices that will be used to minimize to the extent practicable the discharge of pollutants in stormwater associated with construction activity and non-stormwater discharges described in Part II.A.3., in compliance with the terms and conditions of this permit.

Individual operators at a site may develop separate SWP3s that cover only their portion of the project, provided reference is made to the other operators at the site. Where there is more than one SWP3 for a site, permittees must coordinate to ensure that BMPs and controls are consistent and do not negate or impair the effectiveness of each other. Regardless of whether a single comprehensive SWP3 is developed or separate SWP3s are developed for each operator, it is the responsibility of each operator to ensure compliance with the terms and conditions of this general permit in the areas of the construction site where that operator has control over construction plans and specifications or day-to-day operations.

Section A. Shared SWP3 Development

For more effective coordination of BMPs and opportunities for cost sharing, a cooperative effort by the different operators at a site is encouraged. Operators must independently obtain authorization, but may work together to prepare and implement a single, comprehensive SWP3 for the entire construction site.

1. The SWP3 must clearly list the name and, for large construction activities, the general permit authorization numbers, for each operator that participates in the shared SWP3. Until the TCEQ responds to receipt of the NOI with a general permit authorization number, the SWP3 must specify the date that the NOI was submitted to TCEQ by each operator. Each operator participating in the shared plan must also sign the SWP3.

2. The SWP3 must clearly indicate which operator is responsible for satisfying each shared requirement of the SWP3. If the responsibility for satisfying a requirement is not described in the plan, then each permittee is entirely responsible for meeting the requirement within the boundaries of the construction site where they perform construction activities. The SWP3 must clearly describe responsibilities for meeting each requirement in shared or common areas.
3. The SWP3 may provide that one operator is responsible for preparation of a SWP3 in compliance with the CGP, and another operator is responsible for implementation of the SWP3 at the project site.

Section B. Responsibilities of Operators

1. Secondary Operators and Primary Operators with Control Over Construction Plans and Specifications

All secondary operators and primary operators with control over construction plans and specifications shall:

- (a) ensure the project specifications allow or provide that adequate BMPs are developed to meet the requirements of Part III of this general permit;
- (b) ensure that the SWP3 indicates the areas of the project where they have control over project specifications, including the ability to make modifications in specifications;
- (c) ensure that all other operators affected by modifications in project specifications are notified in a timely manner so that those operators may modify their BMPs as necessary to remain compliant with the conditions of this general permit; and
- (d) ensure that the SWP3 for portions of the project where they are operators indicates the name and site-specific TPDES authorization number(s) for operators with the day-to-day operational control over those activities necessary to ensure compliance with the SWP3 and other permit conditions. If the party with day-to-day operational control has not been authorized or has abandoned the site, the person with control over project specifications is considered to be the responsible party until the authority is transferred to another party and the SWP3 is updated.

2. Primary Operators with Day-to-Day Operational Control

Primary operators with day-to-day operational control of those activities at a project that are necessary to ensure compliance with an SWP3 and other permit conditions must ensure that the SWP3 accomplishes the following requirements:

- (a) meets the requirements of this general permit for those portions of the project where they are operators;
- (b) identifies the parties responsible for implementation of BMPs described in the SWP3;
- (c) indicates areas of the project where they have operational control over day-to-day activities; and
- (d) includes, for areas where they have operational control over day-to-day activities, the name and site-specific TPDES authorization number of the parties with control over project specifications, including the ability to make modifications in specifications.

Section C. Deadlines for SWP3 Preparation, Implementation, and Compliance

The SWP3 must be prepared prior to obtaining authorization under this general permit, and implemented prior to commencing construction activities that result in soil

disturbance. The SWP3 must be prepared so that it provides for compliance with the terms and conditions of this general permit.

Section D. Plan Review and Making Plans Available

1. The SWP3 must be retained on-site at the construction site or, if the site is inactive or does not have an on-site location to store the plan, a notice must be posted describing the location of the SWP3. The SWP3 must be made readily available at the time of an on-site inspection to: the executive director; a federal, state, or local agency approving sediment and erosion plans, grading plans, or stormwater management plans; local government officials; and the operator of a municipal separate storm sewer receiving discharges from the site. If the SWP3 is retained off-site, then it shall be made available as soon as reasonably possible. In most instances, it is reasonable that the SWP3 shall be made available within 24 hours of the request.
2. A primary operator of a large construction activity must post the TCEQ site notice near the main entrance of the construction site. An operator of a small construction activity seeking authorization under this general permit and a secondary operator of a large construction activity must post the TCEQ site notice required in Part II.E.1., 2., or 3. of this general permit in order to obtain authorization. If the construction project is a linear construction project, such as a pipeline or highway, the notices must be placed in a publicly accessible location near where construction is actively underway. Notices for these linear sites may be relocated, as necessary, along the length of the project. The notices must be readily available for viewing by the general public; local, state, and federal authorities; and contain the following information:
 - (a) the site-specific TPDES authorization number for the project if assigned;
 - (b) the operator name, contact name, and contact phone number;
 - (c) a brief description of the project; and
 - (d) the location of the SWP3.
3. This permit does not provide the general public with any right to trespass on a construction site for any reason, including inspection of a site; nor does this permit require that permittees allow members of the general public access to a construction site.

Section E. Revisions and Updates to SWP3s

The permittee must revise or update the SWP3 whenever the following occurs:

1. a change in design, construction, operation, or maintenance that has a significant effect on the discharge of pollutants and that has not been previously addressed in the SWP3;
2. changing site conditions based on updated plans and specifications, new operators, new areas of responsibility, and changes in BMPs; or
3. results of inspections or investigations by site operators, operators of a municipal separate storm sewer system receiving the discharge, authorized TCEQ personnel, or a federal, state or local agency approving sediment and erosion plans indicate the SWP3 is proving ineffective in eliminating or significantly minimizing pollutants in discharges authorized under this general permit.

Section F. Contents of SWP3

The SWP3 must include, at a minimum, the information described in this section and must comply with the construction and development effluent guidelines in Part III, Section G of the general permit.

1. A site or project description, which includes the following information:
 - (a) a description of the nature of the construction activity;
 - (b) a list of potential pollutants and their sources;
 - (c) a description of the intended schedule or sequence of activities that will disturb soils for major portions of the site, including estimated start dates and duration of activities;
 - (d) the total number of acres of the entire property and the total number of acres where construction activities will occur, including off-site material storage areas, overburden and stockpiles of dirt, and borrow areas that are authorized under the permittee's NOI;
 - (e) data describing the soil or the quality of any discharge from the site;
 - (f) a map showing the general location of the site (e.g. a portion of a city or county map);
 - (g) a detailed site map (or maps) indicating the following:
 - (i) drainage patterns and approximate slopes anticipated after major grading activities;
 - (ii) areas where soil disturbance will occur;
 - (iii) locations of all controls and buffers, either planned or in place;
 - (iv) locations where temporary or permanent stabilization practices are expected to be used;
 - (v) locations of construction support activities, including off-site activities, that are authorized under the permittee's NOI, including material, waste, borrow, fill, or equipment or chemical storage areas;
 - (vi) surface waters (including wetlands) either at, adjacent, or in close proximity to the site, and also indicating those that are impaired waters;
 - (vii) locations where stormwater discharges from the site directly to a surface water body or a municipal separate storm sewer system;
 - (viii) vehicle wash areas; and
 - (ix) designated points on the site where vehicles will exit onto paved roads (for instance, this applies to construction transition from unstable dirt areas to exterior paved roads).

Where the amount of information required to be included on the map would result in a single map being difficult to read and interpret, the operator shall develop a series of maps that collectively include the required information.

- (h) the location and description of support activities authorized under the permittee's NOI, including asphalt plants, concrete plants, and other activities providing support to the construction site that is authorized under this general permit;
- (i) the name of receiving waters at or near the site that may be disturbed or that may receive discharges from disturbed areas of the project;
- (j) a copy of this TPDES general permit;
- (k) the NOI and acknowledgement certificate for primary operators of large construction sites, and the site notice for small construction sites and for secondary operators of large construction sites;
- (l) stormwater and allowable non-stormwater discharge locations, including storm drain inlets on site and in the immediate vicinity of the construction site; and

- (m) locations of all pollutant-generating activities, such as paving operations; concrete, paint and stucco washout and water disposal; solid waste storage and disposal; and dewatering operations.
2. A description of the BMPs that will be used to minimize pollution in runoff.
- The description must identify the general timing or sequence for implementation. At a minimum, the description must include the following components:
- (a) General Requirements
 - (i) Erosion and sediment controls must be designed to retain sediment on-site to the extent practicable with consideration for local topography, soil type, and rainfall.
 - (ii) Control measures must be properly selected, installed, and maintained according to the manufacturer's or designer's specifications.
 - (iii) Controls must be developed to minimize the offsite transport of litter, construction debris, and construction materials.

(b) Erosion Control and Stabilization Practices

The SWP3 must include a description of temporary and permanent erosion control and stabilization practices for the site, compliant with the requirements of Part III.G.1 and G.2 of this general permit, including a schedule of when the practices will be implemented. Site plans should ensure that existing vegetation is preserved where it is possible.

- (i) Erosion control and stabilization practices may include but are not limited to: establishment of temporary or permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of existing trees and vegetation, slope texturing, temporary velocity dissipation devices, flow diversion mechanisms, and other similar measures.
- (ii) The following records must be maintained and either attached to or referenced in the SWP3, and made readily available upon request to the parties listed in Part III.D.1 of this general permit:
 - (A) the dates when major grading activities occur;
 - (B) the dates when construction activities temporarily or permanently cease on a portion of the site; and
 - (C) the dates when stabilization measures are initiated.
- (iii) Erosion control and stabilization measures must be initiated immediately in portions of the site where construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days. Stabilization measures that provide a protective cover must be initiated immediately in portions of the site where construction activities have permanently ceased. The term "immediately" is used to define the deadline for initiating stabilization measures. In the context of this requirement, "immediately" means as soon as practicable, but no later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased. Except as provided in (A) through (D) below, these measures must be completed as soon as practicable, but no more than 14 calendar days after the initiation of soil stabilization measures:
 - (A) Where the immediate initiation of stabilization measures after construction activity temporarily or permanently ceased is precluded

by snow cover or frozen ground conditions, stabilization measures must be initiated as soon as practicable.

- (B) In arid areas, semi-arid areas, or drought-stricken areas where the immediate initiation of stabilization measures after construction activity has temporarily or permanently ceased or is precluded by arid conditions, erosion control and stabilization measures must be initiated as soon as practicable. Where vegetative controls are not feasible due to arid conditions, the operator shall immediately install, and within 14 calendar days of a temporary or permanent cessation of work in any portion of the site complete, non-vegetative erosion controls. If non-vegetative controls are not feasible, the operator shall install temporary sediment controls as required in Paragraph (C) below.
 - (C) In areas where temporary stabilization measures are infeasible, the operator may alternatively utilize temporary perimeter controls. The operator must document in the SWP3 the reason why stabilization measures are not feasible, and must demonstrate that the perimeter controls will retain sediment on site to the extent practicable. The operator must continue to inspect the BMPs at the frequency established in Section III.F.7.(a) for unstabilized sites.
 - (D) If the initiation or completion of vegetative stabilization is affected by circumstances beyond the control of the permittee, vegetative stabilization must be initiated or completed as soon as conditions or circumstances allow it on the site. The requirement to initiate stabilization is triggered as soon as it is known with reasonable certainty that work will be stopped for 14 or more additional calendar days.
- (iv) Final stabilization must be achieved prior to termination of permit coverage.
 - (v) TCEQ does not expect that temporary or permanent stabilization measures to be applied to areas that are intended to be left un-vegetated or unstabilized following construction (e.g., dirt access roads, utility pole pads, areas being used for storage of vehicles, equipment, or materials).
- (c) Sediment Control Practices

The SWP3 must include a description of any sediment control practices used to remove eroded soils from stormwater runoff, including the general timing or sequence for implementation of controls.

- (i) Sites With Drainage Areas of Ten or More Acres

- (A) Sedimentation Basin(s)

- (1) A sedimentation basin is required, where feasible, for a common drainage location that serves an area with ten (10) or more acres disturbed at one time. A sedimentation basin may be temporary or permanent, and must provide sufficient storage to contain a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed acre drained. When calculating the volume of runoff from a 2-year, 24-hour storm event, it is not required to include the flows from offsite areas and flow from onsite areas that are either undisturbed or have already undergone permanent stabilization, if these flows are diverted around both the disturbed areas of the site and the sediment basin. Capacity calculations shall be included in the SWP3.

- (2) Where rainfall data is not available or a calculation cannot be performed, the sedimentation basin must provide at least 3,600 cubic feet of storage per acre drained until final stabilization of the site.
 - (3) If a sedimentation basin is not feasible, then the permittee shall provide equivalent control measures until final stabilization of the site. In determining whether installing a sediment basin is feasible, the permittee may consider factors such as site soils, slope, available area, public safety, precipitation patterns, site geometry, site vegetation, infiltration capacity, geotechnical factors, depth to groundwater, and other similar considerations. The permittee shall document the reason that the sediment basins are not feasible, and shall utilize equivalent control measures, which may include a series of smaller sediment basins.
 - (4) Unless infeasible, when discharging from sedimentation basins and impoundments, the permittee shall utilize outlet structures that withdraw water from the surface.
 - (B) Perimeter Controls: At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries of the construction area, and for those side slope boundaries deemed appropriate as dictated by individual site conditions.
 - (ii) Controls for Sites With Drainage Areas Less than Ten Acres:
 - (A) Sediment traps and sediment basins may be used to control solids in stormwater runoff for drainage locations serving less than ten (10) acres. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries of the construction area, and for those side slope boundaries deemed appropriate as dictated by individual site conditions.
 - (B) Alternatively, a sediment basin that provides storage for a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed acre drained may be utilized. Where rainfall data is not available or a calculation cannot be performed, a temporary or permanent sediment basin providing 3,600 cubic feet of storage per acre drained may be provided. If a calculation is performed, then the calculation shall be included in the SWP3.
 - (C) If sedimentation basins or impoundments are used, the permittee shall comply with the requirements in Part III.G.6 of this general permit.
3. Description of Permanent Stormwater Controls

A description of any measures that will be installed during the construction process to control pollutants in stormwater discharges that may occur after construction operations have been completed must be included in the SWP3. Permittees are only responsible for the installation and maintenance of stormwater management measures prior to final stabilization of the site or prior to submission of an NOT.
4. Other Required Controls and BMPs
 - (a) Permittees shall minimize, to the extent practicable, the off-site vehicle tracking of sediments and the generation of dust. The SWP3 shall include a description of controls utilized to accomplish this requirement.

- (b) The SWP3 must include a description of construction and waste materials expected to be stored on-site and a description of controls to minimize pollutants from these materials.
 - (c) The SWP3 must include a description of potential pollutant sources from areas other than construction (such as stormwater discharges from dedicated asphalt plants and dedicated concrete batch plants), and a description of controls and measures that will be implemented at those sites to minimize pollutant discharges.
 - (d) Permittees shall place velocity dissipation devices at discharge locations and along the length of any outfall channel (i.e., runoff conveyance) to provide a non-erosive flow velocity from the structure to a water course, so that the natural physical and biological characteristics and functions are maintained and protected.
 - (e) Permittees shall design and utilize appropriate controls to minimize the offsite transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water from the site.
 - (f) Permittees shall ensure that all other required controls and BMPs comply with all of the requirements of Part III.G of this general permit.
5. Documentation of Compliance with Approved State and Local Plans
- (a) Permittees must ensure that the SWP3 is consistent with requirements specified in applicable sediment and erosion site plans or site permits, or stormwater management site plans or site permits approved by federal, state, or local officials.
 - (b) SWP3s must be updated as necessary to remain consistent with any changes applicable to protecting surface water resources in sediment erosion site plans or site permits, or stormwater management site plans or site permits approved by state or local official for which the permittee receives written notice.
 - (c) If the permittee is required to prepare a separate management plan, including but not limited to a WPAP or Contributing Zone Plan in accordance with 30 TAC Chapter 213 (related to the Edwards Aquifer), then a copy of that plan must be either included in the SWP3 or made readily available upon request to authorized personnel of the TCEQ. The permittee shall maintain a copy of the approval letter for the plan in its SWP3.
6. Maintenance Requirements
- (a) All protective measures identified in the SWP3 must be maintained in effective operating condition. If, through inspections or other means, the permittee determines that BMPs are not operating effectively, then the permittee shall perform maintenance as necessary to maintain the continued effectiveness of stormwater controls, and prior to the next rain event if feasible. If maintenance prior to the next anticipated storm event is impracticable, the reason shall be documented in the SWP3 and maintenance must be scheduled and accomplished as soon as practicable. Erosion and sediment controls that have been intentionally disabled, run-over, removed, or otherwise rendered ineffective must be replaced or corrected immediately upon discovery.
 - (b) If periodic inspections or other information indicates a control has been used incorrectly, is performing inadequately, or is damaged, then the operator shall replace or modify the control as soon as practicable after making the discovery.
 - (c) Sediment must be removed from sediment traps and sedimentation ponds no later than the time that design capacity has been reduced by 50%. For perimeter

controls such as silt fences, berms, etc., the trapped sediment must be removed before it reaches 50% of the above-ground height.

- (d) If sediment escapes the site, accumulations must be removed at a frequency that minimizes off-site impacts, and prior to the next rain event, if feasible. If the permittee does not own or operate the off-site conveyance, then the permittee shall work with the owner or operator of the property to remove the sediment.

7. Inspections of Controls

- (a) Personnel provided by the permittee must inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, discharge locations, and structural controls for evidence of, or the potential for, pollutants entering the drainage system. Personnel conducting these inspections must be knowledgeable of this general permit, familiar with the construction site, and knowledgeable of the SWP3 for the site. Sediment and erosion control measures identified in the SWP3 must be inspected to ensure that they are operating correctly. Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking. Inspections must be conducted at least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

Where sites have been finally or temporarily stabilized or where runoff is unlikely due to winter conditions (e.g. site is covered with snow, ice, or frozen ground exists), inspections must be conducted at least once every month. In arid, semi-arid, or drought-stricken areas, inspections must be conducted at least once every month and within 24 hours after the end of a storm event of 0.5 inches or greater. The SWP3 must also contain a record of the total rainfall measured, as well as the approximate beginning and ending dates of winter or drought conditions resulting in monthly frequency of inspections.

As an alternative to the above-described inspection schedule of once every 14 calendar days and within 24 hours of a storm event of 0.5 inches or greater, the SWP3 may be developed to require that these inspections will occur at least once every seven (7) calendar days. If this alternative schedule is developed, then the inspection must occur regardless of whether or not there has been a rainfall event since the previous inspection.

The inspections may occur on either schedule provided that the SWP3 reflects the current schedule and that any changes to the schedule are conducted in accordance with the following provisions: the schedule may be changed a maximum of one time each month, the schedule change must be implemented at the beginning of a calendar month, and the reason for the schedule change must be documented in the SWP3 (e.g., end of "dry" season and beginning of "wet" season).

- (b) Utility line installation, pipeline construction, and other examples of long, narrow, linear construction activities may provide inspection personnel with limited access to the areas described in Part III.F.7.(a) above. Inspection of these areas could require that vehicles compromise temporarily or even permanently stabilized areas, cause additional disturbance of soils, and increase the potential for erosion. In these circumstances, controls must be inspected at least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater, but representative inspections may be performed. For representative inspections, personnel must inspect controls along the construction site for 0.25 mile above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described in Part III.F.7.(a)

above. The conditions of the controls along each inspected 0.25 mile portion may be considered as representative of the condition of controls along that reach extending from the end of the 0.25 mile portion to either the end of the next 0.25 mile inspected portion, or to the end of the project, whichever occurs first.

As an alternative to the above-described inspection schedule of once every 14 calendar days and within 24 hours of a storm event of 0.5 inches or greater, the SWP3 may be developed to require that these inspections will occur at least once every seven (7) calendar days. If this alternative schedule is developed, the inspection must occur regardless of whether or not there has been a rainfall event since the previous inspection. The inspections may occur on either schedule provided that the SWP3 reflects the current schedule and that any changes to the schedule are conducted in accordance with the following provisions: the schedule may be changed a maximum of one time each month, the schedule change must be implemented at the beginning of a calendar month, and the reason for the schedule change must be documented in the SWP3 (e.g., end of "dry" season and beginning of "wet" season).

- (c) In the event of flooding or other uncontrollable situations which prohibit access to the inspection sites, inspections must be conducted as soon as access is practicable.
- (d) The SWP3 must be modified based on the results of inspections, as necessary, to better control pollutants in runoff. Revisions to the SWP3 must be completed within seven (7) calendar days following the inspection. If existing BMPs are modified or if additional BMPs are necessary, an implementation schedule must be described in the SWP3 and wherever possible those changes implemented before the next storm event. If implementation before the next anticipated storm event is impracticable, these changes must be implemented as soon as practicable.
- (e) A report summarizing the scope of the inspection, the date(s) of the inspection, and major observations relating to the implementation of the SWP3 must be made and retained as part of the SWP3. Major observations should include: The locations of discharges of sediment or other pollutants from the site; locations of BMPs that need to be maintained; locations of BMPs that failed to operate as designed or proved inadequate for a particular location; and locations where additional BMPs are needed.

Actions taken as a result of inspections must be described within, and retained as a part of, the SWP3. Reports must identify any incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the report must contain a certification that the facility or site is in compliance with the SWP3 and this permit. The report must be signed by the person and in the manner required by 30 TAC §305.128 (relating to Signatories to Reports).

The names and qualifications of personnel making the inspections for the permittee may be documented once in the SWP3 rather than being included in each report.

- 8. The SWP3 must identify and ensure the implementation of appropriate pollution prevention measures for all eligible non-stormwater components of the discharge, as listed in Part II.A.3. of this permit.
- 9. The SWP3 must include the information required in Part III.B. of this general permit.
- 10. The SWP3 must include pollution prevention procedures that comply with Part III.G.4 of this general permit.

Section G. Erosion and Sediment Control Requirements Applicable to All Sites

Except as provided in 40 CFR §§125.30-125.32, any discharge regulated under this general permit, with the exception of sites that obtained waivers based on low rainfall erosivity, must achieve, at a minimum, the following effluent limitations representing the degree of effluent reduction attainable by application of the best practicable control technology currently available (BPT).

1. *Erosion and sediment controls.* Design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed, and maintained to:
 - (a) Control stormwater volume and velocity within the site to minimize soil erosion;
 - (b) If any stormwater flow will be channelized at the site, stormwater controls must be designed to control both peak flowrates and total stormwater volume to minimize erosion at outlets and to minimize downstream channel and streambank erosion;
 - (c) Minimize the amount of soil exposed during construction activity;
 - (d) Minimize the disturbance of steep slopes;
 - (e) Minimize sediment discharges from the site. The design, installation, and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;
 - (f) If earth disturbance activities are located in close proximity to a surface water, provide and maintain appropriate natural buffers if feasible and as necessary, around surface waters, depending on site-specific topography, sensitivity, and proximity to water bodies. Direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration. If providing buffers is infeasible, the permittee shall document the reason that natural buffers are not feasible, and shall implement additional erosion and sediment controls to reduce sediment load;
 - (g) Preserve native topsoil at the site, unless infeasible; and
 - (h) Minimize soil compaction in post-construction pervious areas. In areas of the construction site where final vegetative stabilization will occur or where infiltration practices will be installed, either:
 - (1) restrict vehicle and equipment use to avoid soil compaction; or
 - (2) prior to seeding or planting areas of exposed soil that have been compacted, use techniques that condition the soils to support vegetative growth, if necessary and feasible;
 - (i) TCEQ does not consider stormwater control features (e.g., stormwater conveyance channels, storm drain inlets, sediment basins) to constitute “surface waters” for the purposes of triggering the buffer requirement in Part III.G.(f) above.
2. *Soil stabilization.* Stabilization of disturbed areas must, at a minimum, be initiated immediately whenever any clearing, grading, excavating, or other earth disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. In the context of this requirement, “immediately” means as soon as practicable, but no later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased. Temporary

stabilization must be completed no more than 14 calendar days after initiation of soil stabilization measures, and final stabilization must be achieved prior to termination of permit coverage. In arid, semi-arid, and drought-stricken areas where initiating vegetative stabilization measures immediately is infeasible, alternative non-vegetative stabilization measures must be employed as soon as practicable. Refer to Part III.F.2.(b) for complete erosion control and stabilization practice requirements.

3. *Dewatering*. Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited, unless managed by appropriate controls.
4. *Pollution prevention measures*. Design, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants. At a minimum, such measures must be designed, installed, implemented, and maintained to:
 - (a) Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
 - (b) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater; and
 - (c) Minimize the discharge of pollutants from spills and leaks, and implement chemical spill and leak prevention and response procedures.
5. *Prohibited discharges*. The following discharges are prohibited:
 - (a) Wastewater from wash out of concrete trucks, unless managed by an appropriate control (see Part V of the general permit);
 - (b) Wastewater from wash out and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
 - (c) Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance; and
 - (d) Soaps or solvents used in vehicle and equipment washing.
6. *Surface outlets*. When discharging from basins and impoundments, utilize outlet structures that withdraw water from the surface, unless infeasible.

Part IV. Stormwater Runoff from Concrete Batch Plants

Discharges of stormwater runoff from concrete batch plants at regulated construction sites may be authorized under the provisions of this general permit provided that the following requirements are met for concrete batch plant(s) authorized under this permit. If discharges of stormwater runoff from concrete batch plants are not covered under this general permit, then discharges must be authorized under an alternative general permit or individual permit. This permit does not authorize the discharge or land disposal of any wastewater from concrete batch plants at regulated construction sites. Authorization for these wastes must be obtained under an individual permit or an alternative general permit.

Section A. Benchmark Sampling Requirements

1. Operators of concrete batch plants authorized under this general permit shall sample the stormwater runoff from the concrete batch plants according to the requirements

of this section of this general permit, and must conduct evaluations on the effectiveness of the SWP3 based on the following benchmark monitoring values:

Table 1. Benchmark Parameters

Benchmark Parameter	Benchmark Value	Sampling Frequency	Sample Type
Oil and Grease	15 mg/L	1/quarter (*1) (*2)	Grab (*3)
Total Suspended Solids	100 mg/L	1/quarter (*1) (*2)	Grab (*3)
pH	6.0 – 9.0 Standard Units	1/quarter (*1) (*2)	Grab (*3)
Total Iron	1.3 mg/L	1/quarter (*1) (*2)	Grab (*3)

- (*1) When discharge occurs. Sampling is required within the first 30 minutes of discharge. If it is not practicable to take the sample, or to complete the sampling, within the first 30 minutes, sampling must be completed within the first hour of discharge. If sampling is not completed within the first 30 minutes of discharge, the reason must be documented and attached to all required reports and records of the sampling activity.
- (*2) Sampling must be conducted at least once during each of the following periods. The first sample must be collected during the first full quarter that a stormwater discharge occurs from a concrete batch plant authorized under this general permit.

January through March

April through June

July through September

October through December

For projects lasting less than one full quarter, a minimum of one sample shall be collected, provided that a stormwater discharge occurred at least once following submission of the NOI or following the date that automatic authorization was obtained under Section II.E.2., and prior to terminating coverage.

- (*3) A grab sample shall be collected from the stormwater discharge resulting from a storm event that is at least 0.1 inches of measured precipitation that occurs at least 72 hours from the previously measurable storm event. The sample shall be collected downstream of the concrete batch plant, and where the discharge exits any BMPs utilized to handle the runoff from the batch plant, prior to commingling with any other water authorized under this general permit.
2. The permittee must compare the results of sample analyses to the benchmark values above, and must include this comparison in the overall assessment of the SWP3's effectiveness. Analytical results that exceed a benchmark value are not a violation of this permit, as these values are not numeric effluent limitations. Results of analyses are indicators that modifications of the SWP3 should be assessed and may be necessary to protect water quality. The operator must investigate the cause for each exceedance and must document the results of this investigation in the SWP3 by the end of the quarter following the sampling event.

The operator's investigation must identify the following:

- (a) any additional potential sources of pollution, such as spills that might have occurred,
- (b) necessary revisions to good housekeeping measures that are part of the SWP3,
- (c) additional BMPs, including a schedule to install or implement the BMPs, and
- (d) other parts of the SWP3 that may require revisions in order to meet the goal of the benchmark values.

Background concentrations of specific pollutants may also be considered during the investigation. If the operator is able to relate the cause of the exceedance to background concentrations, then subsequent exceedances of benchmark values for that pollutant may be resolved by referencing earlier findings in the SWP3.

Background concentrations may be identified by laboratory analyses of samples of stormwater runoff to the permitted facility, by laboratory analyses of samples of stormwater runoff from adjacent non-industrial areas, or by identifying the pollutant is a naturally occurring material in soils at the site.

Section B. Best Management Practices (BMPs) and SWP3 Requirements

Minimum SWP3 Requirements – The following are required in addition to other SWP3 requirements listed in this general permit (including, but not limited to Part III.F.7. of this permit):

1. **Description of Potential Pollutant Sources** - The SWP3 must provide a description of potential sources (activities and materials) that may reasonably be expected to affect the quality of stormwater discharges associated with concrete batch plants authorized under this permit. The SWP3 must describe practices that will be used to reduce the pollutants in these discharges to assure compliance with this general permit, including the protection of water quality, and must ensure the implementation of these practices.

The following must be developed, at a minimum, in support of developing this description:

- (a) **Drainage** – The site map must include the following information:
 - (1) the location of all outfalls for stormwater discharges associated with concrete batch plants that are authorized under this permit;
 - (2) a depiction of the drainage area and the direction of flow to the outfall(s);
 - (3) structural controls used within the drainage area(s);
 - (4) the locations of the following areas associated with concrete batch plants that are exposed to precipitation: vehicle and equipment maintenance activities (including fueling, repair, and storage areas for vehicles and equipment scheduled for maintenance); areas used for the treatment, storage, or disposal of wastes; liquid storage tanks; material processing and storage areas; and loading and unloading areas; and
 - (5) the locations of the following: any bag house or other dust control device(s); recycle/sedimentation pond, clarifier or other device used for the treatment of facility wastewater (including the areas that drain to the treatment device); areas with significant materials; and areas where major spills or leaks have occurred.
- (b) **Inventory of Exposed Materials** – A list of materials handled at the concrete batch plant that may be exposed to stormwater and that have a potential to

the SWP3, and at a minimum, must consist of one training prior to the initiation of operation of the concrete batch plant.

- (e) Record Keeping and Internal Reporting Procedures - A description of spills and similar incidents, plus additional information that is obtained regarding the quality and quantity of stormwater discharges, must be included in the SWP3. Inspection and maintenance activities must be documented and records of those inspection and maintenance activities must be incorporated in the SWP3.
 - (f) Management of Runoff - The SWP3 shall contain a narrative consideration for reducing the volume of runoff from concrete batch plants by diverting runoff or otherwise managing runoff, including use of infiltration, detention ponds, retention ponds, or reusing of runoff.
3. Comprehensive Compliance Evaluation – At least once per year, one or more qualified personnel (i.e., a person or persons with knowledge of this general permit, the concrete batch plant, and the SWP3 related to the concrete batch plant(s) for the site) shall conduct a compliance evaluation of the plant. The evaluation must include the following.
- (a) Visual examination of all areas draining stormwater associated with regulated concrete batch plants for evidence of, or the potential for, pollutants entering the drainage system. These include but are not limited to: cleaning areas, material handling areas, above ground storage tanks, hoppers or silos, dust collection/containment systems, and truck wash down and equipment cleaning areas. Measures implemented to reduce pollutants in runoff (including structural controls and implementation of management practices) must be evaluated to determine if they are effective and if they are implemented in accordance with the terms of this permit and with the permittee's SWP3. The operator shall conduct a visual inspection of equipment needed to implement the SWP3, such as spill response equipment.
 - (b) Based on the results of the evaluation, the following must be revised as appropriate within two weeks of the evaluation: the description of potential pollutant sources identified in the SWP3 (as required in Part IV.B.1., "Description of Potential Pollutant Sources"); and pollution prevention measures and controls identified in the SWP3 (as required in Part IV.B.2., "Measures and Controls"). The revisions may include a schedule for implementing the necessary changes.
 - (c) The permittee shall prepare and include in the SWP3 a report summarizing the scope of the evaluation, the personnel making the evaluation, the date(s) of the evaluation, major observations relating to the implementation of the SWP3, and actions taken in response to the findings of the evaluation. The report must identify any incidents of noncompliance. Where the report does not identify incidences of noncompliance, the report must contain a statement that the evaluation did not identify any incidence(s), and the report must be signed according to 30 TAC §305.128, relating to Signatories to Reports.
 - (d) The Comprehensive Compliance Evaluation may substitute for one of the required inspections delineated in Part IV.B.2.(c) of this general permit.

Section C. Prohibition of Wastewater Discharges

Wastewater discharges associated with concrete production including wastewater disposal by land application are not authorized under this general permit. These wastewater discharges must be authorized under an alternative TCEQ water quality permit or otherwise disposed of in an authorized manner. Discharges of concrete truck wash out at construction sites may be authorized if conducted in accordance with the requirements of Part V of this general permit.

Part V. Concrete Truck Wash Out Requirements

This general permit authorizes the wash out of concrete trucks at construction sites regulated under Sections II.E.1., 2., and 3. of this general permit, provided the following requirements are met. Authorization is limited to the land disposal of wash out water from concrete trucks. Any other direct discharge of concrete production waste water must be authorized under a separate TCEQ general permit or individual permit.

1. Direct discharge of concrete truck wash out water to surface water in the state, including discharge to storm sewers, is prohibited by this general permit.
2. Concrete truck wash out water shall be discharged to areas at the construction site where structural controls have been established to prevent direct discharge to surface waters, or to areas that have a minimal slope that allow infiltration and filtering of wash out water to prevent direct discharge to surface waters. Structural controls may consist of temporary berms, temporary shallow pits, temporary storage tanks with slow rate release, or other reasonable measures to prevent runoff from the construction site.
3. Wash out of concrete trucks during rainfall events shall be minimized. The direct discharge of concrete truck wash out water is prohibited at all times, and the operator shall insure that its BMPs are sufficient to prevent the discharge of concrete truck wash out as the result of rainfall or stormwater runoff.
4. The discharge of wash out water must not cause or contribute to groundwater contamination.
5. If a SWP3 is required to be implemented, the SWP3 shall include concrete wash out areas on the associated site map.

Part VI. Retention of Records

The permittee must retain the following records for a minimum period of three (3) years from the date that a NOT is submitted as required by Part II.E.3. For activities in which an NOT is not required, records shall be retained for a minimum period of three (3) years from the date that the operator terminates coverage under Section II.F.3. of this permit. Records include:

1. A copy of the SWP3;
2. All reports and actions required by this permit, including a copy of the construction site notice;
3. All data used to complete the NOI, if an NOI is required for coverage under this general permit; and
4. All records of submittal of forms submitted to the operator of any MS4 receiving the discharge and to the secondary operator of a large construction site, if applicable.

Part VII. Standard Permit Conditions

1. The permittee has a duty to comply with all permit conditions. Failure to comply with any permit condition is a violation of the permit and statutes under which it was issued, and is grounds for enforcement action, for terminating, revoking, or denying coverage under this general permit, or for requiring a discharger to apply for and obtain an individual TPDES permit.
2. Authorization under this general permit may be suspended or revoked for cause. Filing a notice of planned changes or anticipated non-compliance by the permittee does not stay any permit condition. The permittee must furnish to the executive director, upon request and within a reasonable time, any information necessary for the executive director to determine whether cause exists for revoking, suspending, or

affect the quality of stormwater discharges associated with concrete batch plants that are authorized under this general permit.

- (c) **Spills and Leaks** - A list of significant spills and leaks of toxic or hazardous pollutants that occurred in areas exposed to stormwater and that drain to stormwater outfalls associated with concrete batch plants authorized under this general permit must be developed, maintained, and updated as needed.
 - (d) **Sampling Data** - A summary of existing stormwater discharge sampling data must be maintained, if available.
2. **Measures and Controls** - The SWP3 must include a description of management controls to regulate pollutants identified in the SWP3's "Description of Potential Pollutant Sources" from Part IV.B.1.(a) of this permit, and a schedule for implementation of the measures and controls. This must include, at a minimum:
- (a) **Good Housekeeping** - Good housekeeping measures must be developed and implemented in the area(s) associated with concrete batch plants.
 - (1) Operators must prevent or minimize the discharge of spilled cement, aggregate (including sand or gravel), settled dust, or other significant materials from paved portions of the site that are exposed to stormwater. Measures used to minimize the presence of these materials may include regular sweeping or other equivalent practices. These practices must be conducted at a frequency that is determined based on consideration of the amount of industrial activity occurring in the area and frequency of precipitation, and shall occur at least once per week when cement or aggregate is being handled or otherwise processed in the area.
 - (2) Operators must prevent the exposure of fine granular solids, such as cement, to stormwater. Where practicable, these materials must be stored in enclosed silos, hoppers or buildings, in covered areas, or under covering.
 - (b) **Spill Prevention and Response Procedures** - Areas where potential spills that can contribute pollutants to stormwater runoff, and the drainage areas from these locations, must be identified in the SWP3. Where appropriate, the SWP3 must specify material handling procedures, storage requirements, and use of equipment. Procedures for cleaning up spills must be identified in the SWP3 and made available to the appropriate personnel.
 - (c) **Inspections** - Qualified facility personnel (i.e., a person or persons with knowledge of this general permit, the concrete batch plant, and the SWP3 related to the concrete batch plant(s) for the site) must be identified to inspect designated equipment and areas of the facility specified in the SWP3. The inspection frequency must be specified in the SWP3 based upon a consideration of the level of concrete production at the facility, but must be a minimum of once per month while the facility is in operation. The inspection must take place while the facility is in operation and must, at a minimum, include all areas that are exposed to stormwater at the site, including material handling areas, above ground storage tanks, hoppers or silos, dust collection/containment systems, truck wash down and equipment cleaning areas. Follow-up procedures must be used to ensure that appropriate actions are taken in response to the inspections. Records of inspections must be maintained and be made readily available for inspection upon request.
 - (d) **Employee Training** - An employee training program must be developed to educate personnel responsible for implementing any component of the SWP3, or personnel otherwise responsible for stormwater pollution prevention, with the provisions of the SWP3. The frequency of training must be documented in

terminating authorization under this permit. Additionally, the permittee must provide to the executive director, upon request, copies of all records that the permittee is required to maintain as a condition of this general permit.

3. It is not a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the permit conditions.
4. Inspection and entry shall be allowed under TWC Chapters 26-28, Texas Health and Safety Code §§361.032-361.033 and 361.037, and 40 CFR §122.41(i). The statement in TWC §26.014 that commission entry of a facility shall occur according to an establishment's rules and regulations concerning safety, internal security, and fire protection is not grounds for denial or restriction of entry to any part of the facility or site, but merely describes the commission's duty to observe appropriate rules and regulations during an inspection.
5. The discharger is subject to administrative, civil, and criminal penalties, as applicable, under TWC Chapter 7 for violations including but not limited to the following:
 - (a) negligently or knowingly violating the federal CWA §§301, 302, 306, 307, 308, 318, or 405, or any condition or limitation implementing any sections in a permit issued under CWA §402, or any requirement imposed in a pretreatment program approved under CWA §§402(a)(3) or 402(b)(8);
 - (b) knowingly making any false statement, representation, or certification in any record or other document submitted or required to be maintained under a permit, including monitoring reports or reports of compliance or noncompliance; and
 - (c) knowingly violating §303 of the federal CWA, and placing another person in imminent danger of death or serious bodily injury.
6. All reports and other information requested by the executive director must be signed by the person and in the manner required by 30 TAC §305.128 (relating to Signatories to Reports).
7. Authorization under this general permit does not convey property or water rights of any sort and does not grant any exclusive privilege.
8. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.
9. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.
10. The permittee shall comply with the reporting requirements in 40 CFR §122.41(l), as applicable.

Part VIII. Fees

1. A fee of must be submitted along with the NOI:
 - (a) \$325 if submitting a paper NOI, or
 - (b) \$225 if submitting an NOI electronically.

2. Fees are due upon submission of the NOI. An NOI will not be declared administratively complete unless the associated fee has been paid in full.
3. No separate annual fees will be assessed for this general permit. The Water Quality Annual Fee has been incorporated into the NOI fees as described above.

Appendix A: Automatic Authorization

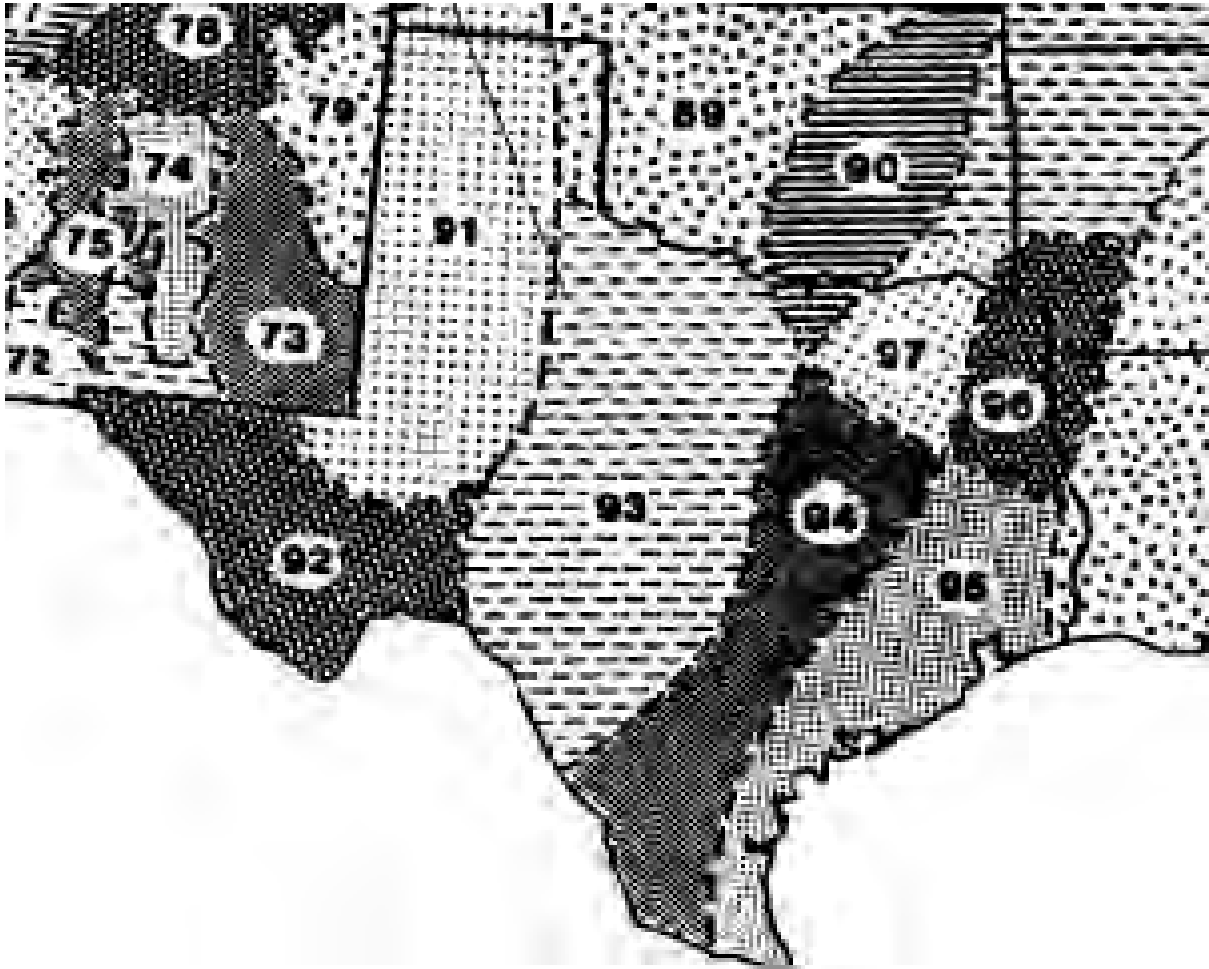
Periods of Low Erosion Potential by County – Eligible Date Ranges

Andrews: Nov. 15 - Apr. 30	Ector: Nov. 15 - Apr. 30
Archer: Dec. 15 - Feb. 14	Edwards: Dec. 15 - Feb. 14
Armstrong: Nov. 15 - Apr. 30	El Paso: Jan. 1 - Jul. 14, or May 15 - Jul. 31, or Jun. 1 - Aug. 14, or Jun. 15 - Sept. 14, or Jul. 1 - Oct. 14, or Jul. 15 - Oct. 31, or Aug. 1 - Apr. 30, or Aug. 15 - May 14, or Sept. 1 - May 30, or Oct. 1 - Jun. 14, or Nov. 1 - Jun. 30, or Nov. 15 - Jul. 14
Bailey: Nov. 1 - Apr. 30, or Nov. 15 - May 14	Fisher: Dec. 15 - Feb. 14
Baylor: Dec. 15 - Feb. 14	Floyd: Nov. 15 - Apr. 30
Borden: Nov. 15 - Apr. 30	Foard: Dec. 15 - Feb. 14
Brewster: Nov. 15 - Apr. 30	Gaines: Nov. 15 - Apr. 30
Briscoe: Nov. 15 - Apr. 30	Garza: Nov. 15 - Apr. 30
Brown: Dec. 15 - Feb. 14	Glasscock: Nov. 15 - Apr. 30
Callahan: Dec. 15 - Feb. 14	Hale: Nov. 15 - Apr. 30
Carson: Nov. 15 - Apr. 30	Hall: Feb. 1 - Mar. 30
Castro: Nov. 15 - Apr. 30	Hansford: Nov. 15 - Apr. 30
Childress: Dec. 15 - Feb. 14	Hardeman: Dec. 15 - Feb. 14
Cochran: Nov. 1 - Apr. 30, or Nov. 15 - May 14	Hartley: Nov. 15 - Apr. 30
Coke: Dec. 15 - Feb. 14	Haskell: Dec. 15 - Feb. 14
Coleman: Dec. 15 - Feb. 14	Hockley: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
Collingsworth: Jan. 1 - Mar. 30, or Dec. 1 - Feb. 28	Howard: Nov. 15 - Apr. 30
Concho: Dec. 15 - Feb. 14	Hudspeth: Nov. 1 - May 14
Cottle: Dec. 15 - Feb. 14	Hutchinson: Nov. 15 - Apr. 30
Crane: Nov. 15 - Apr. 30	Irion: Dec. 15 - Feb. 14
Crockett: Nov. 15 - Jan. 14, or Feb. 1 - Mar. 30	Jeff Davis: Nov. 1 - Apr. 30 or Nov. 15 - May 14
Crosby: Nov. 15 - Apr. 30	Jones: Dec. 15 - Feb. 14
Culberson: Nov. 1 - May 14	Kent: Nov. 15 - Jan. 14 or Feb. 1 - Mar. 30
Dallam: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30	Kerr: Dec. 15 - Feb. 14
Dawson: Nov. 15 - Apr. 30	Kimble: Dec. 15 - Feb. 14
Deaf Smith: Nov. 15 - Apr. 30	King: Dec. 15 - Feb. 14
Dickens: Nov. 15 - Jan. 14, or Feb. 1 - Mar. 30	Kinney: Dec. 15 - Feb. 14
Dimmit: Dec. 15 - Feb. 14	Knox: Dec. 15 - Feb. 14
Donley: Jan. 1 - Mar. 30, or Dec. 1 - Feb. 28	Lamb: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
Eastland: Dec. 15 - Feb. 14	

Loving: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Lubbock: Nov. 15 - Apr. 30
Lynn: Nov. 15 - Apr. 30
Martin: Nov. 15 - Apr. 30
Mason: Dec. 15 - Feb. 14
Maverick: Dec. 15 - Feb. 14
McCulloch: Dec. 15 - Feb. 14
Menard: Dec. 15 - Feb. 14
Midland: Nov. 15 - Apr. 30
Mitchell: Nov. 15 - Apr. 30
Moore: Nov. 15 - Apr. 30
Motley: Nov. 15 - Jan. 14, or Feb. 1 - Mar. 30
Nolan: Dec. 15 - Feb. 14
Oldham: Nov. 15 - Apr. 30
Parmer: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
Pecos: Nov. 15 - Apr. 30
Potter: Nov. 15 - Apr. 30
Presidio: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Randall: Nov. 15 - Apr. 30
Reagan: Nov. 15 - Apr. 30
Real: Dec. 15 - Feb. 14
Reeves: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Runnels: Dec. 15 - Feb. 14
Schleicher: Dec. 15 - Feb. 14

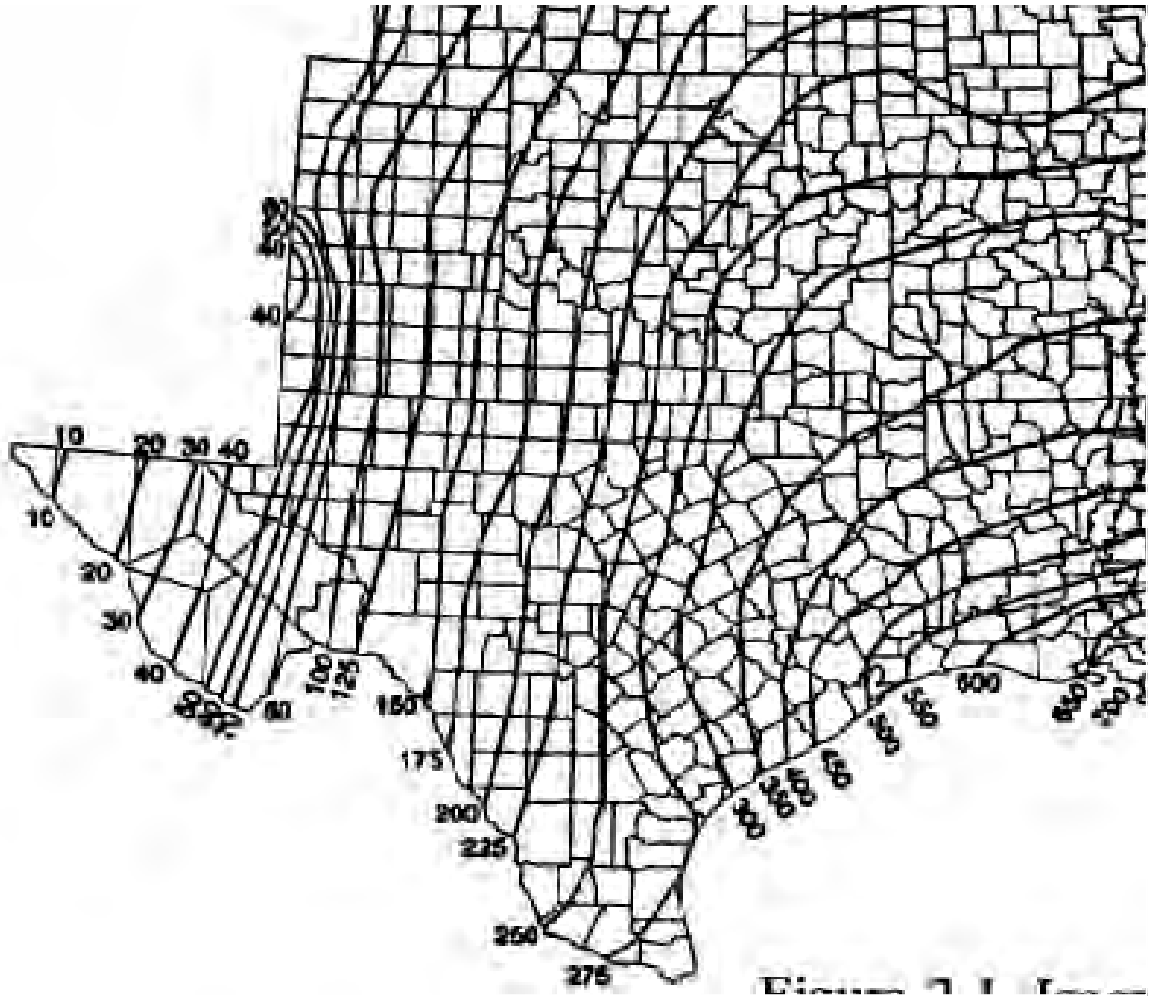
Scurry: Nov. 15 - Apr. 30
Shackelford: Dec. 15 - Feb. 14
Sherman: Nov. 15 - Apr. 30
Stephens: Dec. 15 - Feb. 14
Sterling: Nov. 15 - Apr. 30
Stonewall: Dec. 15 - Feb. 14
Sutton: Dec. 15 - Feb. 14
Swisher: Nov. 15 - Apr. 30
Taylor: Dec. 15 - Feb. 14
Terrell: Nov. 15 - Apr. 30
Terry: Nov. 15 - Apr. 30
Throckmorton: Dec. 15 - Feb. 14
Tom Green: Dec. 15 - Feb. 14
Upton: Nov. 15 - Apr. 30
Uvalde: Dec. 15 - Feb. 14
Val Verde: Nov. 15 - Jan. 14, or Feb. 1 - Mar. 30
Ward: Nov. 1 - Apr. 14, or Nov. 15 - Apr. 30
Wichita: Dec. 15 - Feb. 14
Wilbarger: Dec. 15 - Feb. 14
Winkler: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Yoakum: Nov. 1 - Apr. 30, or Nov. 15 - May 14
Young: Dec. 15 - Feb. 14
Wheeler: Jan. 1 - Mar. 30, or Dec. 1 - Feb. 28
Zavala: Dec. 15 - Feb. 14

Appendix B: Erosivity Index (EI) Zones in Texas



Adapted from Chapter 2 of USDA Agriculture Handbook 703: "Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)," U.S. Department of Agriculture, Agricultural Research Service

Appendix C: Isoerodent Map



Adapted from Chapter 2 of USDA Agriculture Handbook 703: "Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)," U.S. Department of Agriculture, Agricultural Research Service

Appendix D: Erosivity Indices for EI Zones in Texas

Periods:

EI #	1/1	1/16	1/31	2/15	3/1	3/16	3/31	4/15	4/30	5/15	5/30	6/14	6/29	7/14	7/29	8/13	8/28	9/12	9/27	10/12	10/27	11/11	11/26	12/11	12/31
89	0	1	1	2	3	4	7	2	8	27	38	48	55	62	69	76	83	90	94	97	98	99	100	100	100
90	0	1	2	3	4	6	8	13	21	29	37	46	54	60	65	69	74	81	87	92	95	97	98	99	100
91	0	0	0	0	1	1	1	2	6	16	29	39	46	53	60	67	74	81	88	95	99	99	100	100	100
92	0	0	0	0	1	1	1	2	6	16	29	39	46	53	60	67	74	81	88	95	99	99	100	100	100
93	0	1	1	2	3	4	6	8	13	25	40	49	56	62	67	72	76	80	85	91	97	98	99	99	100
94	0	1	2	4	6	8	10	15	21	29	38	47	53	57	61	65	70	76	83	88	91	94	96	98	100
95	0	1	3	5	7	9	11	14	18	27	35	41	46	51	57	62	68	73	79	84	89	93	96	98	100
96	0	2	4	6	9	12	17	23	30	37	43	49	54	58	62	66	70	74	78	82	86	90	94	97	100
97	0	1	3	5	7	10	14	20	28	37	48	56	61	64	68	72	77	81	86	89	92	95	98	99	100
106	0	3	6	9	13	17	21	27	33	38	44	49	55	61	67	71	75	78	81	84	86	90	94	97	100

* Each period begins on the date listed in the table above and lasts until the day before the following period. The final period begins on December 11 and ends on December 31.

Table adapted from Chapter 2 of USDA Agriculture Handbook 703: "Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)," U.S. Department of Agriculture, Agricultural Research Service