Broadway and Ogden Lane Improvements

ADDENDUM 1
February 4, 2026

Update to Respondent:

This addendum, applicable to work referenced above, is an amendment to the bid proposal, plans and specifications and as such will be a part of and included in the Contract Documents.

CHANGES TO THE SOLICITATION

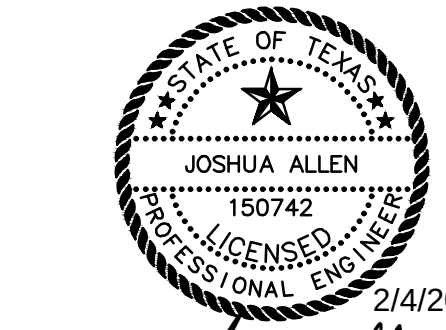
1. **REQUEST FOR PROPOSALS.** Remove document in its entirety and replace with the latest document available on CIVCAST named "Alamo Heights - Broadway Ogden Construction RFP_V2.pdf" (also attached for reference).
2. **EXHIBIT I - PLANS.** Remove document in its entirety and replace with the latest document available on CIVCAST named "Exhibit I_100%_CD_PLANS_BROADWAY AND OGDEN S&S_V2.pdf" (also attached for reference).
3. **EXHIBIT III – PRICING WORKBOOK.** Remove document in its entirety and replace with the latest document available on CIVCAST named "Exhibit III_Pricing Workbook_V2.xlsx" (also attached for reference).
4. **EXHIBIT IV – PROPOSAL RESPONSE ATTACHMENT FORM.** Remove document in its entirety and replace with the latest document available on CIVCAST named "Exhibit IV - Proposal Response Attachment Form_V2.pdf" (also attached for reference).
5. **EXHIBIT V – GENERAL CONDITIONS & SUPPLEMENTARY CONDITIONS.** Remove document in its entirety and replace with the latest document available on CIVCAST named "Exhibit V_General Conditions & Supplementary Conditions_V2.pdf" (also attached for reference).
6. **EXHIBIT VI – SPECIAL PROVISIONS TO TECHNICAL SPECIFICATIONS AND SPECIAL SPECIFICATIONS.** Remove document in its entirety and replace with the latest document available on CIVCAST named "Exhibit VI_Special Provisions to Technical specifications and Special Specifications_V2.pdf" (also attached for reference).

END OF ADDENDUM 1

This Addendum, including these two (2) pages, is 486 (four hundred and eighty-six) pages with attachments in its entirety.

Attachments:

Alamo Heights – Broadway Ogden Construction RFP_V2 (33 pages)
Exhibit I_100%_CD_PLANS_BROADWAY AND OGDEN S&S_V2 (83 pages)
Exhibit III_Pricing Workbook_V2 (3 pages)
Exhibit IV - Proposal Response Attachment Form_V2 (22 pages)
Exhibit V_General Conditions & Supplementary Conditions_V2 (99 pages)
Exhibit VI_Special Provisions to Technical specifications and Special Specifications_V2 (244 pages)



2/4/2026

Joshua Allen, PE
WGI, Inc.

CITY OF ALAMO HEIGHTS

Request for Proposal (RFP)
for
General Construction for Broadway and Ogden Lane Improvements

February 4, 2026

SUBMITTAL DEADLINE:
March 13, 2026 @ 2:00 P.M. CST

Table of Contents

CITY OF ALAMO HEIGHTS Request for Proposal (RFP) 4

1 Introduction 5
1.1 Project Overview 5
1.2 Project Scope and Services 8
1.3 Project Budget 9
1.4 Project Timeline 9

2 Respondent Proposal Logistics 10
2.1 Procurement Events and Timeline 10
2.2 Questions 10
2.3 Response Submission 11
2.4 Checklist of RFP Response Materials 12
2.5 Fee Proposals Shall Read as Follows: 12
2.6 Evaluation and Scoring of Proposals 15
2.7 Short-List Interview Sessions 15
2.8 Rejection of Submissions 15
2.9 Performance and Payment Bonds 15
2.10 Confidentiality 17
2.11 Disclosure of Information 17

3 Wage Rates 17

4 General Conditions of the Contract 17

5 Insurance and Indemnification 17

6 Prohibited Respondents 19

7 Disclosure of Conflict of Interest 20

8 Disclosure of Interested Parties 20

9 Personal Interest 21

10 Award 21

11 Exhibits 21

12 Performance and Payment Bond Forms 23

13 Conflict of Interest Questionnaire 29

14 Special Conditions 31

TECHNICAL SPECIFICATIONS

CITY OF ALAMO HEIGHTS MUNICIPAL CODE

https://ecode360.com/AL6722

SAWS SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION (February 2021 Edition)

https://apps.saws.org/Business_Center/Specs/constspecs/

CITY OF SAN ANTONIO (COSA) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (Latest Edition)

https://www.sanantonio.gov/PublicWorks/Current-Vendor-Resources/Standard-Specifications-and-Details

TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES (2024)

https://www.txdot.gov/content/dam/docs/specifications/2024/spec-book-0924.pdf

CITY OF ALAMO HEIGHTS

REQUEST FOR PROPOSAL (RFP)

GENERAL CONSTRUCTION FOR BROADWAY AND OGDEN LANE IMPROVEMENTS

The City of Alamo Heights, Texas ("City") is soliciting proposals from qualified firms to provide general construction services for Broadway and Ogden Lane Improvements.

City Contact
Phil Laney
Assistant City Manager
Phone: 210-832-3331
planey@alamoheightstx.gov

Mailing/Physical Address
City of Alamo Heights
6116 Broadway
San Antonio, TX 78209

Due to City of Alamo Heights by 2:00 PM, Central Daylight Time (CDT) on Friday, March 13, 2026

Written questions due to City no later than: Friday, February 27, 2026, at 5:00 PM CDT

1 Introduction

The City of Alamo Heights ("Alamo Heights") is located just 4.5 miles north of downtown San Antonio. Alamo Heights is surrounded by San Antonio, the seventh largest metropolitan area in the U.S and is adjacent to the cities of Terrell Hills and Olmos Park. The city encompasses a total area of 2.1 square miles and sits 807 feet above sea level.

Alamo Heights is a home-rule municipality that operates under a municipal charter that has been adopted or amended as authorized by Article XI, Section 5, of the Texas Constitution. The Alamo Heights City Charter was adopted in 1954 and amended in November 2007 and May 2011. Pursuant to its provisions and subject only to the limitations imposed by the state constitution and state law, all power of the City are vested in the elective City Council, which enacts local legislation, adopts budgets, determines policies, and appoints the highest-level City officials. The City Council executes the laws and oversees the government of the City. The City is a full-service city and provides and wide variety of services to citizens and visitors in the Alamo Heights area. Services include police, community development, building inspections, code enforcement, public works (owner and operator of water system and wastewater system), and general administrative activities.

The City of Alamo Heights follows a Council-Manager form of government as provided by the City Charter. Alamo Heights is governed by a Mayor and five (5) Councilmembers who serve staggered two-year terms. The City has three (3) boards and commissions: the Planning & Zoning Commission, Board of Adjustment, and Architectural Review Board.

1.1 Project Overview

The Scope of Services includes general construction services for Broadway and Ogden Lane Improvements project. The City of Alamo Heights has collaborated on this project with WGI, the City's contracted special projects engineer, and includes landscape architecture designs from TBG Partners. The improvements will be at the intersection of Broadway and Ogden Lane and encompass adjacent areas north and south of this intersection on the west side of Broadway.

Since 2023 the City of Alamo Heights City Council has pursued opportunities to identify public improvement projects that would result in increased beautification and safety in the community. Partnering with TBG, the City explored multiple locations, including the intersection of Broadway and Ogden Lane. The Broadway and Ogden Lane intersection generates significant activity due to its proximity to Cambridge Elementary School, a commercial center anchored by a popular coffee shop, and a key ingress and egress point from the Broadway commercial corridor into the neighborhoods west of Broadway.

After a few years of public input and Council feedback, the City contracted with WGI in September 2025 to finalize the proposed design of the Broadway and Ogden Lane Improvements project. This location offered an opportunity to make multiple safety and beautification improvements.

To date, WGI and associated design consultants have completed the Design Package, including the 100% construction set of drawings along with the written project specifications. **The documents can be reviewed and downloaded online at CIVCASTUSA.COM (Project ID: 2026_78209_01).**

The design builds upon four (4) main goals for the project:

- Realign the intersection of Broadway and Ogden Lane
- Create public gathering space in the form of a plaza or patio on the west side of Broadway
- Construct dedicated pedestrian crossing of Broadway featuring pedestrian hybrid beacon and install safe pedestrian infrastructure to cross Ogden Lane
- Incorporate landscape design to maintain shade within the public space, provide beautification, and to facilitate stormwater management

The current intersection configuration includes multiple pathways from Ogden onto Broadway. In addition, the existing roadway from Ogden includes a raised hardscape area featuring an existing oak tree. The large length of roadway features complicated sightlines with the constructed hardscape and nearby on-street parking. Moreover, there is no clear pedestrian crossing across Ogden. Project improvements will realign Ogden to intersect with Broadway at a 90-degree angle and provide a dedicated pedestrian pathway. The realignment of the intersection and repurposing a portion of the roadway geometrics provides opportunities for plaza and patio spaces, offering the public with a space for gathering and use by patrons of area businesses. The third major improvement component includes replacing a mid-block crossing of Broadway at Circle St. and installing a dedicated pedestrian hybrid beacon (PHB) at the Ogden Lane intersection. The new pedestrian beacon is intended to stop traffic on Broadway, increasing the safety of crossing pedestrians. Finally, stormwater runoff travels east on Odgen and is conveyed south onto Broadway along the existing edge of pavement. The proposed design allows stormwater to travel through the plaza on the south side of Ogden via a stormwater management swale.

The Broadway and Ogden Lane improvements project includes the following components:

- Realign the intersection of Ogden Lane at Broadway to consolidate into a single point for two-way traffic, intersecting with Broadway at a 90-degree angle.
- Install widened sidewalk zones along Broadway and Ogden Ln.
- The area abandoned by the realigned intersection will be converted into public patio and plaza spaces. Install a stormwater management bioswale in the south plaza that is located and sized to mimic existing flow conditions.
- Within the patio and plaza spaces, install landscaped planting zones, bounded by hardscape such as buffer walls.

- In the south plaza, incorporate and spotlight the existing memorial sign honoring President John F. Kennedy's visit to the San Antonio area the day before his assassination.
- Install pedestrian-focused mid-block crossing across Broadway, to include mast arms and a pedestrian refuge island in the middle of Broadway.
- Relocate targeted utility poles in coordination with CPS energy.
- Install pavement, enhanced signage and pavement markings, and lighting to maximize visibility and safety.

1.2 Project Scope and Services

The purpose of this RFP is to solicit construction fee proposals for the full development and construction of the Broadway and Ogden Lane Improvements project. The proposal shall include the following:

A) Pre-Construction Services

- Development of Construction Schedule and Budget at final phase of Design;
- Provide recommendations on construction feasibility;
- Advise on availability of materials and labor;
- Assist in value engineering services for the project, if necessary; and
- Schedule and conduct pre-construction meeting with owner, engineer and contractor.

B) General Contractor Services

- Provide and maintain a construction schedule;
- Full-time onsite supervision and field engineering;
- A monthly report on engineering, purchasing, construction, schedule, and cost forecast;
- Define any self-performed work and include plan to secure a minimum of one bid to compare costs of self-performed work to;
- Receive and award subcontractor bids;
- Supervise and direct the work of subcontractors;
- Provide a project superintendent on a full-time basis for the duration of the project;
- Provide and maintain a schedule of values; submit pay applications on a monthly basis;
- Schedule and conduct weekly owner- architect-contractor (OAC) meetings;
- Provide client with the post construction services, including maintenance training, and warranty inspections for the project;
- Shop drawing review;
- Permitting and inspections as required;
- City of Alamo Heights building department interface;
- Quality assurance and quality control; and
- Proactive safety program.

1.3 Project Budget

The estimated project cost budget for all project components is between $1.2 million – $1.5 million.

1.4 Project Timeline

All work specified in these Contract Documents shall be completed within **240 calendar days** from the construction start date indicated on the written Authorization to proceed.

- April 2026 – City Council approval of selected Respondent (NTP Estimated April 15, 2026)
- Late April/Early May 2026 – Contract execution & project deployment kickoff
- Late May 2026 – Groundbreaking
- August 2026 – Substantial completion on proposed pavement
- December 2026 - Substantial completion on all proposed work

The project area borders a public elementary school. There is a high volume of traffic at morning drop-off and afternoon pick-up times, as well as the possibility of vehicular queuing in the project area. **The following project timeline is designed to maximize construction during the summer months when the adjacent school is not in session.** According to the most recent school district calendar, the school year ends on May 22, 2026, and the 2026-2027 school year begins August 19, 2026.

Respondent should pay special attention to infrastructure improvements that prioritize traffic accessing through the project area by the time school is in session, specifically ensuring the proposed asphalt and curbs are in place along Ogden Ln. prior to the beginning of the 2026-2027 school year. In addition, selected Respondent should prioritize timely coordination with adjoining utilities and suppliers for utility pole relocation and crossing signal installation prior to the commencement of roadway work.

2 Respondent Proposal Logistics

This document and all attachments and exhibits referenced within comprise a Request for Proposal (RFP) for general construction services for the Broadway and Ogden Lane Improvements project. **All documents can be found at CIVCASTUSA.com (Project ID: 2026_78209_01)**.

Proposals must be submitted in accordance with instructions given in this document. All information requested must be submitted. Failure to do so may result in the proposal being considered non-responsive and, therefore, rejected.

2.1 Procurement Events and Timeline

This project will follow the schedule below defined in Table 1.

Table 1: Procurement Schedule

#	Activity	Date
1	Issue RFP document	February 4, 2026
2	Pre-Bid Meeting / Site Visit (non-mandatory; location at project site)	February 19, 2026, at 10:00 AM CST
3	Last day to submit questions about the RFP	February 27, 2026
5	Final Q & A addendum posted	March 6, 2026
6	**RFP Response due no later than 2:00 PM CST (Extensions will not be granted)**	**March 13, 2026 No later than 2:00 PM CST**
7	Notification of shortlisted Respondents (if required)	March 2026
8	Onsite Respondent presentations (if required)	March 2026
9	Respondent Selection, PO, and contracting	March 2026
10	Obtain City Council Approval & Contract Execution	April 2026

2.2 Questions

Questions related to this RFP must be emailed to Phil Laney, Assistant City Manager, at planey@alamoheightstx.gov. Questions must be submitted by the date listed in Table 1. Please include "Alamo Heights – Broadway & Odgen Lane Improvements RFP Question" in the email subject line. Respondents are specifically barred from contacting any other City officials or personnel involved in this solicitation for the purpose of discussing this solicitation. Violation may result in respondent disqualification.

Alamo Heights will publish all questions and their answers via one or more addendum. Respondents are required to acknowledge receipt of all addenda in their response.

2.3 Response Submission

Respondents must submit **both electronic and hard copy** RFP responses. Responses in their entirety must be submitted no later than **2:00 PM CST on Friday, March 13, 2026**. It is the sole responsibility of respondents to have packet at designated location prior to the deadline date and time. Any mail delays or other matters causing late receipt are irrelevant and will not excuse late submission. All late RFP responses will be rejected and returned to respondents. Alamo Heights is not responsible for any errors in proposals received. Respondents will only be allowed to alter Proposals after the submittal deadline in response to requests for clarifications by Alamo Heights. Alamo Heights reserves the right to extend the Proposal review period and allow corrections or amendments to be made that are due to minor administrative errors or irregularities, such as errors in typing, transposition or similar administrative errors.

Electronic Responses

Respondents should email RFP responses no later than 2:00 PM CT on Friday, March 13, 2026 to planey@alamoheightstx.gov.

Hard Copy Responses

In addition to the electronic responses, Respondents shall also submit two (2) complete hard copy proposals in a sealed package clearly marked with the project name, "Request for Proposal – Broadway and Ogden Lane Improvements". Hard copies must be delivered by **Friday, March 13, 2026, at 2:00 p.m. CST** to:

Elsa Robles
City Secretary
6116 Broadway
San Antonio, TX 78209

Alamo Heights will not reimburse any expenses incurred by the responder including, but not limited to, expenses associated with the preparation and submission of the response and/or attendance at interviews. Any submittals received after the deadline shall not be opened and will not be considered.

2.4 Checklist of RFP Response Materials

Respondents shall provide the requested documents in the order listed below and follow the described format provided in ***Exhibit IV – Proposal Response Attachment Form***. The intent of the proposal format is to expedite review and evaluation. It is not the intent to constrain Respondents with regard to content, but to assure that the specific requirements set forth in this Solicitation are addressed in a uniform manner amenable to review and evaluation.

The following completed documents from ***Exhibit IV – Proposal Response Attachment Form*** must be provided as part of a proposal:

ATTACHMENT A – PROPOSAL FORM

1. The Proposal Form is included as Attachment A. All blanks on the Proposal Form must be filled by typing, or by writing in blue or black ink. Unfilled blanks may result in the proposal being disqualified.
2. A proposal showing omissions, alterations, conditions, exceptions or other qualifiers which modify the Proposal Form may be rejected as irregular.
3. Prices should be itemized. Unit prices shall be set to no more than two (2) decimal places. The Owner reserves the right to award by item or by lump sum. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

ATTACHMENT B – ORGANIZATION AND BUSINESS INFORMATION

1. Provide general information on your company including the company name, address, website, main telephone number(s) and email address(es) for communication regarding the Bid.
2. Briefly introduce your company, providing a summary of the administration, organization and staffing of your company. Include any information that makes your company unique and sets your company apart from others in your industry.
3. Include indicators of organization size: number of full-time employees, average number of projects per year, number of years in business, estimated revenue, and average project construction cost.
4. Provide the names of subcontractors completing ten percent (10%) or more of the work and include what aspects of the work they are completing and the approximate percentage.

ATTACHMENT C – EXPERIENCE/PAST PERFORMANCE OF RESPONDENT WITH SIMILAR PROJECTS

1. Respondent shall include 3-5 similar current or previous projects completed in the last ten (10) years. Include project owner, name, description, cost, schedule, and personnel, for each relevant project.
2. Indicate whether the original contract price and schedule was met for each project. If not, please explain.
3. Include reference information for each project.

4. If Respondent is proposing the use of a Subcontractor for over fifty percent (50%) of the work or alternate work, at least one of the Projects provided must be representative of that Subcontractors work.

ATTACHMENT D – EXPERIENCE AND QUALIFICATIONS OF PROPOSED KEY PERSONNEL WITH SIMILAR PROJECTS

1. Provide experience and qualifications for the proposed project manager and superintendent including their years of relevant experience, years with company, education, licenses/certifications, and percent availability.
2. Provide a summary of relevant experience for the proposed Project Manager and superintendent that highlights similar projects and their respective role on those projects.

ATTACHMENT E – SAFETY PROGRAM

1. Provide details regarding Workers' Compensation Experience Modification Rate and OSHA 200 Log for the last five (5) years.
2. Complete safety questionnaire. Respondent does not need to submit their Safety Plan at this time. By evaluating the Respondent's safety program, Owner does not endorse or take any responsibility for the effectiveness of the program or any activities to be carried out as part of the program.

ATTACHMENT F – LITIGATION, CLAIMS, AND COMPLIANCE (for Public Sector Owners in Texas)

1. Provide an explanation if the Respondent has defaulted on any project or failed to complete any project.
2. Provide an explanation if the Respondent has been assessed liquidated damages.
3. Provide an explanation if the Respondent has been charged or fined for non-compliance with any state and/or federal regulation.
4. Disclose any relevant civil or criminal judgments, litigation, or pending investigations which involves the Respondent.

ATTACHMENT G – CERTIFICATION AND ACKNOWLEDGEMENT

1. An authorized representative of the Respondent must complete and sign the Certification and Acknowledgment Form.

2.5 Fee Proposals Shall Read as Follows:

Respondent shall complete and submit ***Exhibit III – Pricing Workbook*** in accordance with the instructions contained in this RFP. The price shall remain firm for the duration of the Agreement subject to Owner-approved Change Orders.

The Owner is exempt from all federal excise, state, and local taxes. If billed, the Owner will not remit payment until a corrected invoice is received.

All payments will be processed in accordance with Texas Prompt Payment Act, Texas Government Code, Subtitle F, Chapter 2251, and applicable retainage laws, including Texas Government Code Chapter 2252. The Owner will pay Contractor within thirty (30) calendar days after performance of services was completed, or the day of receipt of a correct invoice for the services, whichever is later.

All payments are subject to retainage as provided in the Contract Documents.

2.6 Evaluation and Scoring of Proposals

Alamo Heights is conducting a best value, guaranteed maximum price procurement based on competitive proposals. Proposal will be evaluated by the Alamo Heights team based on the criteria in Table 2.

Table 2: Evaluation Criteria

#	Criteria	Points
1	Project Cost (*Exhibit III*)	50
2	Relevant Qualifications & Experience (*Exhibit IV*)	35
3	Project Team (*Exhibit IV*)	15

The highest scoring Respondents will be eligible for additional evaluation subject to the approval of Alamo Heights. **A proposal deemed to be not responsive, in the opinion of Alamo Heights, will not be evaluated. Alamo Heights reserves the right to award the most responsible and responsive respondent in the best interest of the City based on price and/or based on best value meeting the requirements for this project. Alamo Heights reserves the right to consider items such as safety record, references, previous performance, delivery time or a criterion specific to this project which the City considers weighted. If the awarded respondent is unable to meet the requirements of the City, services may be awarded to the next best available respondent and continue until a respondent is found that can complete the requirements of the City.**

2.7 Short-List Interview Sessions

Alamo Heights reserves the right to invite one or more Respondents to participate in short-list interview sessions. Information obtained during the short-list interview sessions will be used to finalize evaluations and to select the Respondent with whom to begin contract negotiations.

2.8 Rejection of Submissions

The City of Alamo Heights reserves the right to reject any and all RFPs, to waive irregularities, to request additional information from all Respondents, and further reserves the right to select the RFP that furthers the best interest of the City. This RFP does not obligate the City to enter into an agreement with any Respondent. The City reserves the right to cancel this Request for Proposal at any time, at its discretion.

2.9 Performance and Payment Bonds

The Respondents selected via this RFP shall comply with all applicable state law, including Chapter 2253 of the Texas Government Code, and shall furnish bonds as follows for the Broadway and Ogden Lane Improvements Construction:

1. Performance Bond. The successful Respondent shall provide a performance bond in an amount not less than 100% of the awarded contract amount.

2. Payment Bond. The successful Respondent shall provide a payment bond in an amount not less than 100% of the awarded contract amount, unless the Respondent certifies in writing that it will not utilize any subcontractors, suppliers, or laborers other than its own employees in the performance of the Work.

3. The performance and payment bonds shall be in the form set forth in Section 12 of this RFP.

If the Respondent initially elects not to provide a payment bond based on such certification, any subsequent use of a subcontractor, supplier, or non-employee laborer shall require the Respondent to furnish a payment bond in full compliance with Chapter 2253 of the Texas Government Code, prior to the commencement of any such work. Failure to do so shall constitute a material breach of the Contract.

All required bonds shall be delivered to the City within 10 days after issuance of the Notice of Award and, in all events, prior to execution of the Contract as a condition precedent to issuance of a Notice of Proceed.

The failure of the successful Respondent to supply the required bonds and insurance certificates shall constitute a default, and the City may either award the Contract to the next highest-ranking Respondent or re-advertise for Proposals.

The bonds shall serve as security for the faithful performance of the Contract, and for the payment of all persons, firms, or corporations to whom the Respondent may become legally indebted to for labor, materials, tools, equipment, or services of any nature. Such bonds shall be in the same form as that in Section 12 of this RFP and shall bear the same date as, or a date subsequent to the that of the Agreement. The current power of attorney for the person who signs for any surety company shall be attached to such bonds. These bonds shall be signed by a guaranty or surety company legally authorized to do business in the State of Texas and appearing on the most recently issued (as of the date of the proposal opening) federally qualified U.S. Treasury Circular 570 List of Approved Sureties.

The Respondent shall include the full cost of the performance bond (and payment bond, if applicable) in ***Exhibit III – Pricing Workbook***. No additional compensation shall be allowed for bond premiums.

2.10 Confidentiality

Respondent acknowledges that Alamo Heights is a municipal corporation bound by the public disclosure laws of the State of Texas and that, under Texas Law, Alamo Heights is required to make available all non-exempt public records for inspection and copying. Respondent agrees that in the event Alamo Heights receives a disclosure request for any document submitted by the Respondent, Alamo Heights' sole obligation is to provide Respondent ten (10) days' notice prior to disclosing the document.

2.11 Disclosure of Information

Information made available to the Respondent by Alamo Heights for the performance or administration of this effort shall be used only for those purposes and shall not be used in any other way without the written agreement of the Project Manager.

3 Wage Rates

The Respondents selected via this RFP shall comply with Chapter 2258 of the Texas Government Code ("Texas Prevailing Wage Law"). All persons employed in performance of the Work under the Agreement, or any subcontractors hereunder, shall be paid not less than the general prevailing wage rates of per diem, holiday, and overtime wages prevailing in the locality for Work of a similar character pursuant to Chapter 2258 of the Texas Government Code. The City has adopted the local prevailing and adopted wage rates derived from the most current applicable federal prevailing wage rates for Bexar County, Texas, as published by the United States Department of Labor immediately prior to the execution of the Contract.

4 General Conditions of the Contract

The selected Respondent shall perform the Work in accordance with the General and Supplementary Conditions of the Contract, which shall be based on the Engineers Joint Contract Documents Committee (EJCDC) C-700 and C-800 Series Contract documents, as applicable to the Project. Sample versions of the General Conditions are included in ***Exhibit V – General & Supplementary Conditions of the Contract*** for informational and reference purposes only, to identify the anticipated contractual framework. The City reserves the right, prior to execution of the Contract, to revise, supplement, or modify the General and Supplementary Conditions to the extent required to comply with applicable legal, regulatory, funding, or policy requirements. The final, executed Contract documents, as approved by the City, shall govern and control in the event of any conflict with this RFP or the sample documents.

Submission of a Response to this RFP constitutes the Respondent's acknowledgment that it has reviewed, or had the opportunity to review, the EJCDC based General and Supplementary Conditions referenced herein and has included all associated costs and risks in its Response.

5 Insurance and Indemnification

The selected Respondent shall carry insurance in not less than the following types and amounts for the duration of the Contract and furnish Certificates of Insurance along with copies of policy declaration pages and policy endorsements as evidence thereof. Additional insurance may be required by the City based on the type, scope or size of the project awarded. The cost of such insurance is the Respondent's responsibility. Failure to comply could result in non-award of the contract.

A. Respondent agrees to maintain Worker's Compensation and Employers' Liability Insurance to cover all of its own personnel engaged in performing services for the City under this Contract in the following amounts:

   Worker's Compensation – Texas Statutory
   Employers' Liability -- $100,000.00

B. Architect also agrees to maintain Commercial General Liability, Comprehensive Business Automobile Liability covering claims against Architect for damages resulting from bodily injury, death or property damages from accidents arising in the course of work performed under this Contract in not less than the following amounts:

   Commercial General Liability
   Personal injury and property damage -
   $1,000,000.00 combined single limit each occurrence and
   $2,000,000.00 aggregate

   Comprehensive Business Automobile Liability for all vehicles:
   Bodily injury and property damage -
   $500,000.00 combined single limit each occurrence

C. Architect shall add the City of Alamo Heights as "Additional Insureds" on all required insurance policies, except worker's compensation, employers' liability and professional errors and omissions insurance. The Commercial General Liability Policy and Umbrella Liability Policy shall be of an "occurrence" type policy.

A. Additionally, Respondent agrees to maintain professional errors and omissions liability insurance in the amount of not less than one million dollars ($1,000,000.00) annual aggregate, on a claims made basis, as long as reasonably available in the market place under standard policies.

The selected Respondent shall agree to the following indemnification language:

TO THE FULLEST EXTENT PERMITTED BY LAW, THE CONTRACTOR SHALL INDEMNIFY, HOLD HARMLESS AND DEFEND THE CITY OF ALAMO HEIGHTS, ITS OFFICERS, OFFICIALS, AGENTS, REPRESENTATIVES AND EMPLOYEES, BOTH PAST AND PRESENT, FROM AND AGAINST ANY AND ALL LIABILITY FOR ANY AND ALL CLAIMS, LIENS, SUITS, DEMANDS, AND ACTIONS FOR DAMAGES, JUDGMENTS, INJURIES TO PERSONS (INCLUDING DEATH), PROPERTY DAMAGE (INCLUDING LOSS OF USE), AND EXPENSES, (INCLUDING WITHOUT LIMITATION, COURT COSTS, ATTORNEYS' FEES AND OTHER REASONABLE COSTS OF LITIGATION) ARISING OUT OF, RELATING TO, OR RESULTING FROM CONTRACTOR'S WORK AND THE PERFORMANCE OF THE WORK OR ANY ACTIVITIES CONDUCTED IN CONNECTION WITH OR INCIDENTAL TO THIS CONTRACT AND FROM ANY LIABILITY ARISING OUT OF OR RESULTING FROM INTENTIONAL ACTS OR NEGLIGENCE OF THE CONTRACTOR, INCLUDING ALL SUCH CAUSES OF ACTION BASED UPON COMMON, CONSTITUTIONAL, OR STATUTORY LAW, OR BASED IN WHOLE OR IN PART UPON THE NEGLIGENT OR INTENTIONAL ACTS OR OMISSIONS OF CONTRACTOR, INCLUDING BUT NOT LIMITED TO ITS OFFICERS, AGENTS, EMPLOYEES, SUBCONTRACTORS, LICENSEES, INVITEES, AND OTHER PERSONS DIRECTLY OR INDIRECTLY EMPLOYED BY OR ACTING UNDER THE DIRECTION OR CONTROL OF CONTRACTOR, REGARDLESS OF WHETHER SUCH CLAIM IS CAUSED IN PART BY ANY INDEMNIFIED PARTY, EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW.

6 Prohibited Respondents

1. The City of Alamo Heights will not conduct business with Respondents who have failed to comply with their contracts and have been debarred from doing business with the State of Texas or the federal government.

2. Successful Respondent must affirm, in any resulting contract, that (i) it does not Boycott Israel; and (ii) will not Boycott Israel during the term of any resulting Contract. This section may not apply if the Company is a sole proprietor, a non-profit entity or a governmental entity; and only applies if: (i) the Company has ten (10) or more fulltime employees and (ii) the Contract has a value of $100,000.00 or more to be paid under the terms of the Contract.

3. Successful Respondent must affirm, in any resulting contract, that it is not engaged in business with Iran, Sudan, or a foreign terrorist organization.

4. Successful Respondent must affirm, in any resulting contract, that it does not boycott energy companies, and will not boycott energy companies during the term of the Agreement.

5. Successful Respondent must affirm, in any resulting contract, that it (i) does not have a practice, policy, guidance or directive that discriminates against a firearm entity or firearm trade association; and (ii) will not discriminate against a firearm entity or firearm trade association during the term of the Agreement.

6. Successful Respondent must affirm, in any resulting contract, that it is not (i) owned or controlled by (a) individuals who are citizens of China, Iran, North Korea, Russia, or a designated country; or (b) a company or other entity, including a governmental entity, that is owned or controlled by citizens of or is directly controlled by the government of China, Iran, North Korea, Russia, or a designated country; or (ii) headquartered in China, Iran, North Korea, Russia or a designated country.

7 Disclosure of Conflict of Interest

Effective January 1, 2006, Chapter 176 of the Texas Local Government Code (House Bill 914) requires that any Respondent or person considering doing business with a local government entity disclose the Respondent or person's affiliation or business relationship that might cause a conflict of interest with a local government entity. The Conflict of Interest Questionnaire is available from the Texas Ethics Commission (TEC) at www.ethics.state.tx.us. A copy of the questionnaire is included at the end of this document. Any completed Conflict of Interest Questionnaires should be submitted to the City.

8 Disclosure of Interested Parties

Contracting hereunder may require compliance with §2252.908 Texas Government Code/Disclosure of Interested Parties for contracts that (1) require an action or vote by City Council before the contract may be signed; or (2) have a value of at least $1 million. The law provides that a governmental entity may not enter into certain contracts with a business entity unless the business entity submits a Disclosure of Interested Parties certificate to the governmental entity at the time the business entity submits the signed contract to the governmental entity or state agency.

The process as implemented by TEC is as follows:

1. The Disclosure of Interested Parties certificate must be performed using the Texas Ethics Commission's electronic filing application listing each interested party of which the business entity is aware on Form 1295, obtaining a certification of filing number for this form from the TEC, and printing a copy of it to submit to CITY.

2. The copy of Form 1295 submitted to CITY must contain the unique certification number from the TEC. The form must be filed with CITY pursuant to §2252.908 Texas Government Code, "at the time the business entity submits the signed contract" to CITY.

3. CITY, in turn, will submit a copy of the disclosure form to the TEC not later than the 30th day after the date the City receives the disclosure of interested parties from the business entity.

9 Personal Interest

No officer, employee, independent consultant or elected official of CITY who is involved in the development, evaluation or decision-making process of this Solicitation shall have a financial interest, direct or indirect, in the resulting Agreement. Any willful violation of this Paragraph shall constitute impropriety in office, and any officer or employee guilty thereof shall be subject to disciplinary action up to and including dismissal. In the event a member of the governing body or an appointed board or commission of the CITY belongs to a cooperative association, the CITY may purchase services from the association only if no member of the governing body, board or commission will receive pecuniary benefit from the purchase, other than as reflected as in increase in dividends distributed generally to members of the association. Any violation of this provision with the knowledge, expressed or implied, by the Respondent shall render the Agreement voidable by the CITY. Nevertheless, the CITY may obtain the services under the Agreement if a conflict-of-interest affidavit is filed and the Council member recuses his/herself.

10 Award

The City reserves the right to award the most responsible and responsive respondent in the best interest of the City based on price and/or based on best value meeting the requirements of this RFP. The City reserves the right to consider items such as safety record, references, previous performance, delivery time, or a criterion specific in the RFP which the City considers weighted. The City reserves the right to order from another Respondent in which the City determines an emergency or urgent need becomes necessary. The City of Alamo Heights has the sole, last, and final determination to determine award. The City reserves the right to reject any proposals that do not meet the specifications stated herein or reject all proposals should this project not be approved for any reason.

11 Exhibits

The following information is provided in separate Exhibits, as listed below:

1. Exhibit I – Design Package & 100% Construction Document (CD)
2. Exhibit II – Geotechnical Investigation Report
3. Exhibit III – Pricing Workbook
4. Exhibit IV – Proposal Response Attachment Form
5. Exhibit V – General Conditions & Supplementary Conditions of the Contract
6. Exhibit VI – Construction Contract Special Provisions to Technical Specifications Special Specifications

Exhibit information can be located at CIVCASTUSA.COM (Project ID: 2026_78209_01).

12 Performance and Payment Bond Forms

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT _____
(Name of Contractor)
_____
(Address of Contractor)
a _____
(corporation, partnership, or individual)

hereinafter called Principal, and
_____
(Name of Surety)
_____
(Address of Surety)
hereinafter called Surety, are held and firmly bound unto the CITY OF ALAMO HEIGHTS, TEXAS, hereinafter called OWNER, in liquidated damages (not as a penalty) of _____ Dollars ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a cer tain Contract with the OWNER, dated the ____ day of _____, 2026, a copy of which is hereto attached and made a part hereof, for the construction of the: ___ _____
_____
_____.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one (1) year post-construction workmanship guaranty and materials/equipment warranty period, and if he shall satisfy all claims and demands incurred under such Contract, and **SHALL FULLY INDEMNIFY AND SAVE HARMLESS THE OWNER FROM ALL COSTS AND DAMAGES WHICH IT MAY SUFFER BY REASON OF FAILURE TO DO SO**, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

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

change, extension of time, alteration or addition to the terms of the Contract, or to the WORK, or to the SPECIFICATIONS.

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

This bond is subject to and governed by Section 2253.02 of the Texas Government Code (Vernon's Texas Codes Annotated) and Article 7.19-1 of Vernon's Texas Insurance Code and all amendments thereto.

IN WITNESS WHEREOF, this instrument is executed in triplicate, each counterpart of which shall be deemed an original, this the ____ day of _____, 2026.

ATTEST: _____
(Principal)

_____ By:_____(s)
(Principal) Secretary (Signature)

(SEAL)

_____ _____
(Witness as to Principal) (Address)

_____ _____
(Address)

_____

ATTEST: _____
(Surety)

_____ By:_____
(Surety) Secretary (Attorney-in-Fact)

(SEAL)

_____ _____
(Witness as to Surety) (Address)

_____ _____
(Address)

_____

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

IMPORTANT: Surety companies executing BONDS must be legally authorized by the State Board of Insurance to transact business in the State of Texas.

ATTACH POWER OF ATTORNEY

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT _____
(Name of Contractor)

_____
(Address of Contractor)

a _____
(corporation, partnership, or individual)

hereinafter called Principal, and

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto the CITY OF ALAMO HEIGHTS, TEXAS, hereinafter called OWNER, in liquidated damages (not as a penalty) of _____ Dollars ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain Contract with the OWNER, dated the ____ day of _____, 2026, a copy of which is hereto attached and made a part hereof, for the construction of the: _____

_____
_____.

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials, for or performing labor in, the prosecution of the WORK provided for in such Contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no written change, extension of time, alteration or addition to the terms of the Contract or to WORK to be performed there under, or the SPECIFICATIONS accompanying the same, shall in any ways affect its obligation on this BOND, and it does hereby waive notice of any such written change, extension of time, alteration or addition to the terms of the Contract, or to the WORK, or to the SPECIFICATIONS PROVIDED, FURTHER, that no final settlement between the OWNER

and the CONTRACTOR shall abridge any remaining legal right of any beneficiary hereunder, whose timely filed and legally perfected claim may be unsatisfied.

This bond is subject to and governed by Section 2253.02 of the Texas Government Code (Vernon's Texas Codes Annotated) and Article 7.19-1 of Vernon's Texas Insurance Code and all amendments thereto.

IN WITNESS WHEREOF, this instrument is executed in triplicate, each counterpart of which shall be deemed an original, this the ____ day of _____, 2026.

ATTEST: _____
(Principal)

_____ By:_____(s)
(Principal) Secretary (Signature)

(SEAL)

_____ _____
(Witness as to Principal) (Address)

_____ _____
(Address)

_____

ATTEST: _____
(Surety)

_____ By:_____
(Surety) Secretary (Attorney-in-Fact)

(SEAL)

_____ _____
(Witness as to Surety) (Address)

_____ _____
(Address)

_____

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

IMPORTANT: Surety companies executing BONDS must be legally authorized by the State Board of Insurance to transact business in the State of Texas.

ATTACH POWER OF ATTORNEY

13 Conflict of Interest Questionnaire

CONFLICT OF INTEREST QUESTIONNAIRE — FORM CIQ

For vendor doing business with local governmental entity

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

Name of signatory	Signature	Date

Form provided by Texas Ethics Commission www.ethics.state.tx.us Revised 8/14/2024

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.

Form provided by Texas Ethics Commission www.ethics.state.tx.us Revised 8/14/2024

14 Special Conditions

SC1. A Geotechnical Investigation Report has been developed for the City of Alamo Heights and have been made available for Contractors for informational purposes only. The report has been made available via download of Exhibit II.

SC2. Due to the limits of the work zone within the project site, the working space is restricted.

a. Trench materials and excavated spoils shall be contained within the work zone. At the end of each workday, the Contractor shall backfill and compact all open trenches and either install an all-weather surface or cover all open trenches with steel plates installed flush with the existing pavement. The Contractor shall open the road to traffic at the end of the workday. All excess material and debris shall become the contractor's property and shall be removed from the site at the end of each workday at the Contractor's expense. The Contractor shall ensure staging and storage spoil areas remain clean and that dust control measures are followed to minimize impact to residents in the area. The Contractor shall fully remove all spoils, equipment, trash, and any other items remaining after completion of each phase of the project, and prior to finalization of the overall project.
b. No designated Storage and Staging Area has been secured for the Contractor's use outside of the specified locations within the work zones identified in the Traffic control and phasing plans. This does not prevent the Contractor from securing the use of other property for this purpose, provided the use of such property conforms with all local, state, and federal requirements. The Contractor's storage and staging areas shall be fenced, screened, secured, and maintained at all times in a neat, clean, dust-free, and sanitary condition. Any stockpiled construction materials subject to erosion (dirt, gravel, sand, etc.) shall be covered, sandbagged, or otherwise protected with erosion control measures to prevent erosion and tracking such material onto adjacent streets, inlets, or drains at no additional cost to the City of Alamo Heights. No material or spoils shall be stored within the existing, temporary, or proposed drainage paths. Any unused materials located within the drainage paths shall be removed at the end of each workday.
c. Due to the Project's proximity to residential neighborhoods, commercial areas, and Cambridge Elementary School:
    i. Work hours may be restricted by the City
    ii. Traffic control and pedestrian safety measures shall be continuously maintained
    iii. Flaggers, signage, and temporary access shall be provided as required
    iv. Access for emergency personnel should be maintained at all times
    v. Noise, dust, and debris shall be controlled at all times

SC3. The contractor shall complete all work associated with the installation of the proposed roadway pavement and curb along Ogden Ln. and Broadway during the summer months of school, including but not limited to, mobilization, material and equipment staging, grading, site

asphalt installation, concrete pavement installation, concrete curb installation and pavement markings, between May 23, 2026 and August 18, 2026.

SC4. Due to the project's urban location and site constraints, protection from ongoing construction activities adjacent to existing businesses shall be required. The contractor shall install temporary screened chain-link fencing along the perimeter of construction as directed on the plans unless otherwise directed by the City of Alamo Heights or the Engineer. The contractor shall install temporary cedar fencing adjacent to the commercial business patio at the corner of Broadway and Ogden Ln. as directed on the plans unless otherwise directed by the City of Alamo Heights or the Engineer. Commercial access to the adjacent businesses shall be maintained throughout construction.

SC5. During the preparation for the work for the proposed intersection, the Contractor shall provide 30 calendar days of advanced notification to the City of Alamo Heights Public Works Director, Frank Orta, for coordination with the adjacent business owners and stakeholders prior to mobilizing to the project site and 14 calendar days prior to the commencement of each Phase as described in the plans.

SC6. After selection and prior to commencement of any construction, the Contractor shall attend a coordination meeting with the nearby stakeholders. The Contractor shall communicate construction methods and timelines and answer questions from the community regarding the work occurring within the proposed intersection.

SC7. Construction Phasing and Sequencing: The Contractor may follow the construction sequencing set forth in the Plans and Contract Documents. If the Contractor does not plan to follow the construction sequence included in the Contract Documents (where changes to the construction sequence are allowable), the Contractor shall submit via a submittal the proposed alternative sequence of construction in writing to the City of Alamo Heights and the Consultant for review and approval. It is the Contractor’s responsibility to provide sufficient workforce, materials, and equipment to complete the work in accordance with the Contract duration.

SC8. The City of Alamo Heights will obtain all necessary permits within its jurisdiction for approval. The contractor will be responsible for all other permits, including, but not limited to, the TCEQ Stormwater Permit.

The Contractor is solely responsible for obtaining all other necessary permits, notifications and inspections. The Contractor shall be solely responsible for applying for and securing the permits, sending notifications to the relevant agencies/authorities, and requesting inspections in a timely manner so as not to cause any delays in the construction duration.

The Contractor shall be responsible to prepare and file all documents and forms associated with the Texas Commission on Environmental Quality’s Storm Water Management Program. This includes, but is not limited to, obtaining a Texas Commission on Environmental Quality Storm

Water Permit, Notice of Intent, and Notice of Completion. The Contractor shall be responsible for paying all associated fees.

SC9. Utility Coordination and Relocation: The Respondent shall be responsible for coordination with all utility providers, including CPS Energy and other adjacent utilities, for relocations, adjustments, sequencing, and scheduling necessary to complete the Work. Delays or impacts arising from utility coordination shall not entitle the Respondent to additional compensation. Schedule extensions shall be granted only to the extent delays are caused solely by a City directed change and documented in writing.

SC10. Pedestrian Hybrid Beacon and Signal Work: The Respondent shall be responsible for all coordination, submittals, approvals, fabrication, delivery, and installation related to the Pedestrian Hybrid Beacon and associated traffic control devices.

The City of Alamo Heights has engaged in the advanced procurement of the following materials and will provide them for installation upon request:

- **Addendum will be provided with the exact materials purchased.**

SC11. Safety Program Requirements: The Respondent shall maintain a site-specific safety program addressing public access, pedestrian safety, traffic control, and worker protection.

SC12. Public Information: All competitive sealed proposals are subject to release as public information unless the proposal or specific parts of the proposal can be shown to be exempt from the Texas Public Information Act. Respondents are advised to consult with their legal counsel regarding disclosure issues and take the appropriate precautions to safeguard trade secrets or any other proprietary information. The City assumes no obligation or responsibility for asserting legal arguments on behalf of potential Respondents.

SC13. Lighting Allowance: This item shall be an allowance for construction and materials costs associated with installing additional site lighting along proposed walkways, to be further coordinated with the Owner during construction. The contractor shall submit a Request for Information upon completion of negotiations and award to determine options and scope, and to determine the amount of work available for inclusion based on the allowance amount. Installation and connection of the pole-mounted luminaires shall be inclusive of the bid price for the “686.1 – INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(1 ARM 32’)(LUM)” and shall not be accounted for in the Lighting Allowance.

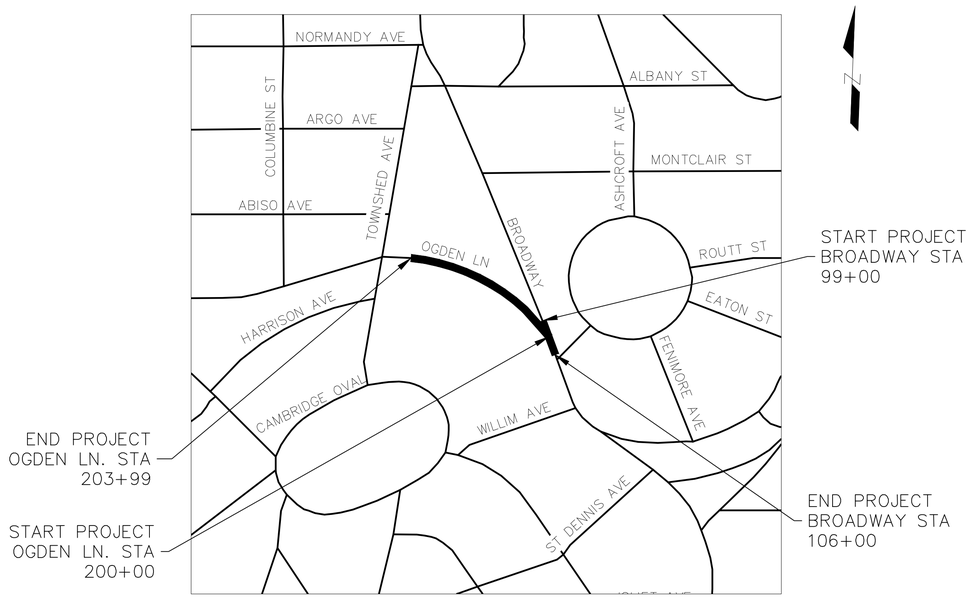
CITY OF ALAMO HEIGHTS, TEXAS

BROADWAY & OGDEN LN. INTERSECTION PLANS

PROJECT NO: 30216560.04

INDEX

G-100 - COVER SHEET AND INDEX
G-101 - OGDEN LN TYPICAL SECTIONS
G-102 - BROADWAY TYPICAL SECTIONS
G-103 - GENERAL NOTES
G-104 - GENERAL NOTES CONT.
G-105 - OVERALL QUANTITIES
C-100 - TCP PHASING LAYOUT
C-101 - DETOUR LAYOUT
C-102 TO C-105 - TCP PHASES 1 - 4
C-106 - HORIZONTAL ALIGNMENT & SURVEY CONTROL POINTS
C-107 TO C-110 - EXISTING CONDITIONS AND DEMOLITION PHASES 1 - 4
C-111 - PROPOSED CIVIL LAYOUT
C-112 - PROPOSED ROADWAY PROFILE
C-113 - CROSS SECTIONS (SHEET 1 OF 2)
C-114 - CROSS SECTIONS (SHEET 2 OF 2)
C-115 - DRAINAGE AREA MAP
C-116 - DRAINAGE CALCULATIONS
C-117 - PROPOSED INTERSECTION LAYOUT
C-118 - PROPOSED PEDESTRIAN HYBRID BEACON LAYOUT
C-119 - VERTICAL PROFILE
C-120 - SIGNAGE & STRIPING LAYOUT
C-121 - PARKING DETAIL
C-122 - EXISTING UTILITIES
C-201 TO C-234 - STANDARDS
L001 - LANDSCAPE COVER SHEET
L002 TO L531 - LANDSCAPE SHEETS

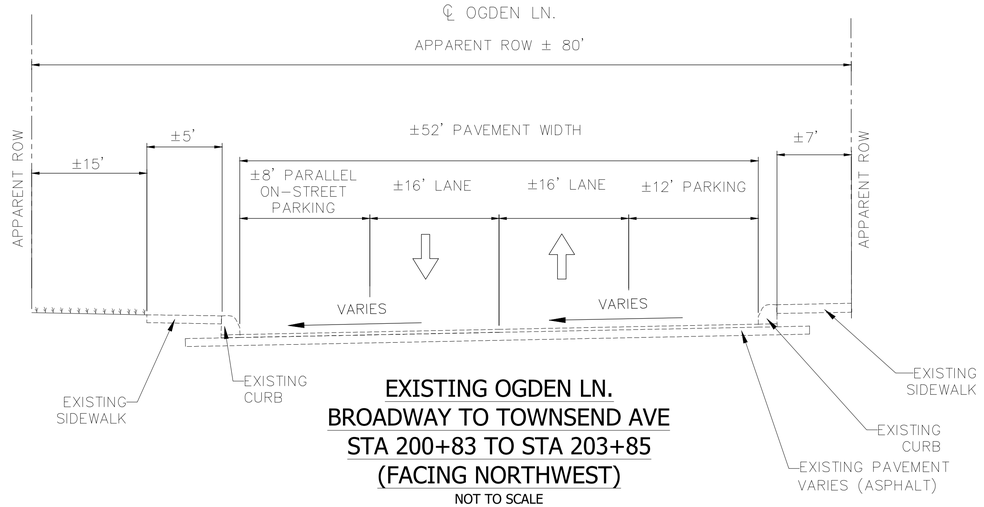


LOCATION MAP
NOT TO SCALE

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

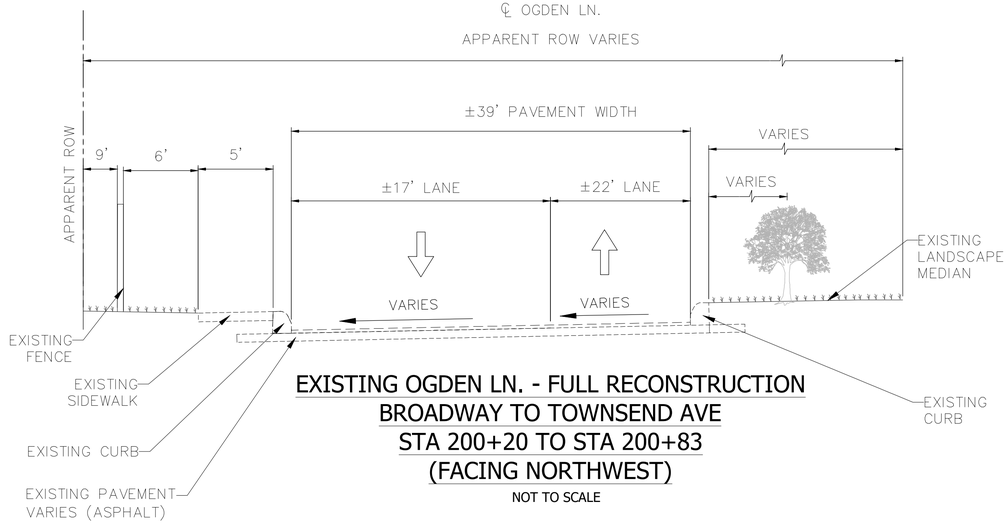
TBG
landscape architects, planners & designers
2101 mccullough ave
suite 110
san antonio, tx 78212
[210] 366-9933
tbgpartners.com

WGI
WGInc.com
ENGINEERING | CONSULTING
755 E. MULBERRY AVE. SUITE 501
SAN ANTONIO, TEXAS 78212
TEXAS REG. NO. F-11201
210.860.9224
WWW.WGINC.COM



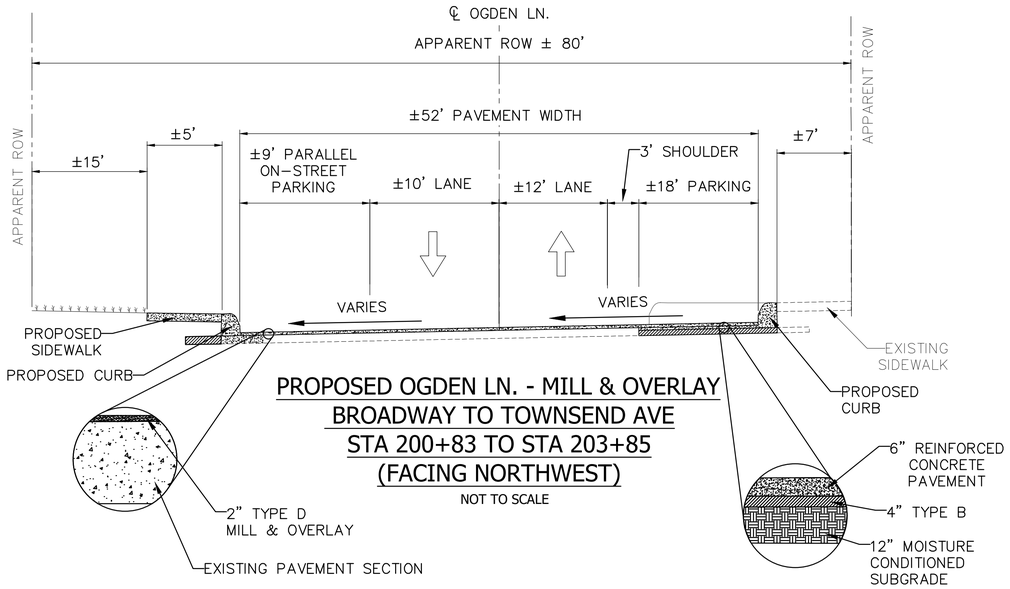
EXISTING OGDEN LN.
BROADWAY TO TOWNSEND AVE
STA 200+83 TO STA 203+85
(FACING NORTHWEST)

NOT TO SCALE



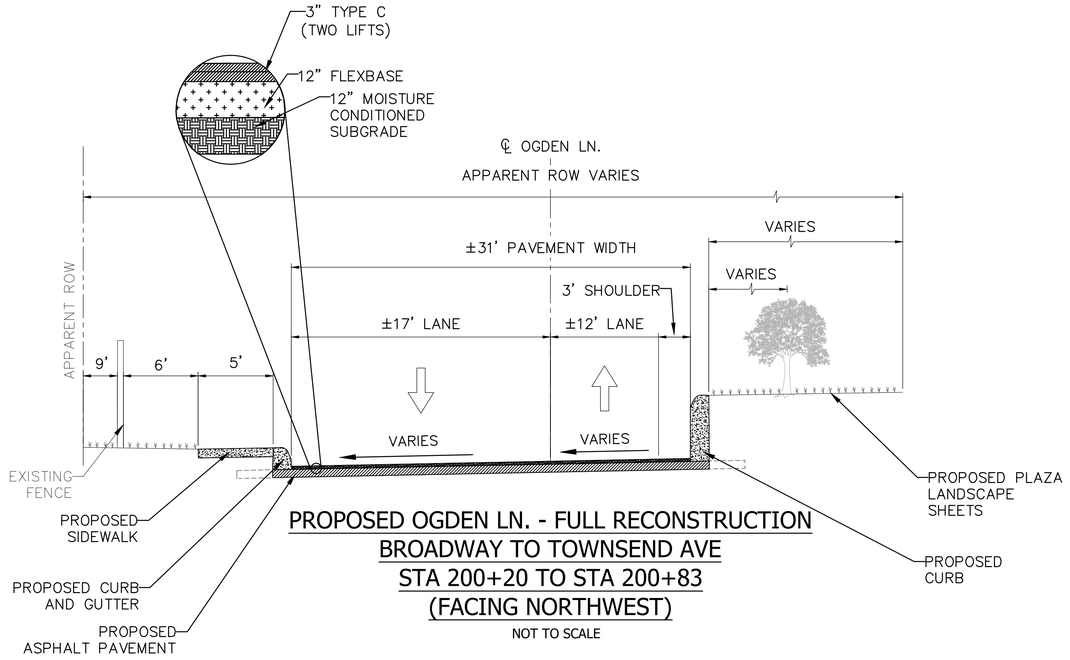
EXISTING OGDEN LN. - FULL RECONSTRUCTION
BROADWAY TO TOWNSEND AVE
STA 200+20 TO STA 200+83
(FACING NORTHWEST)

NOT TO SCALE



PROPOSED OGDEN LN. - MILL & OVERLAY
BROADWAY TO TOWNSEND AVE
STA 200+83 TO STA 203+85
(FACING NORTHWEST)

NOT TO SCALE



PROPOSED OGDEN LN. - FULL RECONSTRUCTION
BROADWAY TO TOWNSEND AVE
STA 200+20 TO STA 200+83
(FACING NORTHWEST)

NOT TO SCALE

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO. F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

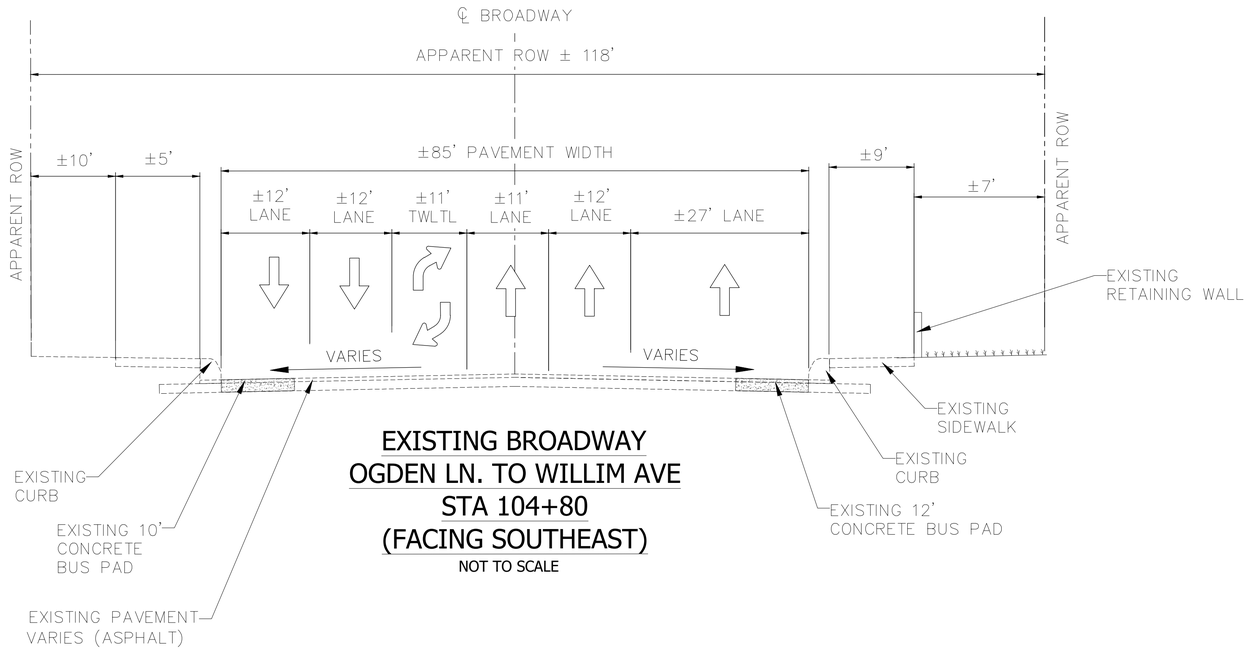
BROADWAY & OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

OGDEN LN TYPICAL SECTIONS

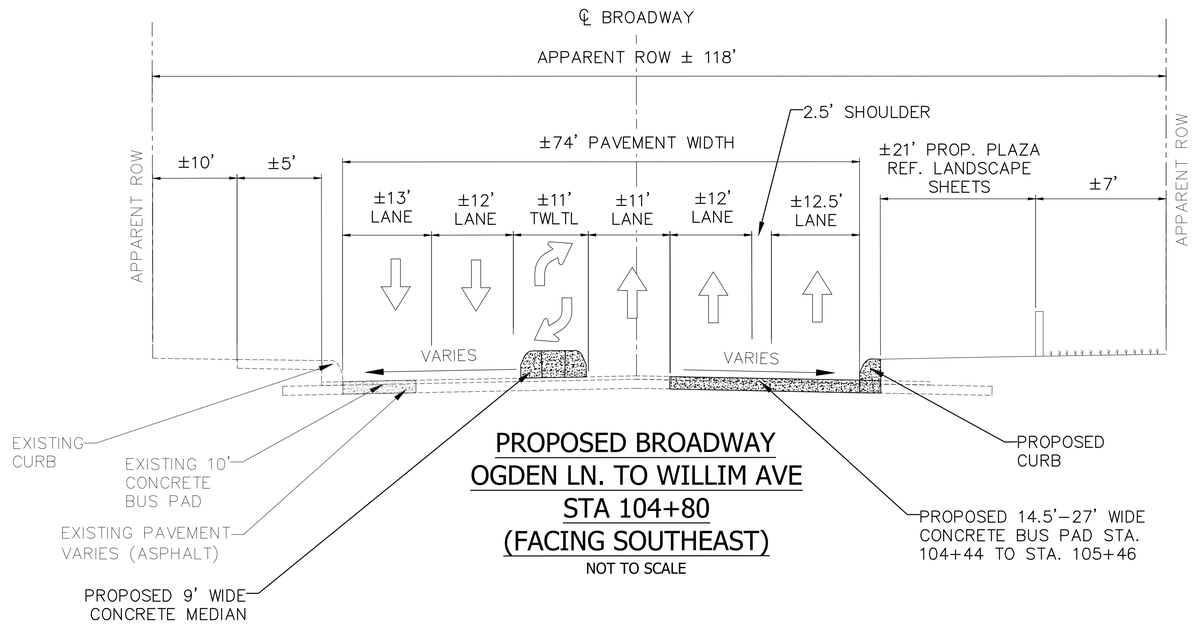
SHEET

G-101



EXISTING BROADWAY
OGDEN LN. TO WILLIM AVE
STA 104+80
(FACING SOUTHEAST)

NOT TO SCALE



PROPOSED BROADWAY
OGDEN LN. TO WILLIM AVE
STA 104+80
(FACING SOUTHEAST)

NOT TO SCALE

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

BROADWAY TYPICAL SECTIONS

SHEET

G-102

GENERAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO THE CITY OF ALAMO HEIGHTS STANDARD SPECIFICATIONS FOR CONSTRUCTION JUNE 2008, OR LATEST.

2. NO EXTRA PAYMENT SHALL BE ALLOWED FOR WORK CALLED FOR ON THE PLANS, BUT NOT INCLUDED IN THE BID PROPOSAL. THIS INCIDENTAL WORK WILL BE REQUIRED AND SHALL BE INCLUDED IN THE PAY ITEM TO WHICH IT RELATES.

3. THE CONTRACTOR SHALL PROVIDE ACCESS FOR THE DELIVERY OF MAIL BY THE U.S. POSTAL SERVICE.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING TO ITS ORIGINAL OR BETTER CONDITION ANY DAMAGE DONE TO EXISTING FENCES, CONCRETE ISLANDS, STREET PAVING, CURBS, SHRUBS, BUSHES OR DRIVEWAYS. (NO SEPARATE PAY ITEM).

5. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT ALL SIGNS AND BARRICADES ARE PROPERLY INSTALLED AND MAINTAINED. ALL LOCATIONS AND DISTANCES WILL BE DECIDED UPON IN THE FIELD BY THE CONTRACTOR, USING THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES". THE CITY'S CONSTRUCTION INSPECTOR AND TRAFFIC ENGINEERING REPRESENTATIVE WILL ONLY BE RESPONSIBLE TO INSPECT BARRICADES AND SIGNS. IF, IN THE OPINION OF THE TRAFFIC ENGINEERING REPRESENTATIVE AND THE CONSTRUCTION INSPECTOR, THE BARRICADES AND SIGNS DO NOT CONFORM TO ESTABLISHED STANDARDS OR ARE INCORRECTLY PLACED OR ARE INSUFFICIENT IN QUANTITY TO PROTECT THE GENERAL PUBLIC, THE CONSTRUCTION INSPECTOR SHALL HAVE THE OPTION TO STOP OPERATIONS UNTIL SUCH TIME AS THE CONDITIONS ARE CORRECTED.

6. IF THE NEED ARISES, ADDITIONAL BARRICADES AND DIRECTIONAL DEVICES MAY BE ORDERED BY THE TRAFFIC ENGINEERING REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.

7. DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.171 C.P.S. MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

8. CONTRACTOR SHALL NOTIFY THE CITY INSPECTOR TWENTY FOUR (24) HOURS PRIOR TO BACKFILL OF ANY UTILITY TRENCHES TO SCHEDULE FOR DENSITY TEST AS REQUIRED.

9. CONTRACTOR SHALL PRESERVE ALL CONSTRUCTION STAKES, MARKS, ETC. IF ANY ARE DESTROYED OR REMOVED BY THE CONTRACTOR OR HIS EMPLOYEES, THEY SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

10. CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES PRIOR TO CONSTRUCTION TO DETERMINE THE LOCATION OF EXISTING UTILITIES. CONTRACTOR SHALL NOTIFY THE FOLLOWING AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO EXCAVATION OPERATION:
    - SAN ANTONIO WATER SYSTEM (SAWS) 210-233-2010
    - CITY OF ALAMO HEIGHTS 210-822-3331
    - TEXAS STATE WIDE ONE CALL LOCATOR 1-800-344-8377
    - CITY PUBLIC SERVICE ENERGY
    - CENTER POINT
    - AT&T

11. 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 DAMAGE 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 SAME DURING CONSTRUCTION.

12. ALL WASTE MATERIAL SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE HIS SOLE RESPONSIBILITY TO DISPOSE OF THIS MATERIAL OFF THE LIMITS OF THE PROJECT. NO WASTE MATERIAL SHALL BE PLACED IN EXISTING LOWS THAT WILL BLOCK OR ALTER FLOW LIMITS OF EXISTING ARTIFICIAL OR NATURAL DRAINAGE.

13. THE CONTRACTOR SHALL NOT PLACE ANY WASTE MATERIAL IN THE 100-YEAR FLOOD PLAIN WITHOUT FIRST OBTAINING AN APPROVED FLOOD PLAIN DEVELOPMENT PERMIT.

14. THE CONTRACTOR SHALL MAINTAIN ALL ADJOINING STREETS AND TRAVELED ROUTES FREE FROM SPILLED AND/OR TRACKED CONSTRUCTION MATERIALS AND/OR DEBRIS.

15. IF THE CONTRACTOR ENCOUNTERS ANY ARCHAEOLOGICAL DEPOSITS DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR MUST STOP EXCAVATION IMMEDIATELY, CONTACT THE CITY INSPECTOR, AND CALL THE CITY OFFICE AT 210-822-3331 FOR AN ARCHAEOLOGICAL INVESTIGATION. THE CONTRACTOR CANNOT BEGIN EXCAVATION AGAIN WITHOUT WRITTEN PERMISSION FROM THE CITY. IF MORE THAN THREE (3) DAYS ARE REQUIRED FOR INVESTIGATION (NOT INCLUDING HOLIDAY AND WEEKENDS) AND IF THE CONTRACTOR IS UNABLE TO WORK IN OTHER AREAS, THEN THE CONTRACTOR WILL BE ALLOWED TO NEGOTIATE FOR ADDITIONAL CONSTRUCTION TIME UPON WRITTEN REQUEST WITHIN TEN (10) DAYS AFTER THE FIRST NOTICE TO THE CITY OF ARCHAEOLOGICAL INVESTIGATION FOR EACH EVENT. IF THE TIME REQUIRED FOR INVESTIGATION IS LESS THAN OR EQUAL TO THREE (3) DAYS FOR EACH EVENT, CONTRACT DURATION WILL NOT BE EXTENDED.

16. IF SUSPECTED CONTAMINATION IS ENCOUNTERED DURING CONSTRUCTION OPERATIONS, CITY OF ALAMO HEIGHTS SHALL BE NOTIFIED IMMEDIATELY WHEN CONTAMINATED SOILS AND /OR GROUNDWATER ARE ENCOUNTERED AT LOCATIONS NOT IDENTIFIED IN THE PLANS. THE NOTIFICATION SHOULD INCLUDE THE STATION NUMBER, TYPE OF CONTAMINATED MEDIA, EVIDENCE OF CONTAMINATION AND MEASURES TAKEN TO CONTAIN THE CONTAMINATED MEDIA AND PREVENT PUBLIC ACCESS. THE CONTAMINATED SOIL AND /OR GROUNDWATER SHALL NOT BE REMOVED FROM THE LOCATION WITHOUT PRIOR ALAMO HEIGHTS APPROVAL. THE CONTRACTOR MUST STOP THE EXCAVATION IMMEDIATELY AND CONTACT THE ALAMO HEIGHTS INSPECTOR. THE CONTRACTOR CANNOT BEGIN EXCAVATION ACTIVITIES WITHOUT WRITTEN PERMISSION FROM THE CITY.

17. CONTRACTOR IS TO INCLUDE A MAILBOX POST BLOCKOUT FOR VACANT LOTS AND ALL RESIDENCES WHICH DO NOT HAVE MAILBOXES AT THE CURB. BLOCKOUTS ARE PROVIDED FOR FUTURE USE BY THE POST OFFICE.

TREE PROTECTION AND PRESERVATION GENERAL NOTES

1. NO UTILITY OR STREET EXCAVATION WORK SHALL BEGIN IN AREAS WHERE TREE PRESERVATION AND TREATMENT MEASURES HAVE NOT BEEN COMPLETED AND APPROVED.

2. TREE PROTECTION FENCING SHALL BE REQUIRED. TREE PROTECTION FENCING SHALL BE INSTALLED, MAINTAINED AND REPAIRED BY THE CONTRACTOR DURING SITE CONSTRUCTION. DURING CONSTRUCTION ACTIVITY, AT LEAST A SIX-INCH LAYER OF COARSE MULCH SHALL BE PLACED AND MAINTAINED OVER THE ROOT PROTECTION ZONE (NO SEPARATE PAY ITEM).

3. 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.

4. ROOTS WILL BE CUT WITH A ROCK SAW OR BY HAND, NOT BY AN EXCAVATOR OR OTHER ROAD CONSTRUCTION EQUIPMENT.

5. ALL CURB AND SIDEWALK WORK SHALL USE ALTERNATIVE CONSTRUCTION METHODS TO MINIMIZE EXTENSIVE ROOT DAMAGE TO TREES (REFER TO DETAILS).

6. EXPOSED ROOTS SHALL BE COVERED AT THE END OF THE DAY USING TECHNIQUES SUCH AS COVERING WITH SOIL, MULCH, OR WET BURLAP.

7. NO EQUIPMENT, VEHICLES OR MATERIALS SHALL OPERATE OR BE STORED WITHIN THE ROOT PROTECTION ZONE OF ANY TREE NEAR THE PROJECT. ROOT PROTECTION ZONE IS 1 FOOT OF RADIUS PER INCH OF TREE'S DIAMETER. A 10-INCH DIAMETER TREE WOULD HAVE A 10 FOOT RADIUS ROOT PROTECTION ZONE AROUND THE TREE. ROOTS OR BRANCHES IN CONFLICT WITH THE CONSTRUCTION SHALL BE CUT CLEANLY ACCORDING TO PROPER PRUNING METHODS. OAK WOUNDS SHALL BE PAINTED OVER WITHIN 30 MINUTES TO PREVENT OAK WILT.

8. 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.

9. NO WIRES, NAILS OR OTHER MATERIAL MAY BE ATTACHED TO PROTECTED TREES.

10. 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 A-300 STANDARDS FOR PRUNING. ALL TREE PRUNING SHALL BE COMPLETED BY A LICENSED CONTRACTOR ONLY AFTER APPROVAL FROM THE CITY OF ALAMO HEIGHTS INSPECTOR.

11. NO EXCESSIVE TREE TRIMMING WILL BE PERMITTED.

12. ALL DEBRIS GENERATED BY THE PRUNING AND TRIMMING OF THE TREES AND /OR BUSHES SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF PROPERLY (NO SEPARATE PAY ITEM).

13. TREES MUST BE MAINTAINED IN GOOD HEALTH THROUGHOUT THE CONSTRUCTION PROCESS. MAINTENANCE MAY INCLUDE, BUT NOT LIMITED TO: WATERING THE ROOT PROTECTION ZONE, WASHING FOLIAGE, FERTILIZATION, PRUNING, ADDITIONAL MULCH APPLICATIONS AND OTHER ON THE PROJECT. MAINTENANCE AS NEEDED ON THE PROJECT.

14. ANY TREE REMOVAL SHALL BE APPROVED BY THE CITY OF ALAMO HEIGHTS INSPECTOR.

15. TREES WHICH ARE DAMAGED OR LOST DUE TO THE CONTRACTOR'S NEGLIGENCE DURING CONSTRUCTION SHALL BE MITIGATED TO THE CITY'S SATISFACTION.

16. 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.

DRAINAGE GENERAL NOTES

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN ALL REQUIRED STORM WATER PERMITS, FEES, AND APPROVALS. NO CONSTRUCTION OF FABRICATION SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED AN THOROUGHLY REVIEWED ALL PERMITS REQUIRED FOR CONSTRUCTION IN DRAINAGE EASEMENTS, RIGHT-OF-WAYS, AND FLOODPLAINS.

2. THE CONTRACTOR SHALL NOTIFY CITY INSPECTOR AT LEAST 24 HOURS PRIOR TO THE INSTALLATION OF ANY DRAINAGE FACILITY WITHIN A DRAINAGE EASEMENT OR STREET RIGHT-OF-WAY NOT INDICATED ON THE CONSTRUCTION PLANS.

3. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING DRAINAGE FACILITIES FROM DAMAGE. ANY DAMAGE TO EXISTING DRAINAGE SYSTEMS, WETHER OR NOT SHOWN ON THE PLANS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR AT THEIR EXPENSE. THE CONTRACTOR SHALL NOTIFY THE CITY INSPECTOR AS SOON AS CONFLICTS WITH UTILITIES ARE ENCOUNTERED OR ANY DRAINAGE SYSTEM IS DAMAGED DURING CONSTRUCTION.

4. CONSTRUCTION SPOILS WILL NOT BE ALLOWED TO BE DEPOSITED ANYWHERE WITHIN A DRAINAGE EASEMENT, RIGHT-OF-WAY OR FLOODPLAIN WITHIN THE LIMITS OF THE PROJECT AND SHALL BE DISPOSED OFFSITE IN COMPLIANCE WITH CURRENT APPLICABLE REGULATIONS.

5. NO STRUCTURE, FENCES, WALLS, LANDSCAPING, OR OTHER OBSTRUCTIONS THAT IMPEDE DRAINAGE SHALL BE PLACED WITHIN THE LIMITS OF THE DRAINAGE EASEMENTS SHOWN ON THE CONSTRUCTION DOCUMENTS.

6. UPON COMPLETION OF TRENCHING, THE AREA WILL BE BACKFILLED AND COMPACTED TO ITS ORIGINAL CONDITION. TRENCHES/BORE PITS TO BE OPEN AND UNATTENDED LONGER THAN 24 HOURS SHALL BE PROTECTED TO WITHSTAND ALL HYDRODYNAMIC AND HYDROSTATIC FORCES AND PREVENT DOWNSTREAM IMPACTS. TRENCHES/BORE PITS TO BE OPEN LONGER THAN 30 DAYS AFTER STARTING EXCAVATION SHALL BE BACKFILLED WITH A SEMI-PERMANENT REPAIR BACKFILL

ACCESSIBILITY REQUIREMENTS

1. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN VEHICULAR AND PEDESTRIAN ACCESS AT ALL TIMES TO LOCAL RESIDENCES AND BUSINESSES.

2. WHEN THE WORK REQUIRES THE EXCAVATION OF THE STREET AND THE REMOVAL OF THE EXISTING DRIVEWAY APPROACHES AND SIDEWALKS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING TEMPORARY ALL-WEATHER ACCESS TO THE BUSINESSES AND RESIDENCES. THE TEMPORARY DRIVEWAY APPROACHES SHALL BE CONSTRUCTED WITH FLEXIBLE BASE OR GRAVEL MATERIAL AT NO SEPARATE COST TO THE CITY. PRIOR TO INITIATING THE CONSTRUCTION OF NEW DRIVEWAY APPROACHES.

3. THE CONTRACTOR SHALL GIVE ADVANCE WARNING IN PERSON, OR IN WRITING, OF AT LEAST 48 HOURS TO EACH RESIDENCE THAT WILL BE IMMEDIATELY AFFECTED, SO THAT ALTERNATE PLANS MAY BE MADE BY THE RESIDENTS.

4. FOR BUSINESSES WITH MORE THAN ONE DRIVEWAY, AT LEAST ONE DRIVEWAY SHALL REMAIN OPEN WHILE THE OTHER NEW DRIVEWAY APPROACHES ARE CONSTRUCTED. FOR BUSINESSES WITH ONLY ONE DRIVEWAY, THE NEW DRIVEWAY APPROACH SHALL BE CONSTRUCTED IN HALF WIDTHS, UNLESS A TEMPORARY ASPHALT DRIVEWAY IS FIRST INSTALLED AT NO SEPARATE COST TO THE CITY.

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE. SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO. F-15985

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
GENERAL NOTES

SHEET
G-103

PROJECT SPECIFIC NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEARING ANY CONSTRUCTION MATERIALS FROM WATERWAYS AFTER ANY FLOOD EVENT AND PROTECTING EXISTING DRAINAGE SYSTEMS.
2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROTECTING THE INTEGRITY OF POWER POLES AND GUY WIRES DURING CONSTRUCTION (NSPI).
3. CONTRACTOR SHALL MAINTAIN VEHICULAR ACCESS THROUGH ALL DRIVEWAYS FOR EMERGENCY ACCESS AT ALL TIMES DURING CONSTRUCTION.
4. PROPERTY LINES SHOWN ARE APPROXIMATE.
5. CONTRACTOR TO PROTECT EXISTING SIGNS (NSPI). PROVIDE TEMPORARY SIGNS AND SALVAGE AND REPLACE SIGNS THAT INTERFERE WITH CONSTRUCTION. (NSPI).
6. CONTRACTOR TO SUPPORT AND KEEP INTACT STORM DRAINS AND INLET STRUCTURES. ANY DAMAGES INCURRED WILL BE AT THE CONTRACTOR'S EXPENSE.
7. CONTRACTOR SHALL PROVIDE ACCESS FOR THE DELIVER OF MAIL BY THE U.S. POSTAL SERVICE.
8. IF DAMAGED THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING EXISTING FENCES, CURBS, STREETS, DRIVEWAYS, SIDEWALKS, LANDSCAPING STRUCTURE, ETC. TO ITS ORIGINAL OR BETTER CONDITION (NSPI).
9. THE CONTRACTOR SHALL PROTECT ALL TREES WITHIN THE PROJECT LIMITS. NO TREE REMOVAL IS PERMITTED UNLESS OTHERWISE STATED IN THE DESIGN PLANS.

GENERAL TRAFFIC CONTROL PLAN NOTES:

1. ALL TRAFFIC CONTROL SHALL CONFORM TO THE LATEST VERSION OF TXDOT AND THE CITY OF SAN ANTONIO STANDARD DETAILS TRAFFIC CONTROL STANDARDS AND THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD), PART VI. FIELD MODIFICATIONS MAY BE MADE TO ADDRESS LOCAL CONDITIONS WITH THE APPROVAL OF THE ENGINEER.
2. WHEN TRAFFIC CONTROL PLAN IS NOT IN EFFECT, REMOVE ALL DEVICES FROM THE TRAVELED LANES AND COVER OR REMOVE ALL WARNING SIGNS.
3. THE CONTRACTOR SHALL NOT HAVE EXCLUSIVE USE OF THE RIGHT-OF-WAY BUT SHALL COOPERATE IN THE USE OF THE RIGHT-OF-WAY WITH THE CITY OF ALAMO HEIGHTS AND TXDOT AS WELL AS VARIOUS PUBLIC UTILITY COMPANIES AS MAY BE REQUIRED. IN THE EVENT OF UNFORESEEN UTILITY ADJUSTMENTS, THE CONTRACTOR SHALL EXECUTE WORK IN SUCH A MANNER AND SEQUENCE AS TO ALLOW THE ADJUSTMENTS TO BE MADE WITH MINIMAL DISRUPTION TO TRAFFIC.
4. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE FOR THE SAFETY AND COMFORT OF THE TRAVELING PUBLIC AT ALL TIMES. CONTRACTOR SHALL BE REQUIRED TO GIVE THE TRAVELING PUBLIC AT LEAST 48 HOURS ADVANCED NOTICE OF ANY LANE CLOSURES OR CHANGE IN TRAFFIC FLOW DIRECTION.
5. METAL PLATES WILL BE ALLOWED TO COVER TRENCHES LEFT OVERNIGHT AND/OR DURING THE DAY THAT HAVE NOT HAD FLOWABLE BACKFILL PLACED. METAL PLATES SHALL NOT BE USED ON ANY SPECIFIC TRENCH FOR MORE THAN 3 CALENDAR DAYS. A HMAP (TY D MIX OR APPROVED EQUAL BY THE ENGINEER) SHALL BE USED AROUND THE EDGES OF ALL METAL PLATES PLACED IN THE PAVEMENT TO PROVIDE A SMOOTH TRANSITION OVER THE PLATES. IF CONTRACTOR CHOOSES NOT TO UTILIZE METAL PLATES, ALL OPEN TRENCHES MUST BE BACKFILLED AT THE END OF EACH WORKING DAY TO ALLOW FOR NON-INTERRUPTED, FREE-FLOW TRAFFIC.
6. UNLESS AUTHORIZED BY THE ENGINEER, CONTRACTOR MAY NOT SHUT DOWN ANY LANES DURING PEAK HOURS. ALL EXISTING TRAFFIC LANES ARE TO BE OPENED TO TRAFFIC DURING PEAK HOURS AND AT THE END OF EACH WORK DAY.
7. ADVANCED WARNING LANE CLOSURE SIGNS SHALL BE COVERED WHEN ALL EXISTING LANES ARE OPEN TO TRAFFIC.
8. CONTRACTOR TO NOTIFY TXDOT INSPECTOR 48 HOURS PRIOR TO CLOSURES ON TXDOT ROW OR WHEN CHANGING CLOSURE PHASES.

AT&T NOTES:

1. THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE.
2. LOCATION OF EXISTING COMMUNICATIONS UTILITIES IS TO BE VERIFIED IN ACCORDANCE WITH GENERAL NOTES.

VIA METROPOLITAN TRANSIT

1. THE CONTRACTOR SHALL NOT REMOVE OR ADJUST ANY VIA ASSETS.
2. IF FOR ANY UNFORESEEN REASON THE REMOVAL OF ANY VIA ASSETS IS NEEDED, THE CONTRACTOR MUST NOTIFY VIA DISPATCH AT (210) 362-5020 AND/OR JOE WILGEN AT (210 441-1518) AS SOON AS POSSIBLE.
3. THE CONTRACTOR MUST NOTIFY VIA DISPATCH AT (210) 362-5020 AND/OR JOE WILGEN AT (210 441-1518) A MINIMUM OF ONE (1) WEEK BEFORE ANY WORK THAT REQUIRES A DETOUR IN ONE OR BOTH DIRECTIONS ALONG A VIA BUS ROUTE.
4. THE CONTRACTOR MUST NOTIFY VIA DISPATCH AT (210) 362-5020 AND/OR JOE WILGEN AT (210 441-1518) A MINIMUM OF ONE (1) DAY BEFORE ANY WORK THAT REQUIRES THE TEMPORARY CLOSURE OF A BUS STOP.
5. THE CONTRACTOR MUST NOTIFY VIA DISPATCH AT (210) 362-5020 AND/OR JOE WILGEN AT (210 441-1518) WHEN ANY TEMPORARILY CLOSED BUS STOP CAN BE REOPENED.
6. THE CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGES TO VIA ASSETS NOT REMOVED BY VIA.
7. THE CONTRACTOR IS REQUIRED TO REPLACE ALL FLATWORK REMOVED OR DAMAGED IN THE COURSE OF EXECUTING THE CONTRACT UNLESS OTHERWISE NOTED BY VIA.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING VIA FACILITIES ADJACENT TO THE WORK AREA.

SIGNAL GENERAL NOTES

1. ALL ELECTRICAL EQUIPMENT SHALL CONFORM TO THE STANDARDS OF THE NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA), THE NATIONAL ELECTRIC SAFETY COUNCIL (NESC), UNDERWRITER'S LABORATORIES (UL), OR THE ELECTRONIC INDUSTRIES ASSOCIATION (EIA) WHERE APPLICABLE.
2. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST REVISION OF THE NATIONAL ELECTRIC CODE (NEC), ILLUMINATION ENGINEER'S SOCIETY (IES), STANDARDS OF THE AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM), AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO), REQUIREMENTS OF THE PLANS, TRAFFIC SIGNAL SPECIAL SPECIFICATIONS, SPECIAL PROVISIONS, AND TO ANY OTHER CODES, STANDARDS, OR LOCAL ORDINANCES WHICH MAY APPLY. WHENEVER REFERENCE IS MADE TO ANY OF THESE STANDARDS, THE REFERENCE SHALL BE CONSIDERED TO MEAN THE CODE, ORDINANCE, OR STANDARD THAT IS IN EFFECT AT THE TIME OF CONSTRUCTION.
3. PRIOR TO BEGINNING ANY WORK ON ANY CITY TRAFFIC SIGNAL FACILITY, THE CONTRACTOR SHALL NOTIFY THE ENGINEER ONE WEEK IN ADVANCE. UNDER NO CIRCUMSTANCES WILL THE CITY ACCEPT WORK DONE WITHOUT THIS PRIOR CONTACT BEING MADE.
4. THE CONSTRUCTION INSPECTOR SHALL BE RESPONSIBLE FOR COORDINATION AND INSPECTION OF ALL ELEMENTS OF THE TRAFFIC SIGNAL SYSTEM. THE ONLY PERSON AUTHORIZED TO MODIFY THAT INSPECTOR'S DIRECTIONS THE ENGINEER.
5. FINAL INSPECTION ON CITY AS WELL AS PRIVATELY ADMINISTERED PROJECTS, FOR THE PURPOSE OF GENERATION OF THE PUNCH LIST, SHALL BE CONDUCTED BY THE ENGINEER OR HIS DESIGNATED AGENT AS WELL AS THE CONTRACTOR AND CITY CONSTRUCTION INSPECTOR. THE CONTRACTOR SHALL NOTIFY THE ENGINEER 48 HOURS IN ADVANCE OF A DESIRE FOR FINAL INSPECTION. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO HAVE A BUCKET TRUCK AVAILABLE AT THE FINAL INSPECTION FOR INSPECTION OF ANY OVERHEAD SIGNAL RESOURCES. AFTER THE PUNCH LIST ITEMS ARE COMPLETED THE SIGNAL MAY BE PUT INTO FLASH OPERATIONS FOR A PERIOD OF TIME DESCRIBED BY THE ENGINEER. A FINAL LETTER OF ACCEPTANCE OF THE TRAFFIC SIGNAL WILL BE INITIATED BY THE ENGINEER TO THE CONSTRUCTION AFTER THE SIGNAL HAS FUNCTIONED PROPERLY FOR A PERIOD OF TIME.
6. THE CONTRACTOR SHALL NOTE THAT THE APPROVAL BY THE ENGINEER IS REQUIRED PRIOR TO INSTALLATION OF ANY EQUIPMENT THAT IS TO BE USED.
7. THE CONTRACTOR SHALL SUBMIT TWO COPIES OF A COMPLETE MATERIAL LIST FOR APPROVAL WHICH SHALL CONFORM TO THESE SPECIFICATIONS. THE LIST SHALL STATE ALL RELEVANT INFORMATION REGARDING MATERIALS AND EQUIPMENT TO ALLOW THE CITY TO PROCURE EXACT REPLACEMENTS OF ANY ITEMS SUPPLIED ON THE PROJECT. THE SUBMITTALS MUST BE COMPLETE ENOUGH TO BE ABLE TO JUDGE IF ITEMS COMPLY WITH THE FEATURES SPECIFIED AND SHALL BE EVALUATED BY THE CONTRACTOR PRIOR TO SUBMITTAL TO ELIMINATE REJECTION OF OBVIOUSLY WRONG ITEMS. THE MATERIALS ON THE LIST SHALL BE IDENTIFIED BY THE CONTRACT PROJECT NAME OR NUMBER, BID ITEM NUMBER, CATALOG PART NUMBERS, CATALOG CUTS, SHOP DRAWINGS, TRADE NAMES, AND SCHEDULES OF OTHER PERTINENT INFORMATION. THE MATERIALS FROM CATALOG CUTS SHALL BE CLEARLY INDICATED BY THE CONTRACTOR. ANY MATERIAL DESIGNATION USED IN THE CONTRACT DOCUMENTS SHALL BE SO NOTED ON THE MATERIAL LIST. IF REQUESTED, THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL.
8. IT IS THE CITY'S INTENT TO KEEP A "PRE-APPROVED" LIST OF EQUIPMENT FOR TRAFFIC SIGNAL PROJECTS. THE INTENT IS TO STREAMLINE THE APPROVAL PROCESS BY MAKING INFORMATION AVAILABLE TO THE CONTRACTOR OF ITEMS THAT HAVE BEEN PREVIOUSLY APPROVED UNDER THESE SPECIFICATIONS. THIS LIST IS IN NO WAY TO BE CONSTRUED AS AN ENDORSEMENT OF ANY BRAND OR PRODUCT. THIS LIST IS AVAILABLE FROM THE TRAFFIC DESIGN ENGINEER, AND USE OF THE LIST DOES NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY TO COMPLY WITH THE SPECIFICATIONS OF A PARTICULAR PROJECT. THE MAINTENANCE OF THIS LIST IS AT THE DISCRETION OF THE ENGINEER. AND THE CONTRACTOR SHOULD BE PREPARED TO PROVIDE SUBMITTALS OF ALL EQUIPMENT AS REQUIRED HEREIN. THE CONTRACTOR SHALL BE ALLOWED TO SUBSTITUTE A REFERENCE TO AN ITEM IN THE "PRE-APPROVED" LIST IN LIEU OF A CATALOG DATA SHEET, IF HE DESIRES, AND IF THE ENGINEER HAS PROVIDED SUCH A LIST. SUCH REFERENCE SHALL BE SUFFICIENTLY COMPLETE FOR THE CITY TO JUDGE WHICH ITEM IS BEING PROPOSED. THE CONTRACTOR MAY ALSO BE ASKED TO SUBMIT ADDITIONAL DOCUMENTATION FROM AN INDEPENDENT TESTING LAB ATTESTING THAT THE MATERIAL SUBMITTED MEETS OR EXCEEDS THE REQUIRED SPECIFICATIONS.
9. THERE SHALL BE NO SUBSTITUTIONS FOR ANY OF THE MATERIALS ON THE SUBMITTAL WITHOUT THE PRIOR WRITTEN APPROVAL OF THE ENGINEER. PROPOSED CHANGES TO THE APPROVED MATERIALS SUBMITTAL SHALL BE SUBMITTED IN WRITING. IF REQUESTED, THE CONTRACTOR SHALL SUBMIT SAMPLES OF PROPOSED MATERIALS FOR TESTING AND EVALUATION BY THE CITY.
10. THE CITY RESERVES THE RIGHT TO REJECT AN INCOMPLETE OR UNCLEAR MATERIAL LIST OR SUBMITTAL. INSTALLATION OF EQUIPMENT NOT CORRESPONDING TO THE SUBMITTAL SHALL BE GROUNDS FOR REJECTION OF THE EQUIPMENT AND REPLACEMENT WITH APPROVED MATERIALS AT NO COST TO THE CITY, EVEN IF THE NON-APPROVED MATERIAL MIGHT OTHERWISE HAVE BEEN APPROVED HAD IT BEEN PROPERLY SUBMITTED.
11. SUBMITTALS SHALL BE DELIVERED TO THE ENGINEER AS SOON AS POSSIBLE AFTER SIGNING OF THE CONTRACT. PAYMENTS TO THE CONTRACTOR MAY BE HELD IF THE SUBMITTAL PROCESS IS NOT COMPLETED IN A TIMELY FASHION, CONSIDERING NO EQUIPMENT CAN BE INSTALLED WITHOUT ALL SUBMITTALS BEING APPROVED.
12. BARRICADING SHALL BE PROVIDED BY THE CONTRACTOR AS PROVIDED FOR IN THE PLANS AND REQUESTED BY THE ENGINEER, INSPECTOR, AND CONSTRUCTION TRAFFIC COORDINATOR. THE CONTRACTOR SHALL SUPPLY HIS OWN BARRICADES OR EMPLOY A LEGITIMATE BARRICADING COMPANY FOR THIS PURPOSE, SUPPLYING THE INSPECTOR WITH THE RESPONSIBLE PARTY'S 24-HOUR TELEPHONE NUMBER FOR EMERGENCIES.
13. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT ALL TRAFFIC CONTROL DEVICES ARE PROPERLY INSTALLED AND MAINTAINED. ALL LOCATIONS AND DISTANCES SHALL BE IN CONFORMANCE WITH THE BARRICADING DETAILS SUPPLIED BY THE TRAFFIC DESIGN ENGINEER, THE CONSTRUCTION TRAFFIC COORDINATOR AND THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. ANY TIME A CONTRACTOR'S VEHICLE OCCUPIES A STREET OPEN TO VEHICULAR TRAFFIC, OR DURING THE WORK IN THE STREET FOR THE PURPOSE OF HANGING HEADS, ERECTION OF POLES, CUTTING AND INSTALLATION OF LOOPS, OR ANY OTHER SUCH WORK, ADEQUATE ADVANCE WARNING SIGNS AND BARRICADES OR CONES SHALL BE USED AS REQUIRED BY THE TEXAS MUTCD. ADDITIONALLY, ALL LOCATIONS NOT IN A ROAD PROJECT SHALL HAVE THE SIGNAL CONSTRUCTION AHEAD SIGNS AND END CONSTRUCTION SIGNS ON ALL APPROACHES OF THE INTERSECTION HAVING THE NEW SIGNALS OR MODIFICATION INSTALLED. ANY TRENCHES LEFT OVERNIGHT AS WELL AS ANY FOUNDATIONS THAT DO NOT HAVE POLES SITTING ON THEM OR ANY OTHER SUCH HAZARD TO THE PUBLIC SHALL BE ADEQUATELY COVERED AND BARRICADED WITH REFLECTIVE STANDARD BARRICADES EQUIPPED WITH WARNING FLASHERS OR AS DIRECTED BY THE ENGINEER.
14. IF THE CONTRACTOR ELECTS TO DO THEIR OWN BARRICADING, A TRAFFIC CONTROL PLAN IS REQUIRED 48 HOURS (EXCLUDING WEEKENDS) IN ADVANCE FOR APPROVAL. CONTRACTOR SHALL ADHERE TO THE APPROPRIATE REQUIREMENTS OF ITEM 530, "BARRICADES, SIGNS AND TRAFFIC HANDLING."
15. ANY LANE CLOSURES OR TOTAL CLOSURES OF STREETS OR EXISTING SIDEWALKS MUST BE APPROVED IN ADVANCE. A 72-HOUR NOTICE IS REQUIRED ON ALL LANE CLOSURES AND/OR TOTAL CLOSURES. NO CLOSURES OR PARTIAL CLOSURES SHALL OCCUR DURING THE PEAK HOURS OF 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM, WEEKDAYS.
16. REFLECTORIZED SIGNS SHALL BE CONSTRUCTED OF RETRO-REFLECTIVE SHEETING AND SHALL BE MAINTAINED TO MEET THE APPEARANCE, COLOR AND REFLECTIVITY REQUIREMENTS. PAINTS AND COLORATION OF SIGNS SHALL BE EQUAL TO TXDOT'S STANDARDS. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. CONTRACTORS SHALL FURNISH COPIES OF CERTIFICATIONS FROM MANUFACTURERS OF THE LIGHTS THAT THE WARNING LIGHTS MEET THE REQUIREMENTS OF THE ITE STANDARD FOR FLASHING AND STEADY BURN WARNING LIGHTS, IF REQUESTED.
17. SIGNS ERECTED ON PORTABLE SUPPORTS NORMALLY MEAN SIGNS WHICH ARE USED DURING THE DAY TO WARN OR GUIDE TRAFFIC THROUGH AND/OR AROUND THE ACTUAL CONSTRUCTION AREA, BUT AT THE END OF THE DAY SUCH SIGNS ARE EITHER REMOVED OR TURNED AWAY FROM THE VIEW OF TRAFFIC. PORTABLE SUPPORTS SHALL BE AS SHOWN IN THE DETAIL. SIGNS REQUIRED FOR NIGHTTIME USAGE SHOULD NOT NORMALLY BE MOUNTED ON TEMPORARY SUPPORTS, EXCEPT WHEN APPROVED BY THE INSPECTOR. SIGNS ERECTED ON FIXED SUPPORTS FOR USE ON CONSTRUCTION PROJECTS NORMALLY MEAN SIGNS THAT ARE TO REMAIN IN PLACE FOR BOTH DAY AND NIGHT USAGE TO REGULATE, WARN AND GUIDE TRAFFIC IN ADVANCE OF AND WITHIN THE LIMITS OF THE PROJECT INCLUDING THE CROSSROAD APPROACHES. HOWEVER, UNDER CERTAIN CONDITIONS, SUCH AS WHERE A SIGN MAY BE REQUIRED FOR A FEW DAYS DURATION AND THEN IS NO LONGER NEEDED OR WHERE A SIGN IS MOVED FROM LOCATION TO LOCATION EVERY FEW DAYS OR WHERE IT IS NOT PRACTICAL OR DESIRABLE TO PROVIDE A FIXED MOUNTING, SUCH SIGNS MAY BE ERECTED ON A TEMPORARY SUPPORT. SIGNS ERECTED ON TEMPORARY SUPPORTS SHOULD BE AT A MINIMUM HEIGHT OF 3 FEET. SIGNS ERECTED ON FIXED SUPPORTS SHOULD BE AT A MINIMUM HEIGHT OF 7 FEET. ALL REGULATORY SIGNS SHALL BE ERECTED AT LEAST 7 FEET ABOVE THE GROUND. POSTS FOR FIXED SUPPORTS SHOULD BE SET IN THE GROUND WITHOUT CONCRETE FOOTINGS. WHERE PORTABLE OR TEMPORARY SUPPORTS REQUIRE THE USE OF WEIGHTS TO KEEP THE SIGN OR BARRICADE FROM TURNING OVER, THE USE OF SOME TYPE OF SANDBAG IS RECOMMENDED. THE USE OF PIECES OF CONCRETE, ROCKS, IRON, STEEL OR OTHER SOLID OBJECTS WILL NOT BE PERMITTED. SIGNING SHOWN ON THE DETAILS IS TYPICAL AND MAY BE ADJUSTED TO FIT FIELD CONDITIONS. NO MORE THAN 2 SIGNS SHALL BE PLACED ON A BARRICADE.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING APPROPRIATE VISIBILITY OF NEW OR EXISTING SIGNALS. THE CONTRACTOR WILL BE RESPONSIBLE FOR TEMPORARY SIGNALS OR SIGNAL RELOCATIONS NECESSARY TO MEET THE VISIBILITY REQUIREMENTS IN THE TEXAS MUTCD WHEN TRAFFIC IS DETOURED TO ANOTHER PART OF THE ROADWAY EVEN IF NO OTHER SIGNAL WORK IS PART OF THE CONTRACT.
19. ADDITIONALLY, THE CITY SHALL NOT ALLOW AN EXISTING TRAFFIC SIGNAL OR FLASHER SYSTEM TO BE TURNED OFF AND STOP SIGNS USED TO CONTROL TRAFFIC. THE CONTRACTOR SHALL PLAN AHEAD AND CONSIDER THIS WHEN PLANNING HIS PROJECT STRATEGY. IT IS SUGGESTED THAT THE NEW POLES BE INSTALLED AS SOON AS POSSIBLE AND POSSIBLY TEMPORARILY WIRED OVERHEAD TO AVOID THIS PROBLEM. EXCEPT IN HIGHLY UNUSUAL CIRCUMSTANCES, THE CITY WILL REQUIRE THE CONTRACTOR TO PLACE THE NEW SIGNALS IN OPERATION BEFORE THE OLD SIGNALS ARE REMOVED. IF TEMPORARY SIGNALS CANNOT BE AVOIDED, THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL TEMPORARY SIGNALS.
20. THE CITY SHALL NOT SUPPLY NOR LEND OUT EQUIPMENT ON A CONTRACT-DEDUCTION BASIS OR ANY OTHER BASIS UNLESS SUCH ARRANGEMENT IS SO STATED IN THE PLANS OR APPROVED BY THE ENGINEER.
21. THE LOCATIONS OF UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ALL INVOLVED UTILITIES, TUNNELS, AND STORM DRAINS MAY NOT BE COMPLETE ON THE PLANS, AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY ADDITIONAL INFORMATION FROM THE APPLICABLE SOURCES PRIOR TO CONSTRUCTION, AND DETERMINING THE ACCURACY AND ADEQUACY OF SUCH INFORMATION NECESSARY FOR HIS PERFORMANCE OF THE WORK. DAMAGE TO ANY UTILITY OR EXISTING FACILITIES (INCLUDING DETECTOR LOOPS NOT INVOLVED IN THE PROJECT) SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE. EXISTING LOOP DETECTORS DAMAGED OR BROKEN BY THE CONTRACTOR SHALL BE REPLACED BY HIM AT NO EXPENSE TO THE CITY, UNLESS OTHER ARRANGEMENTS HAVE BEEN MADE IN WRITING WITH THE CITY.
22. ANY AND ALL MAINTENANCE, REATTACHMENTS TO CPS POLES OR CITY POLES, TEMPORARY SIGNALS, RELOCATION OF SIGNALS OVER LANES, OR POLE RELOCATIONS OR REMOVALS SHALL BE BY THE CONTRACTOR. THE CITY SHALL HAVE NO MAINTENANCE OR CONSTRUCTION RESPONSIBILITIES DURING CONSTRUCTION EXCEPT FOR THE TIMING IN THE CONTROLLER CABINET ITSELF.
23. DURING DETOURS, TRAFFIC SIGNAL HEADS MUST BE REPOSITIONED BY THE CONTRACTOR TO THE MINIMUM REQUIREMENTS OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND TO THE DIRECTIONS OF THE ENGINEER AND/OR INSPECTOR.
24. WHERE LEFT TURN ARROWS PRESENTLY EXIST AND A ONE-LANE DETOUR ROAD WILL BE BUILT AS A TEMPORARY CONSTRUCTION DETOUR, THE INSPECTOR AND ENGINEER MAY REQUIRE THE ARROW(S) BE ELIMINATED TEMPORARILY BY THE CONTRACTOR TO FACILITATE TRAFFIC MOVEMENT.
25. IN THE EVENT THAT THE CONTRACTOR OR THEIR SUB-CONTRACTOR DAMAGES ANY TRAFFIC SIGNAL FACILITIES TO THE POINT THAT THE SIGNAL INSTALLATION IS INOPERATIVE IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO SET TEMPORARY STOP SIGNS AS SOON AS POSSIBLE. IT WILL ALSO BE THE CONTRACTOR'S RESPONSIBILITY TO HAVE AN OFF-DUTY POLICE OFFICER ON THE SITE WITHIN TWO HOURS OF THE NON-FUNCTIONING SIGNAL. IF THE SIGNAL IS NOT REPAIRED TO THE ENGINEER'S SATISFACTION WITHIN THE FIRST HOUR. IN THE EVENT THAT THE CONTRACTOR IS UNABLE TO ACCOMPLISH THE ABOVE, THE CITY OF ALAMO HEIGHTS SHALL AT IT'S OPTION SEND AN ON-DUTY POLICE OFFICER TO THE SITE AND HAVE ANOTHER INDEPENDENT PRIVATE TRAFFIC SIGNAL CONTRACTOR TO FACILITATE THE REPAIRS. ANY AND ALL COST INCURRED BY THE CITY OF ALAMO HEIGHTS TO REPAIR THE DAMAGED SIGNAL FACILITIES SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR FOR THE PROJECT.

CITY OF ALAMO HEIGHTS
6116 BROADWAY, ST.
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15985

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
GENERAL NOTES CONT.

SHEET
G-104

ESTIMATED QUANTITIES				CIVIL (C-111)	DEMOLITION (C-106 TO C-110)	PVMT. MARKING & SIGNAGE (C-120)	PHB SIGNAL (C-118)	UTILITIES (C-123)	LANDSCAPE	OVERALL ADDITIONAL QUANTITIES
SPEC	DESCRIPTION	UNIT	QTY							
100.1	MOBILIZATION	LS	1	0	0	0	0	0	0	1
101.1	PREPARING RIGHT-OF-WAY	LS	1	0	0	0	0	0	0	1
103.1	REMOVE CONCRETE CURB (700 LF < X < 10,000 LF)	LF	986	0	986	0	0	0	0	0
103.3	REMOVE SIDEWALKS AND DRIVEWAYS (1,000 SF < X < 3,000 SF)	SF	3924	0	3924	0	0	0	0	0
103.4	REMOVE MISCELLANEOUS CONCRETE	SF	536	0	536	0	0	0	0	0
104.1	STREET EXCAVATION (1,000 CY < X < 10,000 CY)	CY	1636	0	1636	0	0	0	0	0
200.1	FLEXIBLE BASE (12" COMPACTED DEPTH)	SY	219	219	0	0	0	0	0	0
202.1	PRIME COAT	GAL	118.6	118.6	0	0	0	0	0	0
203.1	TACK COAT	GAL	139.3	139.3	0	0	0	0	0	0
205.2	HOT MIX ASPHALTIC PAVEMENT TYPE B (4" COMP DEPTH) (< 10,000 SY)	SY	374	374	0	0	0	0	0	0
205.3	HOT MIX ASPHALTIC PAVEMENT TYPE C (6" COMP DEPTH) (< 10,000 SY)	SY	219	219	0	0	0	0	0	0
205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (1.5" COMP DEPTH) (< 10,000 SY)	SY	100	0	0	0	0	0	0	100
205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (2" COMP DEPTH) (1,000 < X < 5,000 SY)	SY	1393	1393	0	0	0	0	0	0
205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (3" COMP DEPTH)	SY	100	0	0	0	0	0	0	100
208.1	SALVAGING, HAULING, AND STOCKPILING RECLAIMABLE ASPHALTIC PAVMENT (2" DEPTH)	SY	1174	1174	0	0	0	0	0	0
208.1	SALVAGING, HAULING, AND STOCKPILING RECLAIMABLE ASPHALTIC PAVMENT (3" DEPTH)	SY	100	0	0	0	0	0	0	100
208.1	SALVAGING, HAULING, AND STOCKPILING RECLAIMABLE ASPHALTIC PAVMENT (4" DEPTH)	SY	100	0	0	0	0	0	0	100
209.1	CONCRETE PAVEMENT (6" DEPTH)	SY	374	374	0	0	0	0	0	0
209.1	CONCRETE PAVEMENT (8" DEPTH)	SY	42	42	0	0	0	0	0	0
209.1	CONCRETE PAVEMENT (8" DEPTH) (INTEGRATED COLOR)	SY	30	30	0	0	0	0	0	0
209.2	REINFORCED CONCRETE BUS PAD	SY	264	264	0	0	0	0	0	0
308.1	DRILLED SHAFTS (36")	LF	32	0	0	0	32	0	0	0
413.1	FLOWABLE FILL (LOW STRENGTH)	CY	50	0	0	0	0	0	0	50
500.1	CONCRETE CURB (> 1,000 LF)	LF	1067	1067	0	0	0	0	0	0
502.1	CONCRETE SIDEWALKS (> 1,000 SY)	SY	362	179	0	0	0	0	183	0
502.3	SIDEWALK DRAIN (4')	EA	1	1	0	0	0	0	0	0
503.2	PORTLAND CEMENT CONCRETE DRIVEWAY (COMMERCIAL)	SY	69	69	0	0	0	0	0	0
504.1	CONCRETE MEDIAN	SY	32	32	0	0	0	0	0	0
505.1	CONCRETE RIPRAP (4" THICK)	SY	50	0	0	0	0	0	0	50
505.1	CONCRETE RIPRAP (5" THICK)	SY	170	170	0	0	0	0	0	0
506.1	CONCRETE RETAINING WALLS (COMB. TYPE)	CY	10	10	0	0	0	0	0	0
512.1	ADJUSTING EXISTING MANHOLES	EA	1	0	0	0	0	1	0	0
512.3	VALVE BOX ADJUSTMENTS	EA	4	0	0	0	0	4	0	0
515.1	TOPSOIL (< 500 CY)	CY	5.8518519	5.851851852	0	0	0	0	0	0
516.1	BERMUDA SODDING (< 2,000 SY)	SY	52.666667	52.66666667	0	0	0	0	0	0
530.1	BARRICADES, SIGNS AND TRAFFIC HANDLING	LS	1	0	0	0	0	0	0	1
531.2	R7-1 METRO ST. NAME, BLK NUMBERS (VARIES x 24")(HIGH INTENSITY)	EA	2	0	0	2	0	0	0	0
531.3	R1-1 STOP (30")(HIGH INTENSITY)	EA	1	0	0	1	0	0	0	0
531.21	R7-1 NO PARKING ANYTIME (18" X 24")(HIGH INTENSITY)	EA	2	0	0	2	0	0	0	0
531.44	W16-7 DIAGONAL ARROW SIGN(24"x12")(HIGH INTENSITY)	EA	4	0	0	4	0	0	0	0
531.51	W11-2 PED CROSSING (30" X 30")(HIGH INTENSITY)	EA	4	0	0	4	0	0	0	0
531.62	W16-9P AHEAD (36" X 20")(HIGH INTENSITY)	EA	2	0	0	2	0	0	0	0
531.XX	R10-23 STOP ON RED SIGN	EA	2	0	0	2	0	0	0	0
535.1	4 INCH WIDE YELLOW LINE (< 100,000 LF)	LF	1633	0	0	1633	0	0	0	0
535.2	4 INCH WIDE WHITE LINE (< 30,000 LF)	LF	1200	0	0	1200	0	0	0	0
535.3	6 INCH WIDE YELLOW LINE	LF	349	0	0	349	0	0	0	0
535.3	8 INCH WIDE YELLOW LINE	LF	104	0	0	104	0	0	0	0
535.4	6 INCH WIDE WHITE LINE	LF	1086	0	0	1086	0	0	0	0
535.4	8 INCH WIDE WHITE LINE	LF	92	0	0	92	0	0	0	0
535.*	12 INCH WHITE LINE	LF	89	0	0	89	0	0	0	0
535.7	24 INCH WIDE WHITE LINE (< 1,500 LF)	LF	346	0	0	346	0	0	0	0
536.21	12 INCH WIDE BLACK LINE	LF	480	0	0	480	0	0	0	0
540	TEMPORARY EROSION, SEDIMENTATION AND WATER POLLUTION PREVENTION CONTROL	LS	1	0	0	0	0	0	0	1
615.1	TRAFFIC SIGNAL CONTROLLER ASSEMBLY (TYPE 332 CABINET)	EA	1	0	0	0	1	0	0	0
618.1	CONDUIT (2 INCH/PVC SCHEDULE 40)	LF	60	0	0	0	60	0	0	0
618.2	CONDUIT (3 INCH/PVC SCHEDULE 40)	LF	120	0	0	0	120	0	0	0
618.5	CONDUIT (3 INCH/PVC SCHEDULE 40)(BORE)	LF	90	0	0	0	90	0	0	0
620.1	ELECTRICAL CONDUCTORS (NO. 6)(BARE)	LF	82	0	0	0	82	0	0	0
620.2	ELECTRICAL CONDUCTORS (NO. 8)(BARE)	LF	330	0	0	0	330	0	0	0
620.3	ELECTRICAL CONDUCTORS (NO. 6)(INSULATED)	LF	290	0	0	0	290	0	0	0
624.8	GROUND BOXES TYPE D (162922) WITH APRON	EA	3	0	0	0	3	0	0	0
628.1	ELECTRICAL SERVICES (INSTALLATION)	EA	1	0	0	0	1	0	0	0
655.1	TYPE 332 CONTROLLER FOUNDATION	EA	1	0	0	0	1	0	0	0
682.1	INSTALL VEHICLE SIGNAL SECTION WITH BACK PLATE (12 INCH)(1 SECTION)	EA	12	0	0	0	12	0	0	0
684.1*	TRAFFIC SIGNAL CABLES (TYPE A)(14 AWG)(CONDUCTOR NO. 4)	EA	250	0	0	0	250	0	0	0
684.1	TRAFFIC SIGNAL CABLES (TYPE A)(14 AWG)(CONDUCTOR NO. 9)	EA	2420	0	0	0	2420	0	0	0
684.1	TRAFFIC SIGNAL CABLES (TYPE A)(16 AWG)(CONDUCTOR NO. 3)	EA	460	0	0	0	460	0	0	0
686.1	INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(1 ARM 32')(LUM)	EA	2	0	0	0	2	0	0	0
687.1	PEDESTAL POLE ASSEMBLY	EA	1	0	0	0	1	0	0	0
688.2	PEDESTRIAN DETECTORS (2 INCH PUSH BUTTON)	EA	3	0	0	0	3	0	0	0
805.1	POLICE OFFICER;	HR	80	0	0	0	0	0	0	80
5073	PRECAST CONCRETE WHEEL STOP	EA	22	22	0	0	0	0	0	0
6001	PORTABLE CHANGEABLE MESSAGE SIGN (TXDOT SPEC)	EA	3	0	0	0	0	0	0	3
LA 1	FINE GRADING	LS	1	0	0	0	0	0	1	0
LA 2	BRICK PAVERS	SF	1380	0	0	0	0	0	1380	0
LA 4	RAW STEEL FOOT BRIDGE	EA	2	0	0	0	0	0	2	0
LA 5	C.M.U. CONCRETE SEAT WALLS	LF	57	0	0	0	0	0	57	0
LA 6	SHADE TREE 4-5" CAL.	EA	5	0	0	0	0	0	5	0
LA 7	SHADE TREE 6" CAL.	EA	1	0	0	0	0	0	1	0
LA 8	ORNAMENTAL TREE 2" CAL.	EA	8	0	0	0	0	0	8	0
LA 9	SOIL AMENDMENT IN PLANTING BED	SF	4295	0	0	0	0	0	4295	0
LA 10	PLANT BEDS (GROUNDCOVER PLANTING)	SF	4295	0	0	0	0	0	4295	0
LA 11	PERMANENT IRRIGATION SYSTEM	SF	4295	0	0	0	0	0	4295	0
LA 12	BIKE RACK	EA	3	0	0	0	0	0	3	0
LA 13	24" - 48" LIMESTONE BOULDER	EA	145	0	0	0	0	0	145	0
LA 14	LIGHTING ALLOWANCE	ALW	1	0	0	0	0	0	1	0
SS845.5	TEMPORARY CONSTRUCTION SECURITY FENCE	LF	468	0	0	0	468	0	0	0
SS845.6	TEMPORARY WOOD FENCE	LF	28	0	0	0	28	0	0	0
SUP 1	CPS POLE RELOCATION	EA	3	0	0	0	0	3	0	0
SUP 2	VIA BUS STOP (SHELTER) RELOCATION (PERMANENT)	LS	1	0	0	0	0	0	0	1
SUP 3	SWALE	LS	1	1	0	0	0	0	0	0

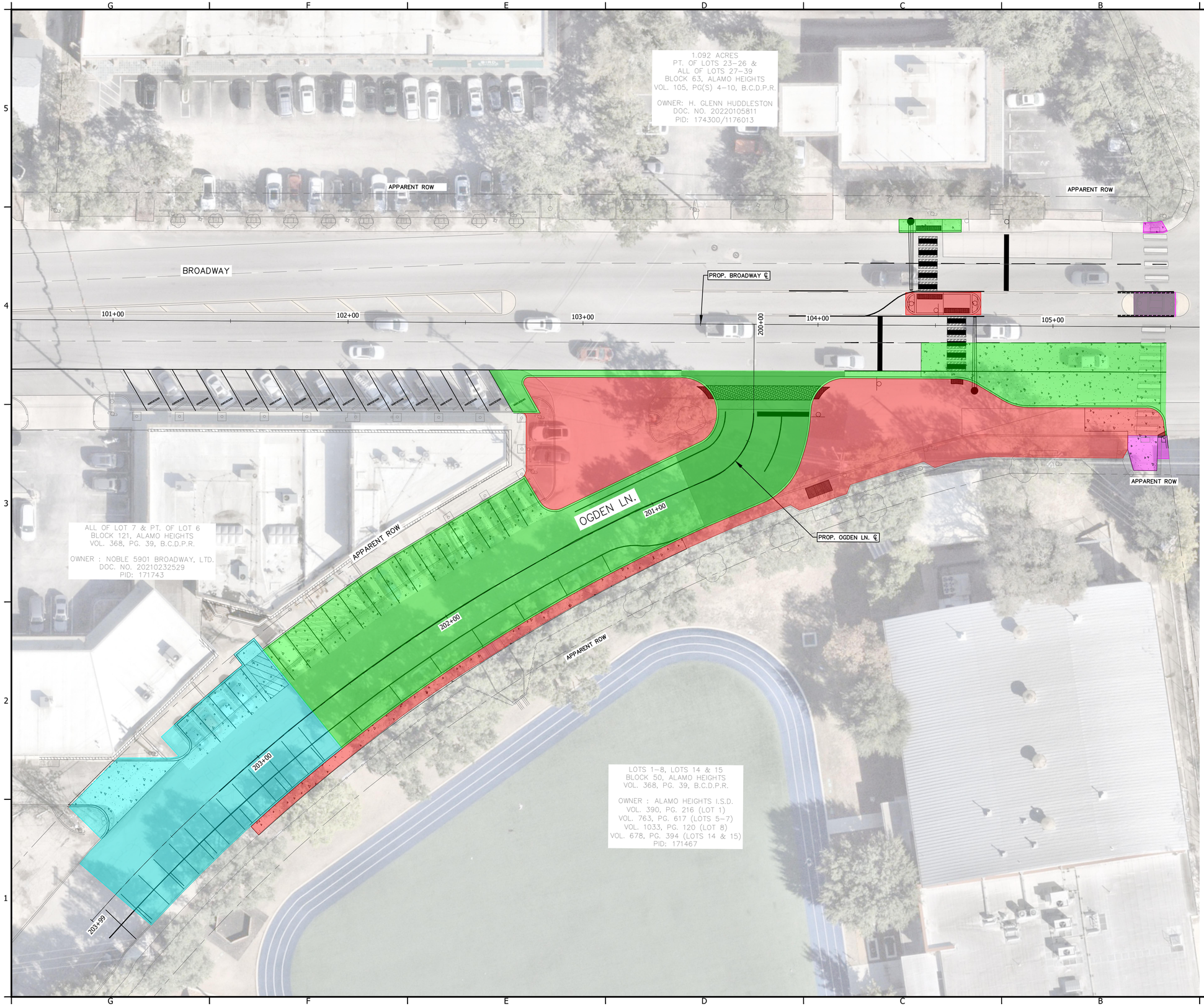
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO. F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
OVERALL QUANTITIES

SHEET
G-105



0' 10' 20' 40'

FULL SIZE: HORZ. 1"= 20'
HALF SIZE: HORZ. 1"= 40'

LEGEND

- PHASE 1
- PHASE 2A
- PHASE 2B
- PHASE 3

BROADWAY AND OGDEN, SEQUENCE OF WORK

1. INSTALL SWPPP, OVERALL DETOUR, AND MAINTAIN FOR DURATION OF PROJECT.
2. PREP. ROW
3. IMPLEMENT PHASE 1 TCP
   A. FOLLOW DEMOLITION PHASE 1, DEMO EXISTING CROSSWALK ON BROADWAY
   B. COMPLETE TEMPORARY RESTORATION
   C. TEAR DOWN TCP PHASE 1
4. IMPLEMENT TCP PHASE 2A
   A. FOLLOW DEMOLITION PHASE 2, DEMO EXISTING STREET AND PARKING
   B. INSTALL TEMPORARY PARKING ALONG OGDEN LN.
   C. INSTALL PROPOSED PAVEMENT AND PROPOSED CURB
   D. INSTALL PROPOSED DRAINAGE SYSTEM
   E. TEAR DOWN TCP PHASE 2A
5. IMPLEMENT TCP PHASE 2B
   A. FOLLOW DEMOLITION PHASE 3, DEMO EXISTING STREET AND PARKING
   B. INSTALL TEMPORARY SCREENED FENCING
   C. INSTALL PROPOSED PAVEMENT AND PROPOSED CURB
   D. TEAR DOWN TCP PHASE 2B
   E. RELEASE OGDEN LN. FOR TRAFFIC
6. IMPLEMENT TCP PHASE 3
   A. INSTALL PHB CROSSWALK
   B. COMPLETE ALL RESTORATION FOR BROADWAY CROSSWALK
   C. COMPLETE PROPOSED IMPROVEMENTS BEHIND PROPOSED CURB
   D. TEAR DOWN PEDESTRIAN SCREENED FENCING
   E. TEAR DOWN TCP PHASE 3
   F. RELEASE BROADWAY FOR TRAFFIC
8. COMPLETE FINAL CLEAN UP AND RESTORATION OF PROJECT LIMITS.
9. ADJUST SURFACE FEATURES TO FINISHED GRADE.
10. INSTALL STRIPING AND SIGNAGE.
11. FINAL ASPHALT RESTORATION.
12. FINAL CLEAN UP.

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
SAN ANTONIO, TEXAS 78209

FIRM NO. F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

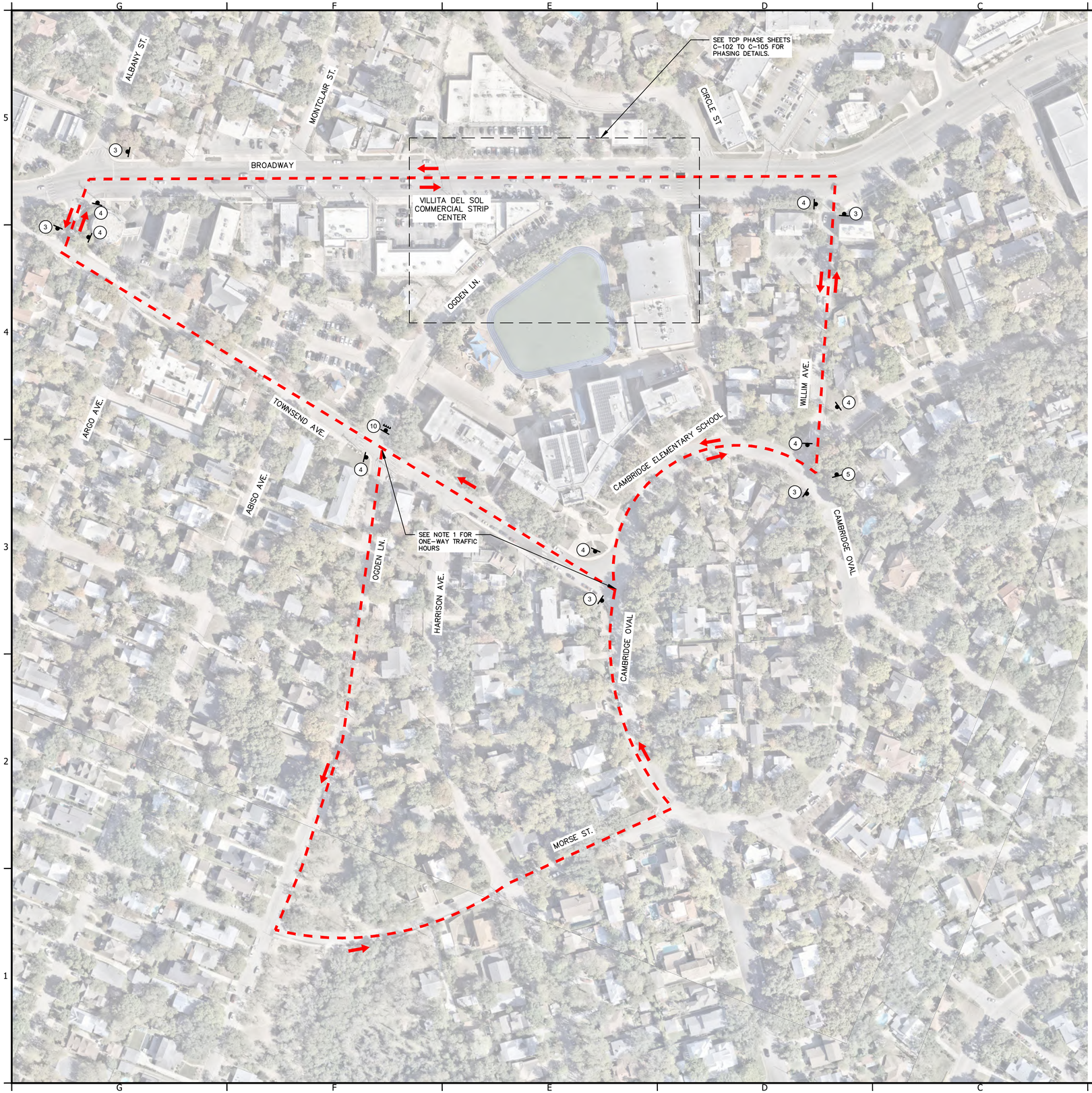
STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

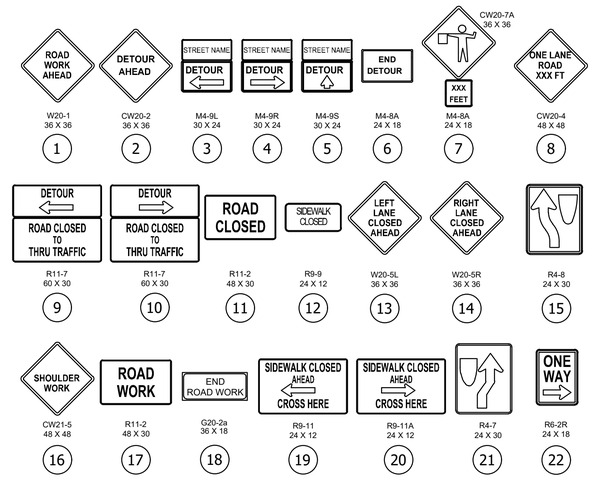
BROADWAY AND OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

TCP PHASING LAYOUT

SHEET
C-100





LEGEND

- PROPERTY BOUNDARY
- DETOUR ROUTE
- EXISTING TRAFFIC DIRECTION
- DETOUR TRAFFIC DIRECTION
- TYPE III BARRICADE (8')
- CHANNELIZING DEVICE
- LOW-PROFILE CONCRETE BARRIERS
- SIGN
- CONSTRUCTION AREA
- POTENTIAL ACCESS ROUTE
- POTENTIAL STAGING AREA
- PEDESTRIAN SCREENED FENCING

0' 50' 100' 200'

FULL SIZE: HORZ. 1"= 100'
HALF SIZE: HORZ. 1"= 200'

NOTES:

1. CONTRACTOR TO OBSERVE & MAINTAIN EX. ONE-WAY TRAFFIC CONDITIONS (TOWNSEND):

MON	–	FRI:
7:00AM	–	9:00AM
2:00PM	–	4:00PM

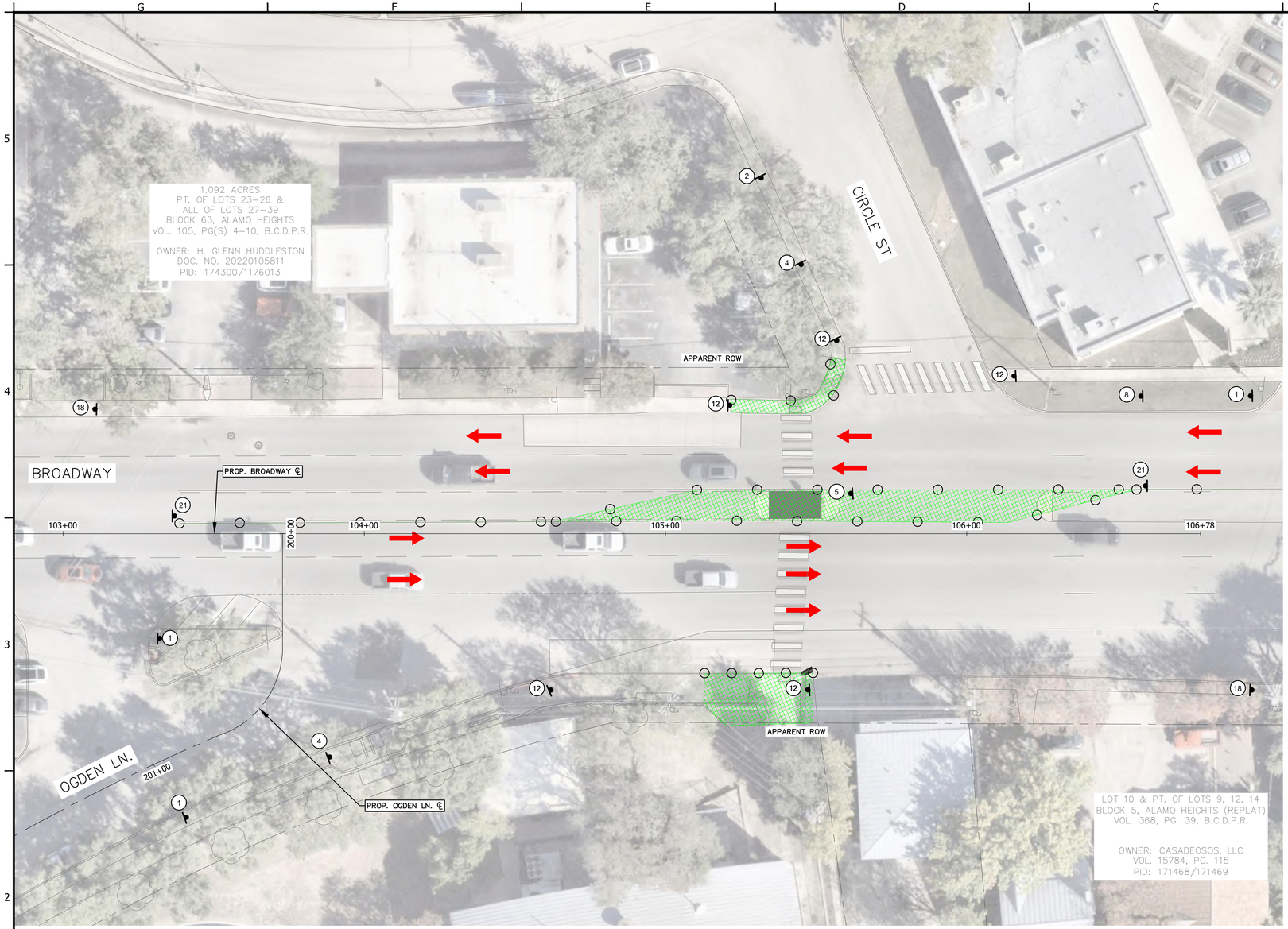
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
SAN ANTONIO, TEXAS 78209

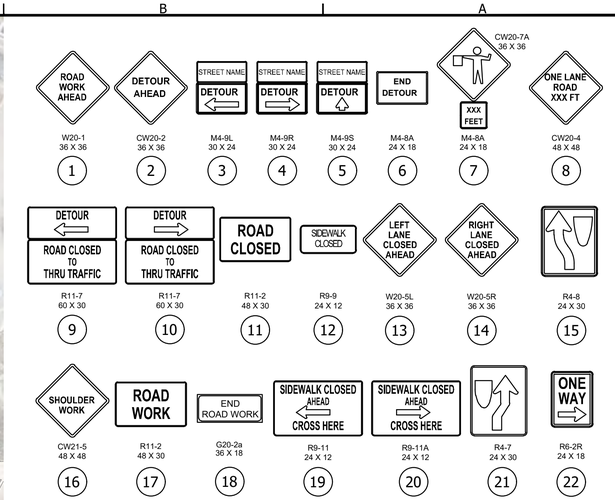
FIRM NO: F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY AND OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
DETOUR LAYOUT

SHEET
C-101





LEGEND

- PROPERTY BOUNDARY
- DETOUR ROUTE
- EXISTING TRAFFIC DIRECTION
- DETOUR TRAFFIC DIRECTION
- TYPE III BARRICADE (8')
- CHANNELIZING DEVICE
- LOW-PROFILE CONCRETE BARRIERS
- SIGN
- CONSTRUCTION AREA
- POTENTIAL ACCESS ROUTE
- POTENTIAL STAGING AREA
- PEDESTRIAN SCREENED FENCING — X — X — X — X —

0' 10' 20' 40'

FULL SIZE: HORZ. 1"= 20'
HALF SIZE: HORZ. 1"= 40'

NARRATIVE:

THE PURPOSE OF THIS PHASE IS TO REMOVE THE EXISTING MEDIAN ON BROADWAY INCLUDING THE CROSSWALK PAVEMENT MARKINGS,ADA RAMPS AND SIDEWALK CONNECTIONS.

STEPS:

1. CONTRACTOR TO COORDINATE WITH CAMBRIDGE ELEMENTARY SCHOOL 3 WEEKS PRIOR TO MOBILIZATION.
2. CONTRACTOR TO SET UP TRAFFIC CONTROL BARRICADES AND DETOUR SIGNAGE FOR DEMOLITION AND REMOVAL OF EXISTING CROSSWALK STRIPING AND FLATWORK.
3. CONTRACTOR TO DEMOLISH EXISTING CONCRETE MEDIAN AND CROSSWALK INFRASTRUCTURE.
4. CONTRACTOR TO RESTORE EXISTING CONCRETE SIDEWALKS AND INSTALL PROPOSED PAVEMENT REPLACING THE EXISTING MEDIAN.
5. CONTRACTOR TO REMOVE TRAFFIC CONTROL BARRICADING AND SIGNAGE ASSOCIATED WITH DEMOLITION AND LEAVE SIGNAGE ASSOCIATED WITH OVERALL DETOUR FOR REMAINING PHASES SHALL REMAIN IN PLACE.

NOTES:

1. REFER TO DEMOLITION PHASE 1, SHEET C–107 FOR DEMOLITION DETAILS.

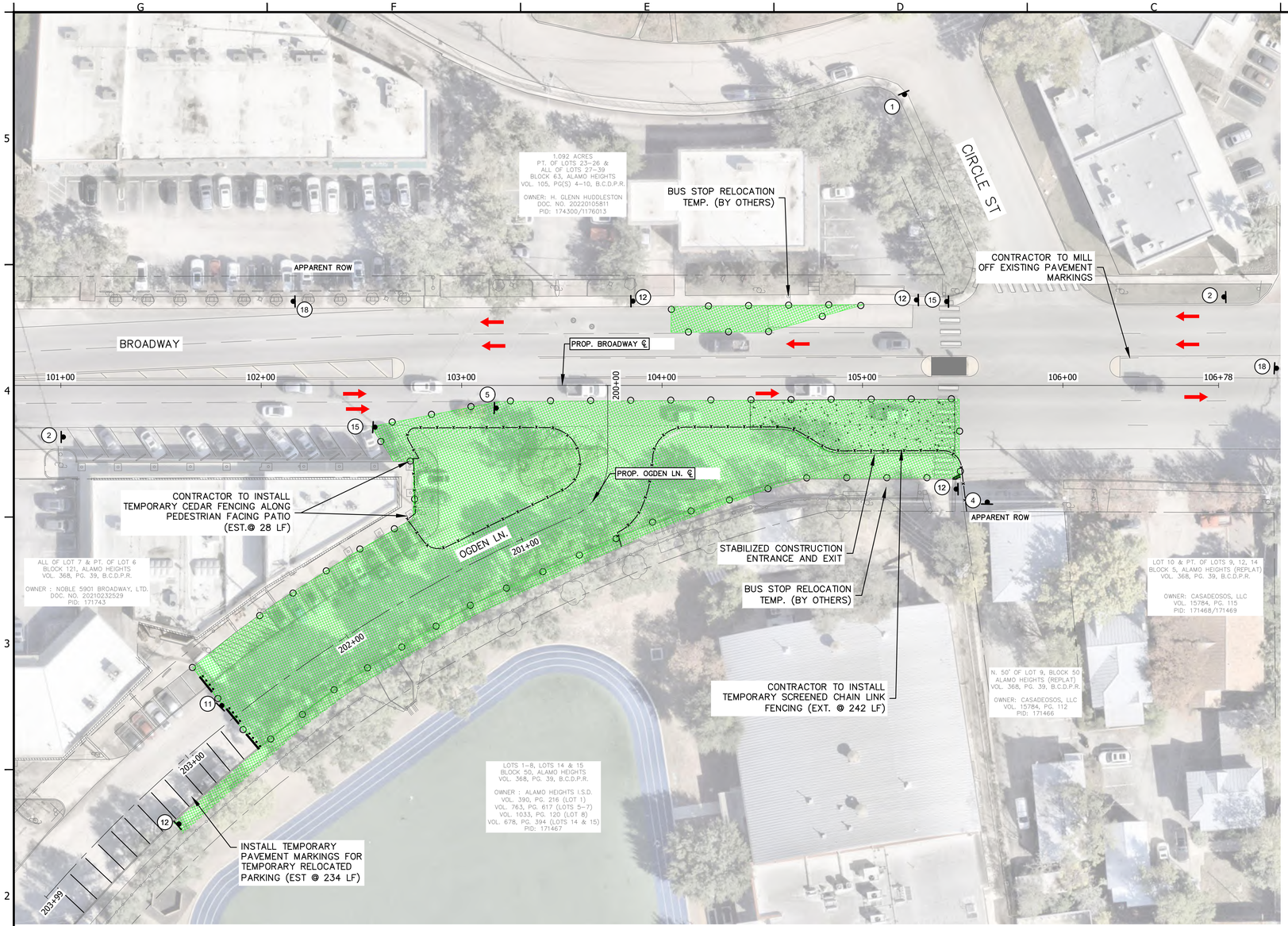
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
SAN ANTONIO, TEXAS 78209

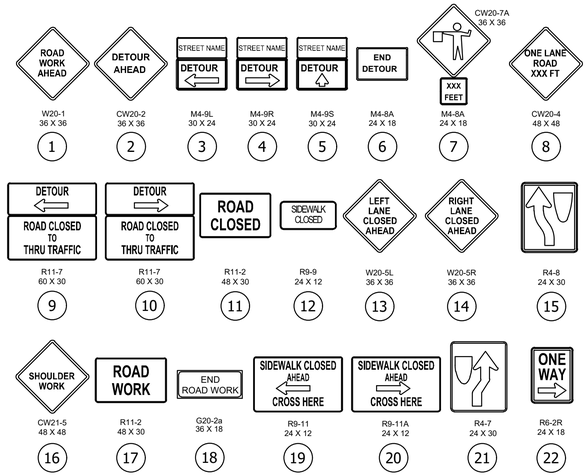
FIRM NO: F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY AND OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
TCP PHASE 1

SHEET
C-102





LEGEND

- PROPERTY BOUNDARY
- DETOUR ROUTE
- EXISTING TRAFFIC DIRECTION
- DETOUR TRAFFIC DIRECTION
- TYPE III BARRICADE (8')
- CHANNELIZING DEVICE
- LOW-PROFILE CONCRETE BARRIERS
- SIGN
- CONSTRUCTION AREA
- POTENTIAL ACCESS ROUTE
- POTENTIAL STAGING AREA
- PEDESTRIAN SCREENED FENCING

0' 15' 30' 60'

FULL SIZE: HORZ. 1"= 30'
HALF SIZE: HORZ. 1"= 60'

NARRATIVE:

THE PURPOSE OF THIS PHASE IS TO REMOVE EXISTING PAVEMENT, CURB AND SIDEWALK, AND LANDSCAPE MEDIAN ALONG ODGEN LN. TO CONSTRUCT CONCRETE BUS PAD, ASPHALT PAVEMENT AND CONCRETE CURB FROM STA 200+20 TO STA 202+70, AND INSTALL TEMPORARY SCREENED FENCING AROUND AREAS TO BE RESTORED IN FUTURE TCP PHASE.

1. CONTRACTOR TO COORDINATE WITH CAMBRIDGE ELEMENTARY SCHOOL 2 WEEKS PRIOR FOR ANTICIPATED TRAFFIC CONTROL PHASING PATTERN CHANGE.
2. CONTRACTOR TO SET UP TRAFFIC CONTROL BARRICADES FOR DEMOLITION OF EXISTING OGDEN LN. AND MAINTAIN ACCESS FOR AFFECTED PROPERTY OWNERS AT ALL TIMES.
3. CONTRACTOR TO IMPLEMENT TEMPORARY PAVEMENT MARKINGS FOR PARKING AS SHOWN IN PLANS.
4. CONTRACTOR TO DEMOLISH EXISTING OGDEN LN. ROADWAY AND FLAT WORK FROM STA 200+20 TO STA 202+70.
5. CONTRACTOR TO INSTALL PROPOSED ASPHALT PAVING, CONCRETE PARKING, CONCRETE CURB AND NECESSARY PAVEMENT MARKINGS ALONG OGDEN LN. FROM STA 200+20 TO STA 202+70 AND SOUTHBOUND BROADWAY.
6. CONTRACTOR TO REMOVE TRAFFIC CONTROL BARRICADING AND SIGNAGE ASSOCIATED WITH DEMOLITION. CONTRACTOR SHALL LEAVE TEMPORARY SCREENED FENCING AND SIGNAGE FOR OVERALL DETOUR IN PLACE FOR THE REMAINING PHASES.

NOTES:

1. REFER TO DEMOLITION PHASE 2, SHEET C-108, FOR DEMOLITION DETAILS.

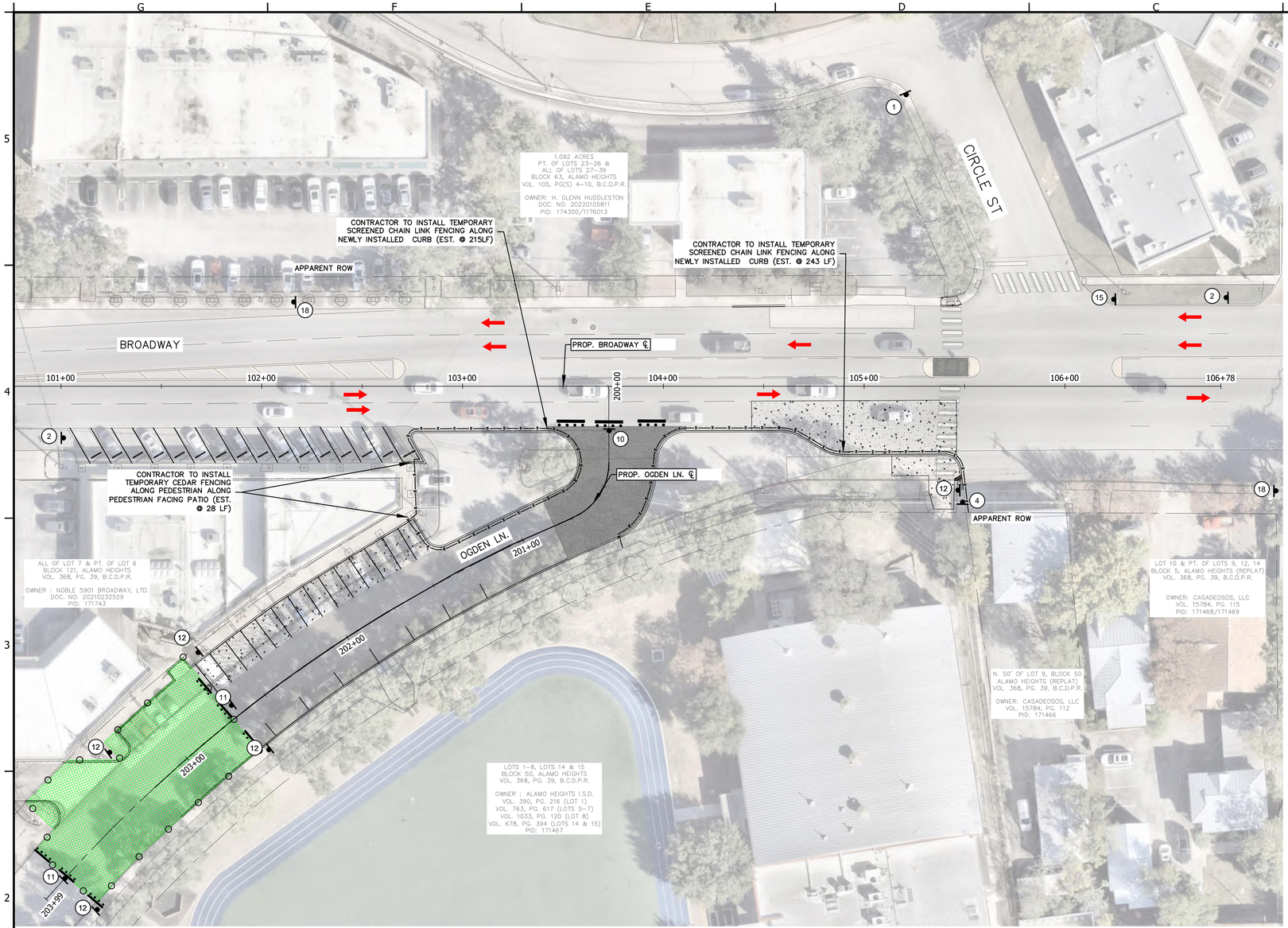
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
SAN ANTONIO, TEXAS 78209

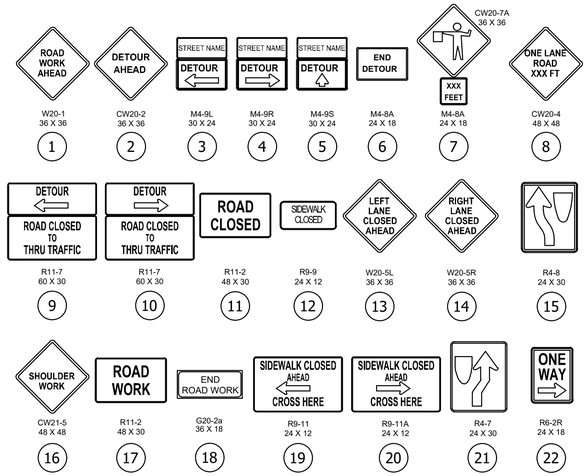
FIRM NO: F-15985
WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9324

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

BROADWAY AND OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
TCP PHASE 2A

SHEET
C-103





LEGEND

- PROPERTY BOUNDARY
- DETOUR ROUTE
- EXISTING TRAFFIC DIRECTION
- DETOUR TRAFFIC DIRECTION
- TYPE III BARRICADE (8')
- CHANNELIZING DEVICE
- LOW-PROFILE CONCRETE BARRIERS
- SIGN
- CONSTRUCTION AREA
- POTENTIAL ACCESS ROUTE
- POTENTIAL STAGING AREA
- PEDESTRIAN SCREENED FENCING

0' 15' 30' 60'

FULL SIZE: HORZ. 1"= 30'
HALF SIZE: HORZ. 1"= 60'

NARRATIVE:

THE PURPOSE OF THIS PHASE IS TO CONSTRUCT REMAINING FLATWORK AND PAVEMENT MARKINGS FOR OGDEN LN. FROM STA 202+70 TO STA 203+45.

1. CONTRACTOR TO COORDINATE WITH CAMBRIDGE ELEMENTARY SCHOOL 2 WEEKS PRIOR FOR ANTICIPATED TRAFFIC CONTROL PHASING PATTERN CHANGE.
2. CONTRACTOR TO SET UP TRAFFIC CONTROL BARRICADES FOR DEMOLITION OF EXISTING OGDEN LN. AND MAINTAIN ACCESS FOR AFFECTED PROPERTY OWNERS AT ALL TIMES.
3. CONTRACTOR TO DEMOLISH EXISTING OGDEN LN. ROADWAY AND ADJACENT PARKING.
4. CONTRACTOR TO INSTALL PROPOSED ROADWAY AND FLAT WORK IMPROVEMENTS ALONG OGDEN LN.
5. CONTRACTOR TO REMOVE TRAFFIC CONTROL BARRICADING AND SIGNAGE ASSOCIATED WITH DEMOLITION AND LEAVE SIGNAGE ASSOCIATED WITH OVERALL DETOUR AND FLAT WORK FROM STA. 202+70 TO END AND ASPHALT PAVING, CONCRETE PARKING, CONCRETE CURB AND NECESSARY PAVEMENT MARKINGS ALONG OGDEN LN. FROM STA 200+70 TO STA 203+85.

NOTES:

1. REFER TO DEMOLITION PHASE 3, SHEET C-109, FOR DEMOLITION DETAILS.
2. CONTRACTOR TO LIMIT THE IMPACT TO THE PUBLIC FOR THE WORK ACCESS LOCATIONS WITHIN THE SCREENED CHAIN LINK AREAS. CONTRACTOR TO CONSIDER UTILIZING STABILIZED CONSTRUCTION ACCESS POINTS FOR ACCESS TO WORK AREAS.

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
SAN ANTONIO, TEXAS 78209

FIRM NO: F-15065
WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9324

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

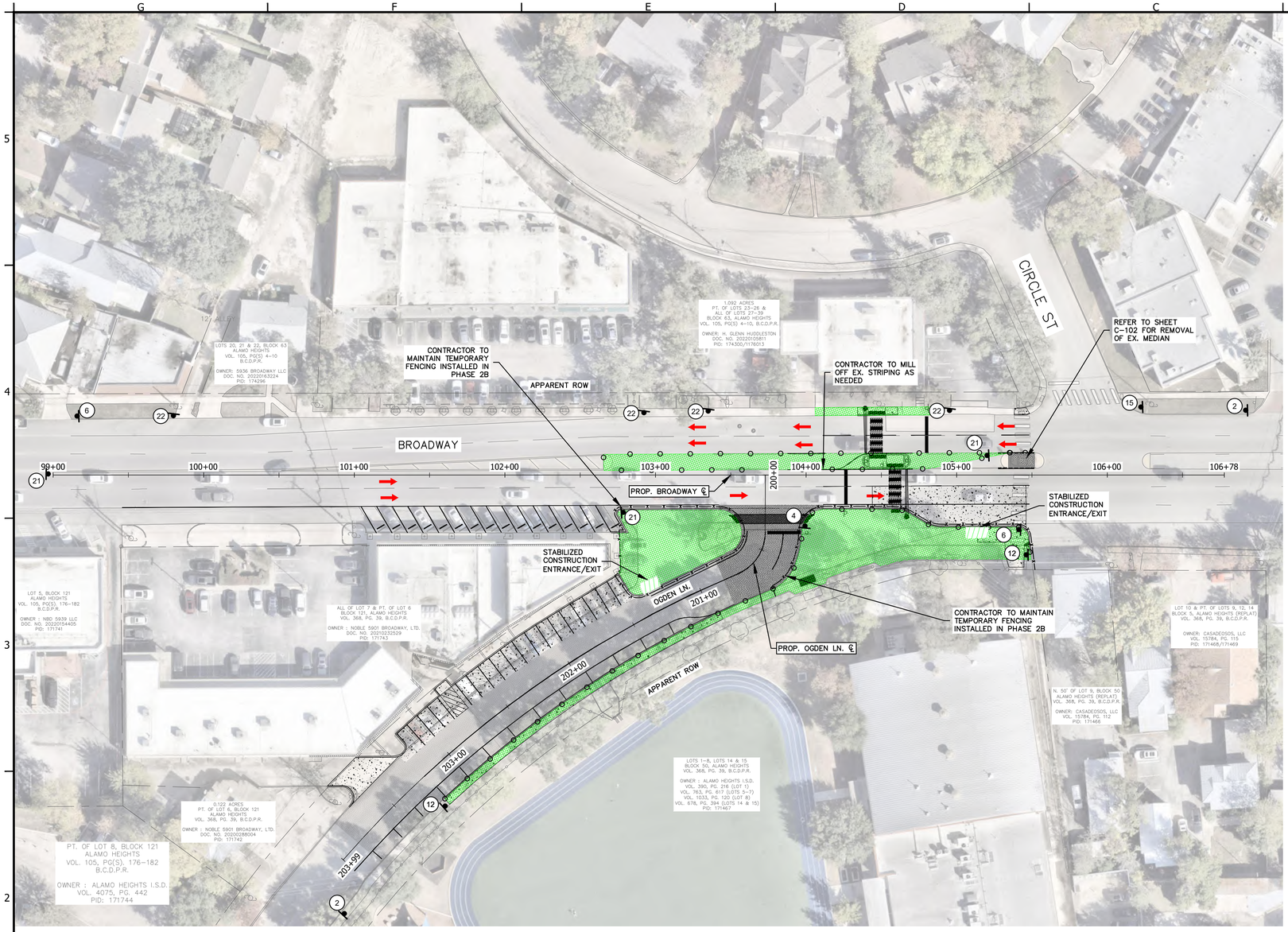
BROADWAY AND OGDEN LN. INTERSECTION PLANS

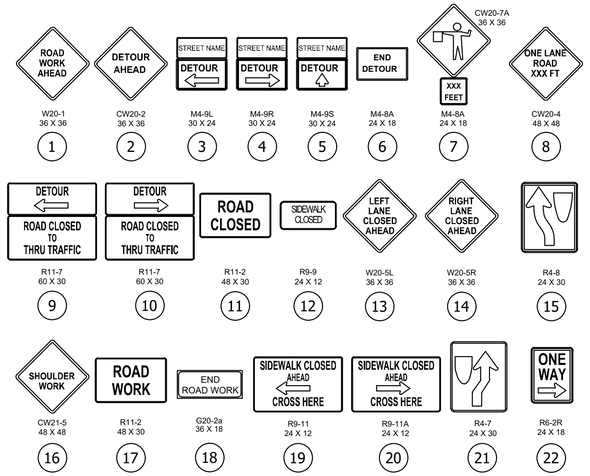
ALAMO HEIGHTS, TX

TCP PHASE 2B

SHEET

C-104





LEGEND

- PROPERTY BOUNDARY
- DETOUR ROUTE
- EXISTING TRAFFIC DIRECTION
- DETOUR TRAFFIC DIRECTION
- TYPE III BARRICADE (8')
- CHANNELIZING DEVICE
- LOW-PROFILE CONCRETE BARRIERS
- SIGN
- CONSTRUCTION AREA
- POTENTIAL ACCESS ROUTE
- POTENTIAL STAGING AREA
- PEDESTRIAN SCREENED FENCING

0' 20' 40' 80'

FULL SIZE: HORZ. 1"= 40'
HALF SIZE: HORZ. 1"= 80'

NARRATIVE:

THE PURPOSE IS THIS PHASE IS TO CONSTRUCT THE REMAINING FLATWORK BEHIND THE SCREENED FENCE, THE PEDESTRIAN HYBRID BEACON, MEDIAN, AND SIDEWALK ALONG OGDEN LN.

1. CONTRACTOR TO COORDINATE WITH CAMBRIDGE ELEMENTARY SCHOOL 2 WEEKS PRIOR FOR ANTICIPATED TRAFFIC CONTROL PHASING PATTERN CHANGE.
2. CONTRACTOR TO SET UP TRAFFIC CONTROL BARRICADES FOR INSTALLATION OF PROPOSED MEDIAN AND PHB SIGNAL WORK.
3. CONTRACTOR TO EXCAVATE EXISTING ROADWAY FOR MEDIAN INSTALLATION AND INSTALL PROPOSED TRAFFIC CONDUITS AND REQUIRED FLATWORK.
4. CONTRACTOR TO INSTALL REMAINING TRAFFIC INFRASTRUCTURE IMPROVEMENTS.
5. CONTRACTOR TO REMOVE TRAFFIC CONTROL BARRICADING AND SIGNAGE ASSOCIATED WITH OVERALL DETOUR AND PEDESTRIAN SCREENED FENCING.

NOTES:

1. REFER TO DEMOLITION PHASE 4, SHEET C-110, FOR DEMOLITION DETAILS.

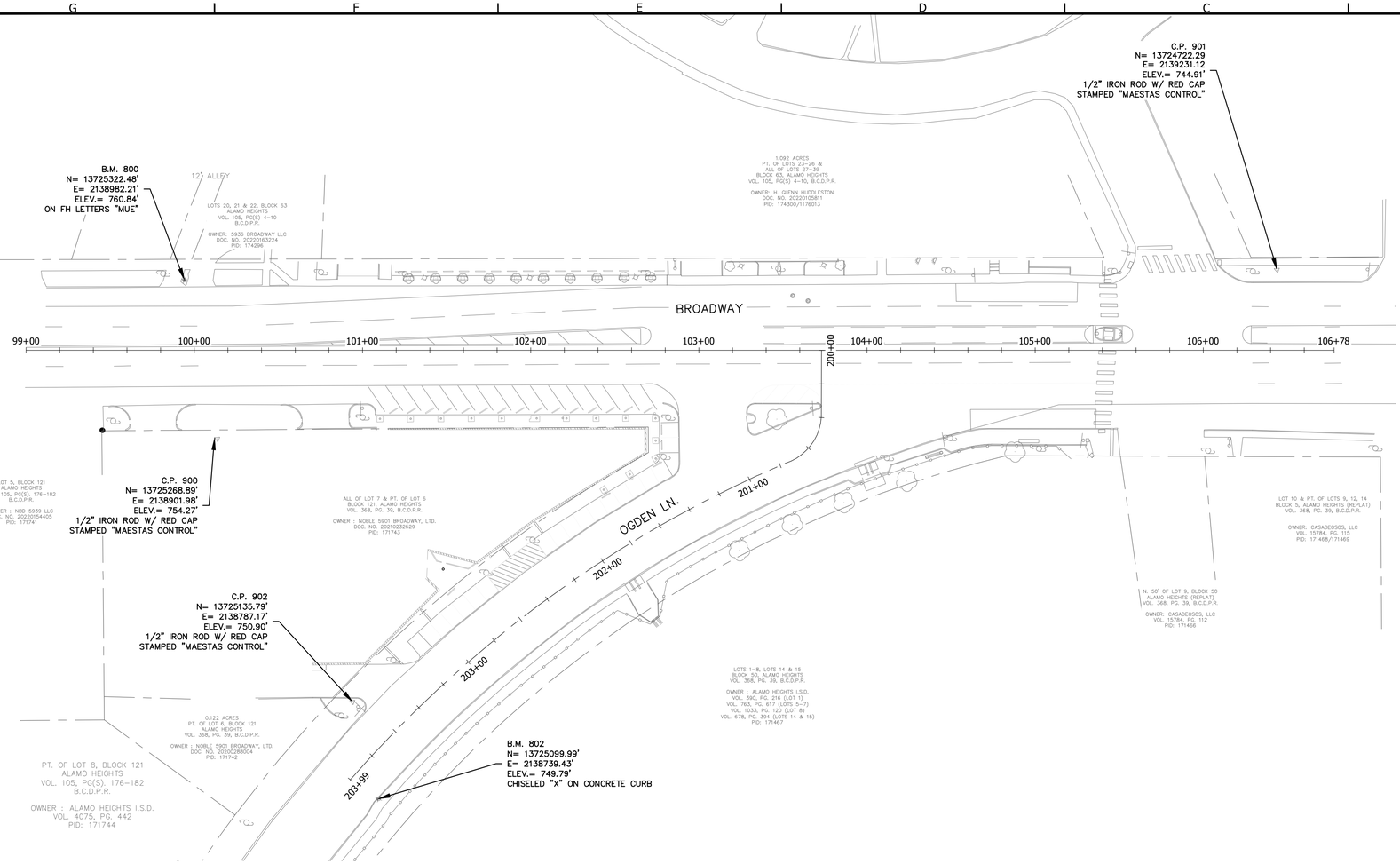
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
SAN ANTONIO, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9324
FIRM NO: F-15065

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

BROADWAY AND OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
TCP PHASE 3

SHEET
C-105



Horizontal Alignment Report

```
********************************************************************************
Alignment Name: Broadway CL
Station Range: Start:   99+00.00, End: 106+77.66
Description:
********************************************************************************

Begin Broadway CL
  N 13,725,394.1364   E 2,138,908.2242                    99+00.00

Line (1)
  S21° 59' 29.33"E    377.657'
  N 13,725,043.9576   E 2,139,049.6451                   102+77.66
Line (1)

Line (2)
  S21° 59' 29.33"E    200.000'
  N 13,724,858.5097   E 2,139,124.5388                   104+77.66
Line (2)

Line (3)
  S21° 59' 29.33"E    51.309'
  N 13,724,810.9335   E 2,139,143.7526                   105+28.97
Line (3)

Line (4)
  S21° 59' 29.33"E    148.691'
  N 13,724,673.0618   E 2,139,199.4326                   106+77.66
Line (4)

  N 13,724,673.0618   E 2,139,199.4326                   106+77.66
End Broadway CL

********************************************************************************
Alignment Length: 777.657'
********************************************************************************
```

```
********************************************************************************
Alignment Name: Proposed Ogden CL
Station Range: Start:   200+00.00, End: 203+99.30
Description:
********************************************************************************

Begin Proposed Ogden CL
  N 13,724,955.6575   E 2,139,085.3054                   200+00.00

Line (1)
  S68° 02' 46.98"W    39.482'
  N 13,724,940.8968   E 2,139,048.6861                   200+39.48
Line (1)

Curve (2)
  BC    N 13,724,940.8968   E 2,139,048.6861             200+39.48
  CTR   N 13,724,970.2273   E 2,139,038.8332
  PI    N 13,724,934.1256   E 2,139,028.5295

    Direction Back   S71° 25' 52.45"W
      Radius         30.941'
      Delta          68°59'45"(RT)
      Length         37.259'
      Tangent        21.264'
      Chord Direction      N74° 04' 15.22"W   Distance   35.049'
    Direction Ahead N39° 34' 22.89"W

  EC    N 13,724,950.5159   E 2,139,014.9833             200+76.74
Curve (2)

  Reversing Curve

  **Non-Tangent** Radial Bearing N44° 50' 32.74"E
Curve (3)
  BC    N 13,724,950.5159   E 2,139,014.9833             200+76.74
  CTR   N 13,724,441.8173   E 2,138,509.0751
  PI    N 13,725,066.1994   E 2,138,898.6618

    Direction Back   N45° 09' 27.26"W
      Radius         717.438'
      Delta          25°45'37"(LT)
      Length         322.560'
      Tangent        164.053'
      Chord Direction      N58° 02' 15.62"W   Distance   319.850'
    Direction Ahead N70° 55' 03.97"W

  EC    N 13,725,119.8324   E 2,138,743.6234             203+99.30
Curve (3)

  N 13,725,119.8324   E 2,138,743.6234                   203+99.30
End Proposed Ogden CL

********************************************************************************
Alignment Length: 399.302'
********************************************************************************
```

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO. F-15065

WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX

HORIZONTAL ALIGNMENT & SURVEY CONTROL POINTS

SHEET
C-106

1.092 ACRES
PT. OF LOTS 23–26 &
ALL OF LOTS 27–39
BLOCK 63, ALAMO HEIGHTS
VOL. 105, PG(S) 4–10, B.C.D.P.R.

OWNER: H. GLENN HUDDLESTON
DOC. NO. 20220105811
PID: 174300/1176013

ALL OF LOT 7 & PT. OF LOT 6
BLOCK 121, ALAMO HEIGHTS
VOL. 368, PG. 39, B.C.D.P.R.

OWNER : NOBLE 5901 BROADWAY, LTD.
DOC. NO. 20210232529
PID: 171743

LOTS 1–8, LOTS 14 & 15
BLOCK 50, ALAMO HEIGHTS
VOL. 368, PG. 39, B.C.D.P.R.

OWNER : ALAMO HEIGHTS I.S.D.
VOL. 390, PG. 216 (LOT 1)
VOL. 763, PG. 617 (LOTS 5–7)
VOL. 1033, PG. 120 (LOT 8)
VOL. 678, PG. 394 (LOTS 14 & 15)
PID: 171467

BROADWAY

PROP. BROADWAY CL

PROP. OGDEN CL

OGDEN LN

101+00
102+00
103+00
104+00
105+00
200+00
201+00
202+00
203+00
203+99

REMOVE EXISTING PEDESTRIAN CROSSING SIGN (EST. @ 1 EA)

REMOVE EXISTING CONCRETE SIDEWALK – ADA RAMP (EST. @ 41 SF)

REMOVE EXISTING PEDESTRIAN CROSSING SIGN (EST. @ 2 EA)

CONCRETE BUS PAD TO REMAIN

REMOVE EXISTING CONCRETE SIDEWALK – ADA RAMP (EST. @ 47 SF)

REMOVE EXISTING CONCRETE CURB (EST. @ 38 LF)

SAWCUT AND REMOVE EXISTING ASPHALT PAVEMENT (EST. @ 185 SF)

CONTRACTOR TO MILL EXISTING PAVEMENT MARKINGS FOR TWO WAY LEFT TURN LANE (NSPI).

CONTRACTOR TO MILL OFF EXISTING YELLOW STRIPING

REMOVE EXISTING CONCRETE MEDIAN–ADA RAMP (EST. @ 43 SF)

CONTRACTOR TO MILL OFF EXISTING CROSSWALK STRIPING

REMOVE EXISTING PEDESTRIAN CROSSING SIGN (EST. @ 1 EA)

REMOVE EXISTING CONCRETE CURB (EST. @ 17 LF)

REMOVE EXISTING CONCRETE SIDEWALK –ADA RAMP (EST. @ 185 SF)

0' 10' 20' 40'
FULL SIZE: HORZ. 1"= 20'
HALF SIZE: HORZ. 1"= 40'

LEGEND

- ASPHALT DEMO & REMOVAL
- REMOVE CONCRETE (BUS PAD/DRIVEWAY)
- REMOVE CONCRETE (SIDEWALK/MEDIAN)
- REMOVE LANDSCAPE MEDIAN
- REMOVE CONCRETE CURB
- REMOVE METAL GRATE
- REMOVE CROSSWALK PAVEMENT MARKINGS
- EXIST. RIGHT OF WAY
- EXIST. FENCE
- EXIST. SIGN
- EXIST. ELEC TEL MANHOLE
- EXIST. TREES
- EXIST. LIGHT POLES

STREET EXCAVATION LIMITS		
Point Number	Station	Offset
1	105+52.13	–14.810'L
2	105+52.20	–4.413'L
3	105+34.46	–4.332'L
4	105+34.36	–14.774'L

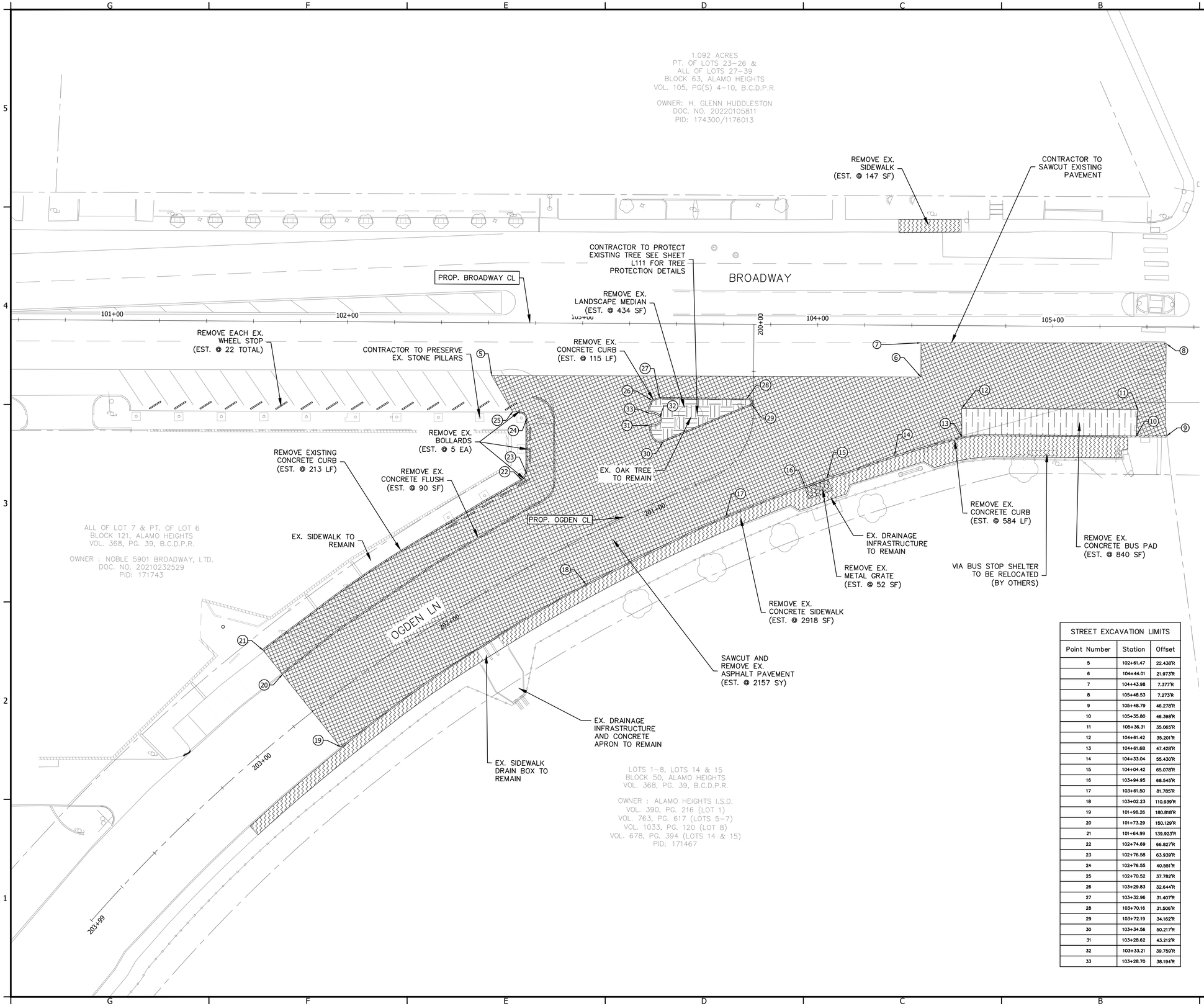
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
EXISTING CONDITIONS & DEMOLITION LAYOUT PH 1

SHEET
C-107



STREET EXCAVATION LIMITS		
Point Number	Station	Offset
5	102+61.47	22.438'R
6	104+44.01	21.973'R
7	104+43.98	7.377'R
8	105+48.53	7.273'R
9	105+48.79	46.278'R
10	105+35.80	46.398'R
11	105+36.31	35.065'R
12	104+61.42	35.201'R
13	104+61.68	47.428'R
14	104+33.04	55.430'R
15	104+04.42	65.078'R
16	103+94.95	68.545'R
17	103+61.50	81.785'R
18	103+02.23	110.939'R
19	101+98.26	180.818'R
20	101+73.29	150.129'R
21	101+64.99	139.923'R
22	102+74.69	66.827'R
23	102+76.58	63.939'R
24	102+76.55	40.551'R
25	102+70.52	37.782'R
26	103+29.83	32.644'R
27	103+32.96	31.407'R
28	103+70.16	31.506'R
29	103+72.19	34.162'R
30	103+34.56	50.217'R
31	103+28.62	43.212'R
32	103+33.21	39.759'R
33	103+28.70	38.194'R

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15985

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
DEMOLITION LAYOUT PH 2

SHEET
C-108

1.092 ACRES
PT. OF LOTS 23–26 &
ALL OF LOTS 27–39
BLOCK 63, ALAMO HEIGHTS
VOL. 105, PG(S) 4–10, B.C.D.P.R.

OWNER: H. GLENN HUDDLESTON
DOC. NO. 20220105811
PID: 174300/1176013

0' 10' 20' 40'
FULL SIZE: HORZ. 1"= 20'
HALF SIZE: HORZ. 1"= 40'

LEGEND

- ASPHALT DEMO & REMOVAL
- REMOVE CONCRETE (BUS PAD/DRIVEWAY)
- REMOVE CONCRETE (SIDEWALK/MEDIAN)
- REMOVE LANDSCAPE MEDIAN
- REMOVE CONCRETE CURB
- REMOVE METAL GRATE
- REMOVE CROSSWALK PAVEMENT MARKINGS
- EXIST. RIGHT OF WAY
- EXIST. FENCE
- EXIST. SIGN
- EXIST. ELEC TEL MANHOLE
- EXIST. TREES
- EXIST. LIGHT POLES

PROP. BROADWAY CL

BROADWAY

101+00 102+00 103+00 200+00 104+00 105+00

PROP. OGDEN CL

201+00

OGDEN LN

202+00

203+00

SAWCUT AND REMOVE EX. CONCRETE SIDEWALK (EST. @ 62 SF)

ALL OF LOT 7 & PT. OF LOT 6
BLOCK 121, ALAMO HEIGHTS
VOL. 368, PG. 39, B.C.D.P.R.

OWNER : NOBLE 5901 BROADWAY, LTD.
DOC. NO. 20210232529
PID: 171743

REMOVE EX. CONCRETE RIBBON (EST. @ 93 SF)

REMOVE EX. CONCRETE DRIVEWAY (EST. @ 574 SF)

SAWCUT AND REMOVE EX. ASPHALT PAVEMENT (EST. @ 576 SY)

REMOVE EX. CONCRETE SIDEWALK (EST. @ 212 SF)

LOTS 1–8, LOTS 14 & 15
BLOCK 50, ALAMO HEIGHTS
VOL. 368, PG. 39, B.C.D.P.R.

OWNER : ALAMO HEIGHTS I.S.D.
VOL. 390, PG. 216 (LOT 1)
VOL. 763, PG. 617 (LOTS 5–7)
VOL. 1033, PG. 120 (LOT 8)
VOL. 678, PG. 394 (LOTS 14 & 15)
PID: 171467

STREET EXCAVATION LIMITS		
Point Number	Station	Offset
34	101+64.99	139.923'R
35	101+73.00	149.768'R
36	101+73.29	150.129'R
37	101+98.26	180.817'R
38	101+17.53	256.714'R
39	100+87.28	231.025'R
40	101+34.32	183.597'R
41	101+33.14	180.253'R
42	101+26.82	173.064'R

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15065
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
DEMOLITION LAYOUT PH 3

SHEET
C-109

1.092 ACRES
PT. OF LOTS 23–26 &
ALL OF LOTS 27–39
BLOCK 63, ALAMO HEIGHTS
VOL. 105, PG(S) 4–10, B.C.D.P.R.

OWNER: H. GLENN HUDDLESTON
DOC. NO. 20220105811
PID: 174300/1176013

SAWCUT AND REMOVE EXISTING ASPHALT PAVEMENT (EST. @ 304 SF)

CONTRACTOR TO MILL EXISTING PAVEMENT MARKINGS FOR TWO WAY LEFT TURN LANE (NSPI).

PROP. BROADWAY CL

BROADWAY

101+00 102+00 103+00 104+00 105+00

200+00

PROP. OGDEN CL

201+00

OGDEN LN

202+00

203+00

203+99

43 44 45 46

ALL OF LOT 7 & PT. OF LOT 6
BLOCK 121, ALAMO HEIGHTS
VOL. 368, PG. 39, B.C.D.P.R.

OWNER : NOBLE 5901 BROADWAY, LTD.
DOC. NO. 20210232529
PID: 171743

LOTS 1–8, LOTS 14 & 15
BLOCK 50, ALAMO HEIGHTS
VOL. 368, PG. 39, B.C.D.P.R.

OWNER : ALAMO HEIGHTS I.S.D.
VOL. 390, PG. 216 (LOT 1)
VOL. 763, PG. 617 (LOTS 5–7)
VOL. 1033, PG. 120 (LOT 8)
VOL. 678, PG. 394 (LOTS 14 & 15)
PID: 171467

0' 10' 20' 40'
FULL SIZE: HORZ. 1"= 20'
HALF SIZE: HORZ. 1"= 40'

LEGEND

- ASPHALT DEMO & REMOVAL
- REMOVE CONCRETE (BUS PAD/DRIVEWAY)
- REMOVE CONCRETE (SIDEWALK/MEDIAN)
- REMOVE LANDSCAPE MEDIAN
- REMOVE CONCRETE CURB
- REMOVE METAL GRATE
- REMOVE CROSSWALK PAVEMENT MARKINGS
- EXIST. RIGHT OF WAY
- EXIST. FENCE
- EXIST. SIGN
- EXIST. ELEC TEL MANHOLE
- EXIST. TREES
- EXIST. LIGHT POLES

STREET EXCAVATION LIMITS		
Point Number	Station	Offset
43	104+37.25	–13.894'L
44	104+69.28	–14.200'L
45	104+69.35	–4.680'L
46	104+37.31	–4.570'L

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
DEMOLITION LAYOUT PH 4

SHEET
C-110

1.092 ACRES
PT. OF LOTS 23–26 &
ALL OF LOTS 27–39
BLOCK 63, ALAMO HEIGHTS
VOL. 105, PG(S) 4–10, B.C.D.P.R.

OWNER: H. GLENN HUDDLESTON
DOC. NO. 20220105811
PID: 174300/1176013

ALL OF LOT 7 & PT. OF LOT 6
BLOCK 121, ALAMO HEIGHTS
VOL. 368, PG. 39, B.C.D.P.R.

OWNER : NOBLE 5901 BROADWAY, LTD.
DOC. NO. 20210232529

LOTS 1–8, LOTS 14 & 15
BLOCK 50, ALAMO HEIGHTS
VOL. 368, PG. 39, B.C.D.P.R.

OWNER : ALAMO HEIGHTS I.S.D.
VOL. 390, PG. 216 (LOT 1)
VOL. 763, PG. 617 (LOTS 5–7)
VOL. 1033, PG. 120 (LOT 8)
VOL. 678, PG. 394 (LOTS 14 & 15)
PID: 171467

N. 50' OF LO
ALAMO HEIG
VOL. 368, PG

OWNER: CAS
VOL. 157
PID:

BROADWAY

PROP. BROADWAY ℄

OGDEN LN

PROP. OGDEN ℄

APPARENT ROW

APPARENT ROW

PROP. 5' SIDEWALK
(EST. @ 14 SY)
PROP. CURB
(EST. 26 LF)

PROPOSED
CONCRETE
BUS PAD

START FULL DEPTH
RECONSTRUCTION
STA: 200+20

END FULL DEPTH
RECONSTRUCTION
MATCH EX.
ASPHALT GRADES
STA: 105+48

START
PROP.
CURB TIE
INTO EX.

REFER TO
LANDSCAPE SHEETS
FOR CREEK BED
DETAILS

PATIO FOUNDATION
TO REMAIN

PROP. CURB
TO MATCH
EX. SIDEWALK

PROP. 6"
REINFORCED
CONCRETE
PAVEMENT

PROP. UNLOADING
AREA FOR DELIVERY
VEHICLES

PROP. CURB
(EST. @ 624 LF)

PROP. SAW CUT EX.
PAVEMENT

PROP.
DRIVEWAY

END PROP.
CURB TIE
INTO EX.

PROP. METAL GRATE
TIE INTO EX. DRAIN
BOX

PROP. CURB
(EST. @ 481 LF)

END FULL DEPTH RECONSTRUCTION
AND START MILL AND OVERLAY
STA: 200+83

START PROP. 5' SIDEWALK SAWCUT
AND TIE INTO PROP. SIDEWALK
(REF. LANDSCAPE PLANS)

TIE INTO EX. DRAIN BOX

CONTRACTOR TO INSTALL
TOPSOIL AND SODDING (EST.
@ 58 SY – 2 LF WIDE)

END PROP. 5' SIDEWALK
(EST. @ 122 SY)
SAWCUT AND TIE INTO
EXIST.

END PROP. CURB
AND GUTTER TIE
INTO EX.

END MILL AND OVERLAY
STA: 203+84
MATCH EX. ASPHALT GRADES

REFER TO
LANDSCAPE SHEETS
FOR CREEK BED
DETAILS

TIE INTO PROP. SIDEWALK
(REF. LANDSCAPE PLANS)

START PROP. 10'
SIDEWALK
(EST. @ 38 SY)
MATCH EX. GRADE

START PROP. CURB
AND GUTTER TIE
INTO EX. DRIVEWAY
GRADE

101+00 102+00 103+00 104+00 105+00

200+00 201+00 202+00 203+00 203+99

13' 12' 11' 15' 118' 11' 10' 11' 12' 7' 20' 3' 11' 10' 9' 5' 15' 80'

.65% .96% .33%

0' 10' 20' 40'
FULL SIZE: HORZ. 1"= 20'
HALF SIZE: HORZ. 1"= 40'

LEGEND

- PROP. CONCRETE
- PROP. CURB
- PROP. MILL AND OVERLAY
- PROP. FULL RECONSTRUCTION
- PROP. SIGN

NOTES:

1. REFER TO SIGNAGE AND STRIPING SHEET FOR SIGN AND STRIPING DETAILS.

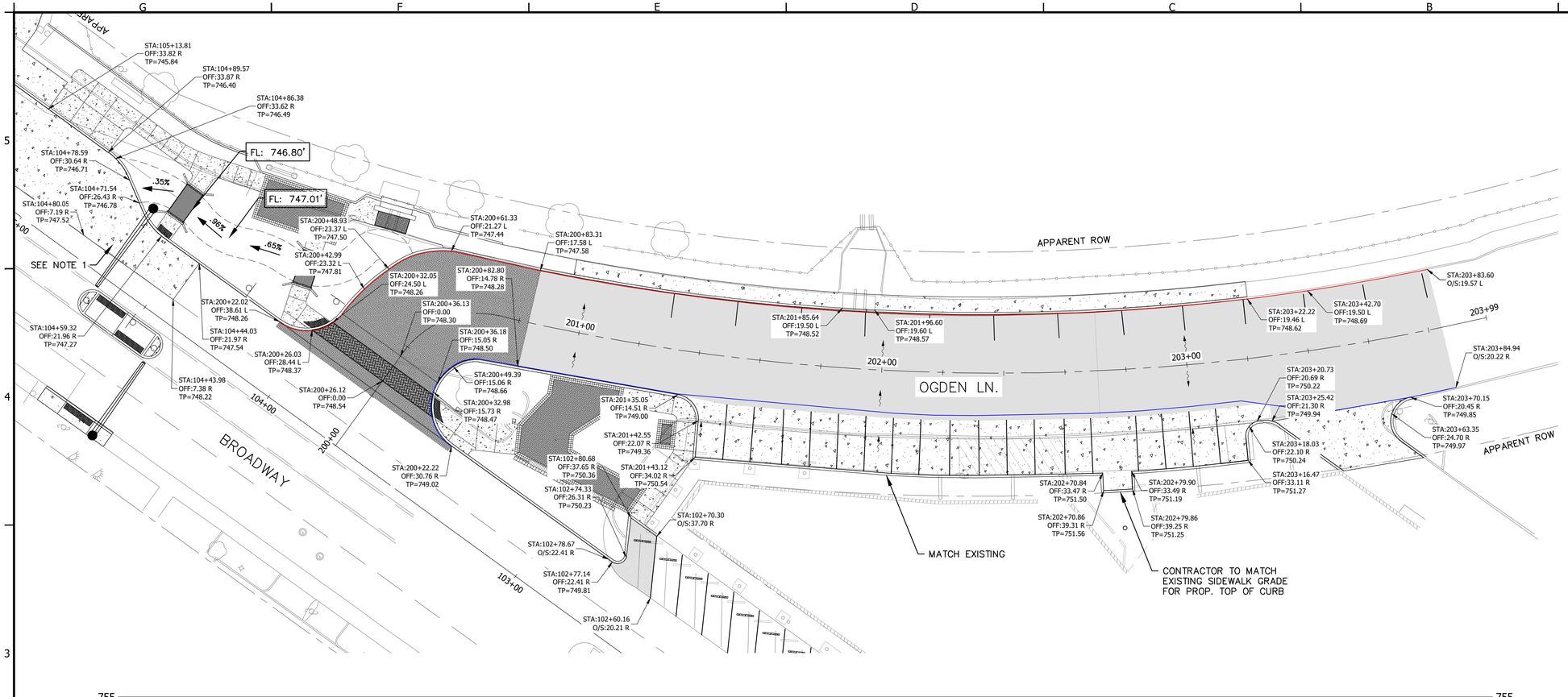
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15905

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

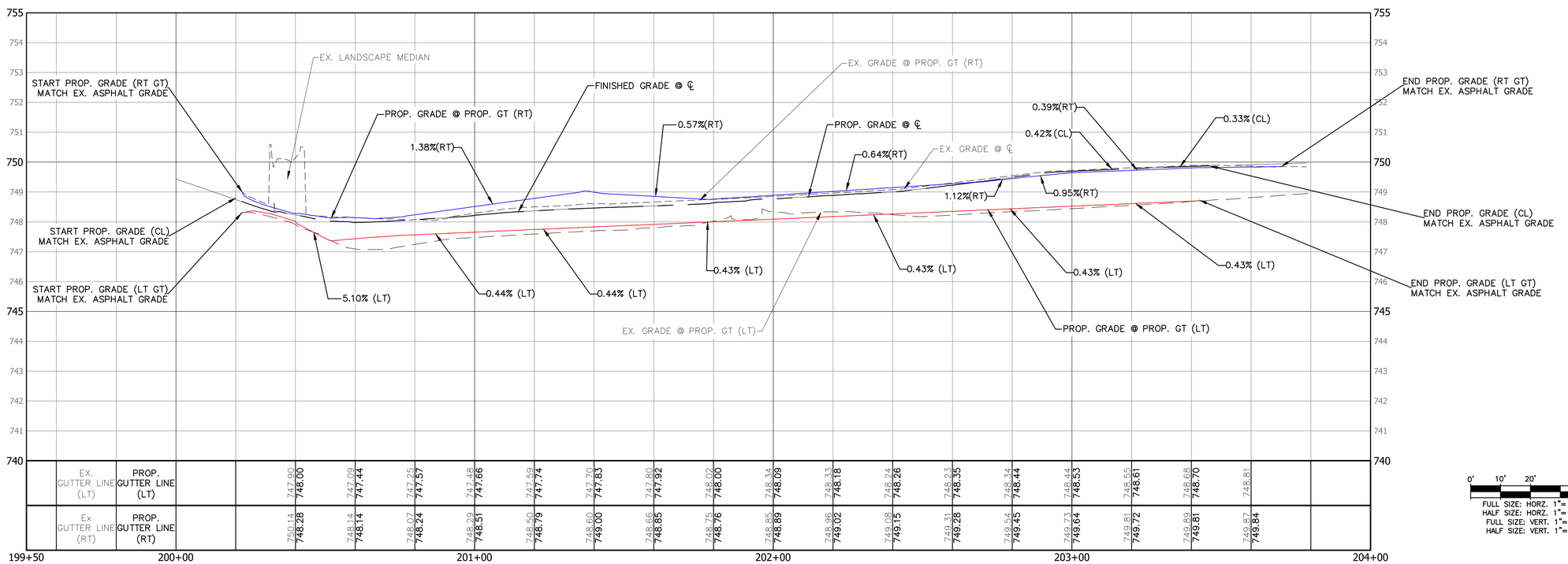
BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
PROPOSED CIVIL LAYOUT

SHEET
C-111



NOTES:

1. CONTRACTOR TO SUBMIT A RFI FOR REQUEST OF THE PROPOSED SURFACE CAD FILE AND REFERENCE PROPOSED GRADES. PROPOSED FINISHED GRADES FOR BUS PAD INCLUDE INTERMEDIATE CROSS SLOPE GRADE BREAK FOR CROSS SLOPE TRANSITION FROM EXISTING BROADWAY ASPHALT CROSS SLOPE TO PROPOSED 2% CROSS SLOPE AT BUS PAD AT STOPPING LOCATION.



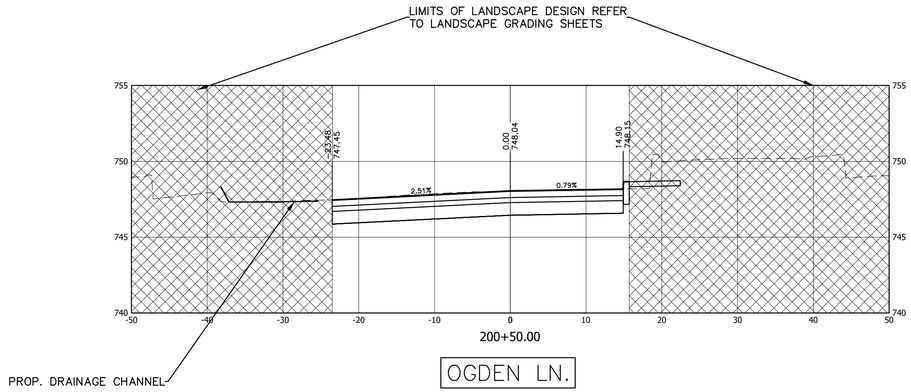
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

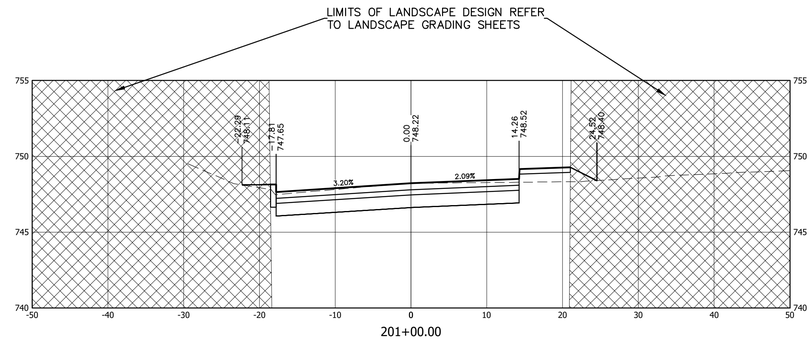
WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15905

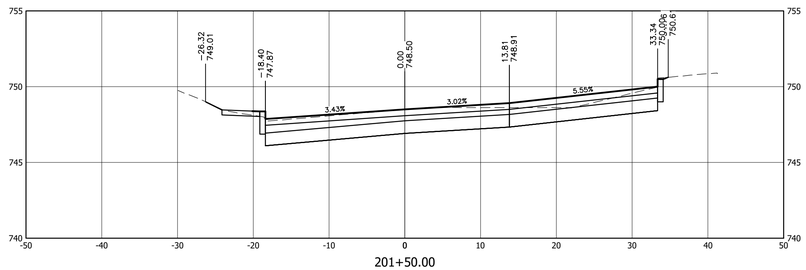
STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

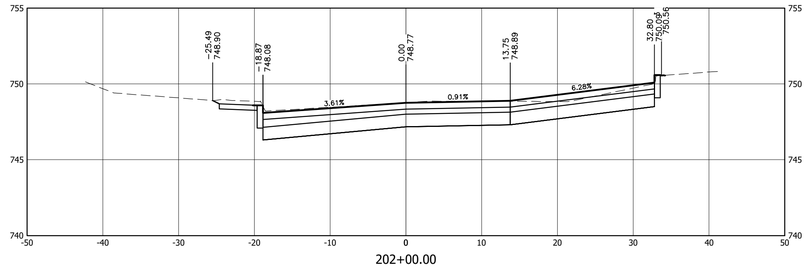
BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
PROPOSED ROADWAY PROFILE

SHEET
C-112









0' 5' 10' 20'

FULL SIZE: HORZ. 1"= 10'
HALF SIZE: HORZ. 1"= 20'
FULL SIZE: VERT. 1"= 5'
HALF SIZE: VERT. 1"= 10'

LEGEND

PROP. SURFACE
EX. SURFACE

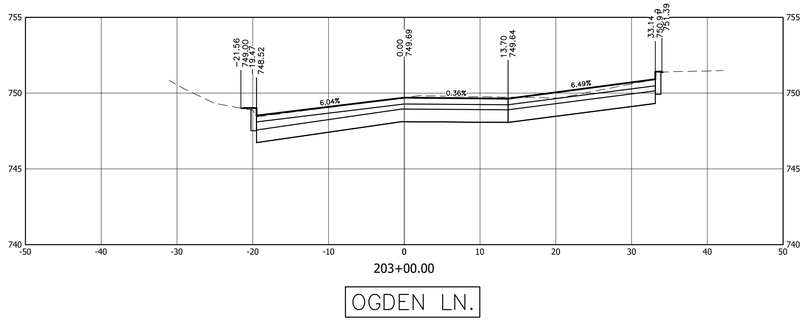
CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO. F-15065
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

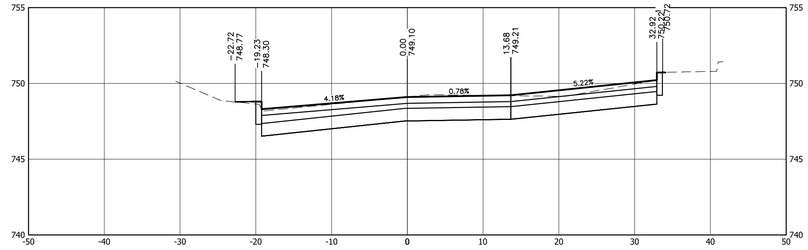
BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
CROSS SECTIONS (SHEET 1 OF 2)

SHEET
C-113



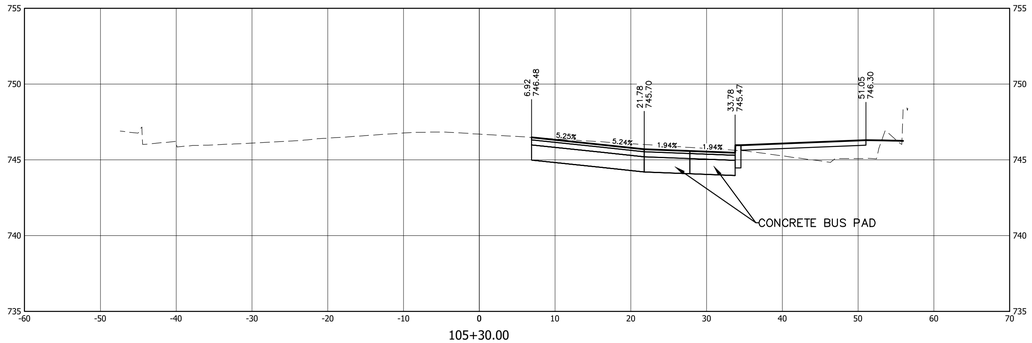
203+00.00

OGDEN LN.



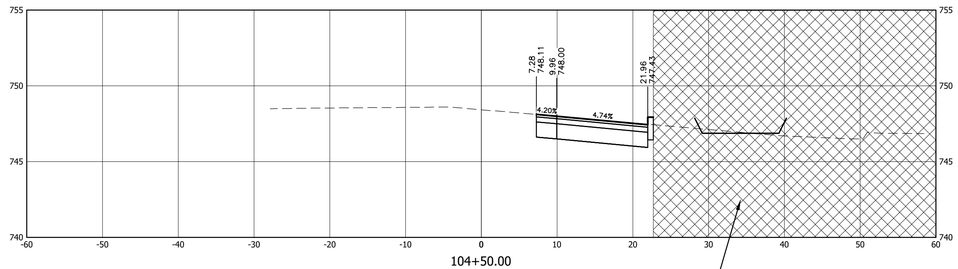
202+50.00

OGDEN LN.



105+30.00

BROADWAY



104+50.00

BROADWAY

LIMITS OF LANDSCAPE DESIGN
REFER TO LANDSCAPE GRADING SHEETS

0' 5' 10' 20'

FULL SIZE: HORZ. 1"= 10'
HALF SIZE: HORZ. 1"= 20'
FULL SIZE: VERT. 1"= 5'
HALF SIZE: VERT. 1"= 10'

LEGEND

PROP. SURFACE
EX. SURFACE

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15905
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

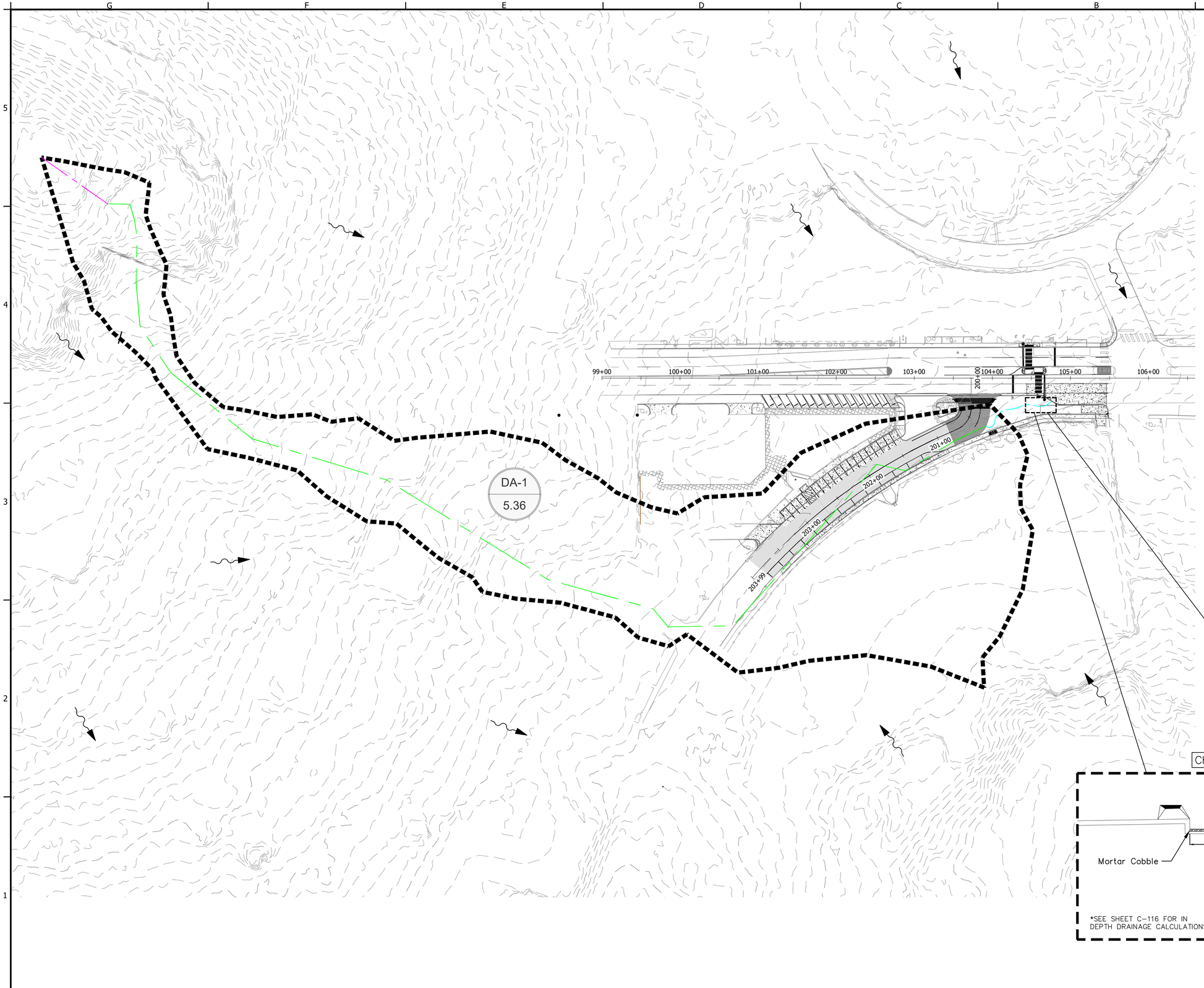
BROADWAY & OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

CROSS SECTIONS (SHEET 2 OF 2)

SHEET

C-114



NOTES:

1. TOPOGRAPHY SHOWN IS THE TEXAS NATURAL RESOURCES INFORMATION SYSTEM (TNRIS) LIDAR CONTOUR DATA DISPLAYED AT 1' INTERVAL (2021).
2. RAINFALL REFERENCE ATLAS 14 (PRECIPITATION ZONE 3).

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15985

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
DRAINAGE AREA MAP

SHEET
C-115

Conditions: Existing											
Precipitation Area: PA_3											
Atlas14 Existing Time of Concentration Table PA_3											
Drainage Basin(s)/ Analysis Points	Sheet Flow (max length = 150')					Shallow Concentrated Flow 1					Total
	n	L_t (ft)	P_2 (in)	S_t (%)	T_t (min)	Paved/Unpaved	L_{sc} (ft)	S_{sc} (%)	K	T_t (min)	T_c (min)
DA–1	0.410	100	3.960	7.000	11.900	Paved	1500	4.100	20.320	6.100	18.000
	$T_t=\frac{0.007(nL_t)^{0.8}}{(P_2)^{0.5}S_t^{0.4}}$					$T_{sc}=\frac{L_{sc}}{3600KS_{sc}^{0.5}}$					T_t+T_{sc}

Atlas14 Existing Flow Table PA_3				
Drainage Area		Coefficient	Intensity	Q Flow
Area(s)	A (ac.)	C	I_{25} (in/hr)	Q_{25} (ft^3/s)
DA–1	5.360	0.920	6.630	32.694
				Q = CIA

Conditions: Proposed														
Precipitation Area: PA_3														
Atlas14 Proposed Time of Concentration Table PA_3														
Drainage Basin(s)/ Analysis Points	Sheet Flow (max length = 150')					Shallow Concentrated Flow 1					Channel Flow			Total
	n	L_t (ft)	P_2 (in)	S_t (%)	T_t (min)	Paved/Unpaved	L_{sc} (ft)	S_{sc} (%)	K	T_t (min)	L (ft)	V (ft/sec)	T_{CH} (min)	T_c (min)
DA–1	0.410	100	3.960	7.000	11.900	Paved	1500	4.100	20.320	6.100	100	4.670	0.400	18.400
	$T_t=\frac{0.007(nL_t)^{0.8}}{(P_2)^{0.5}S_t^{0.4}}$					$T_{sc}=\frac{L_{sc}}{3600KS_{sc}^{0.5}}$					$T_{ch}=\frac{L_{ch}}{3600*V}$			$T_t+T_{sc}+T_{ch}$

Atlas14 Proposed Flow Table PA_3				
Drainage Area		Coefficient	Intensity	Q Flow
Area(s)	A (ac.)	C	I_{25} (in/hr)	Q_{25} (ft^3/s)
DA–1	5.360	0.920	6.570	32.398
				Q = CIA

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO. F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

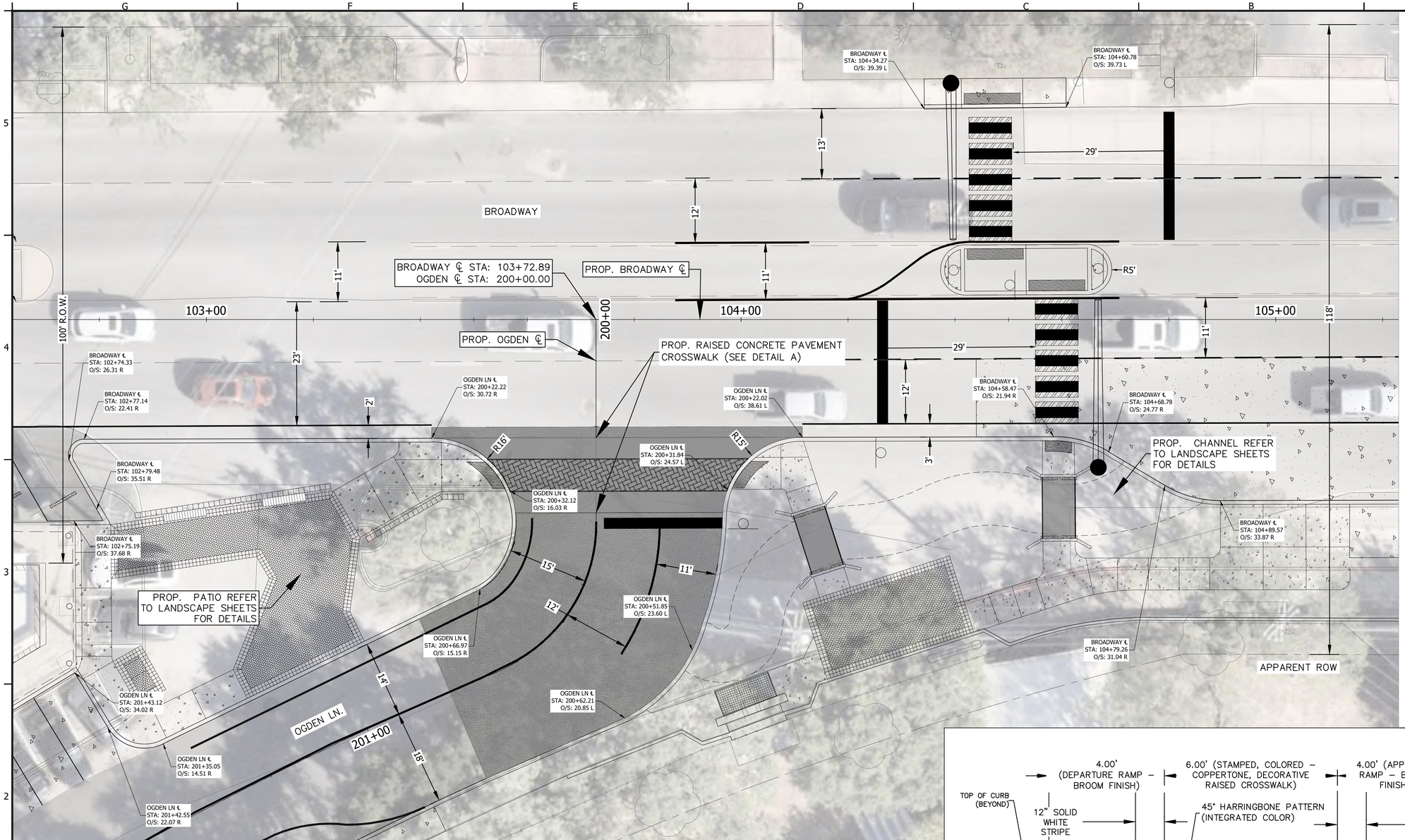
BROADWAY & OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

DRAINAGE CALCULATIONS

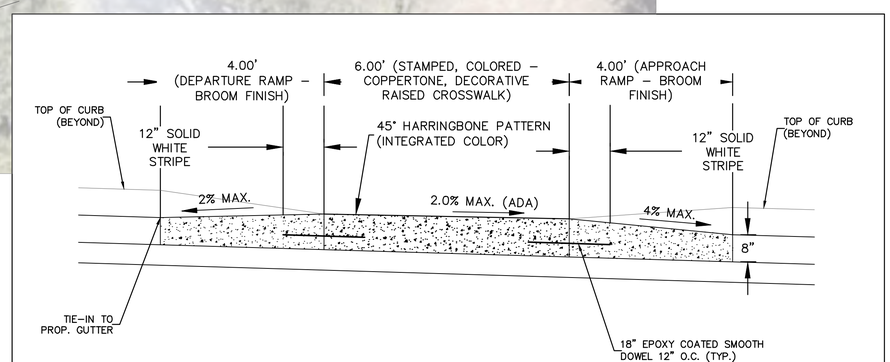
SHEET

C-116



0' 5' 10' 20'

FULL SIZE: HORZ. 1"= 10'
HALF SIZE: HORZ. 1"= 20'



Detail A: Raised Concrete Pavement Crosswalk Detail

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15985
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

PROPOSED INTERSECTION LAYOUT

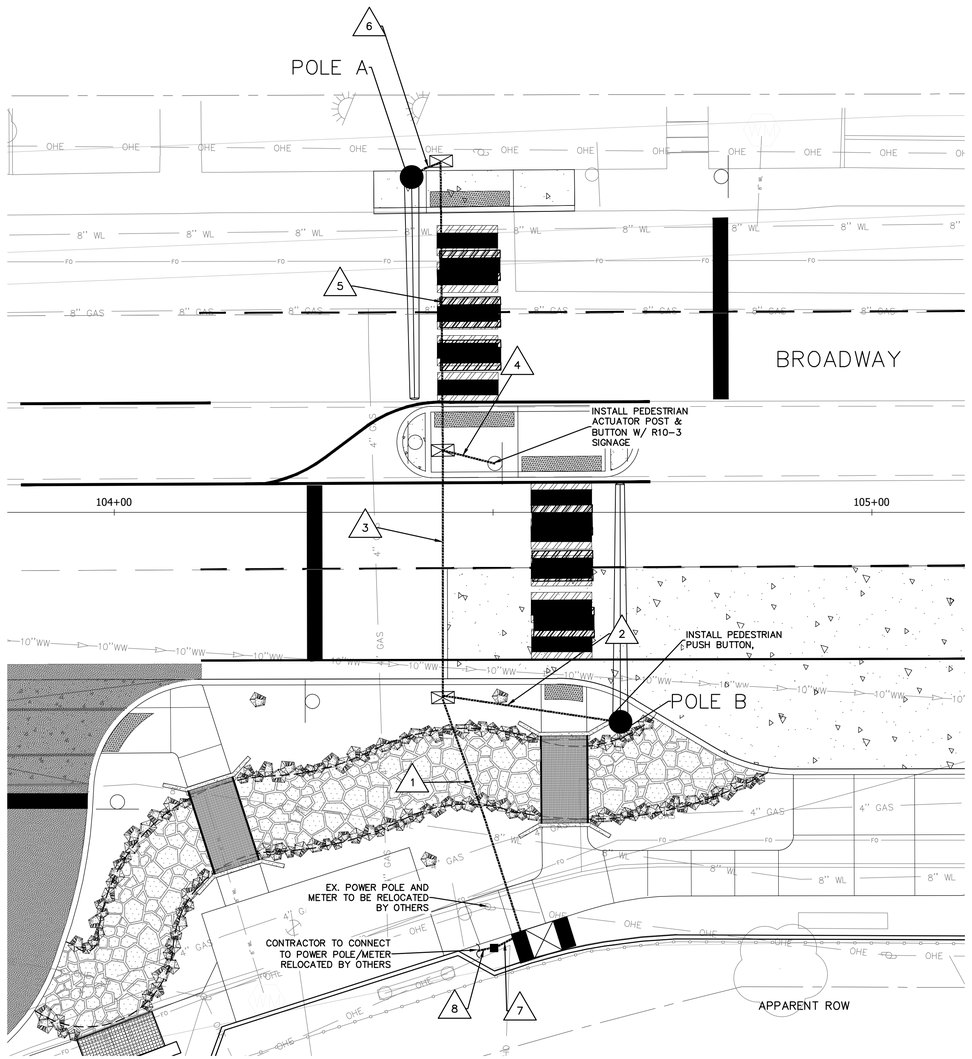
SHEET

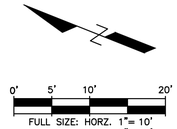
C-117

Proposed Pole and Foundations				
	Mast Arm Length (ft)	Foundation Type	Foundation Depth (ft)	Equipment on Pole
Pole A – 30 ft	32	TxDOT 36–A	16	32' mast arm, LED beacons (6), W11–2 (2) signs, W16–7PL (1) sign, φ4 APS pushbutton with R10–25 sign, ped head, luminaire arm
Pole B – 30 ft	32	TxDOT 36–A	16	32' mast arm, LED beacons (6), W11–2 (2) signs, W16–7PL (1) sign, φ4 pushbutton with R10–25 sign, ped head, luminaire arm

Inside Pole		
	9/C #14 AWG (Beacons) – Feet	3/C #16 AWG (Ped APS Push Buttons) – Feet
Pole A	190	5
Pole B	170	5
Total Qty	360	10

Inside Cabinet			
	1/C #8 AWG (Bare) – Feet	9/C #14 AWG (Beacons) – Feet	3/C #16 AWG (Ped APS Push Buttons) – Feet
Total Qty	10	80	20





LEGEND

- PROP. PULL BOX
- PROP. SIGNAL CABINET
- PROP. SIGN
- CONDUIT RUN NUMBER
- ELECTRICAL SERVICE PEDESTAL

Conduit & Cables Summary – Broadway and Ogden Pedestrian Beacons (Overhead)											
Column 1	Column 2	Conduit Size & Type				Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Run #	Length (Feet)	3" trench	3" directional bore	2" trench	1" riser	1/C #6 XHHW – Feet	1/C #6 AWG (Bare) – Feet	1/C #8 AWG (Bare) – Feet	9/C #14 AWG (Beacons) – Feet	3/C #16 AWG (Ped APS Push Buttons) – Feet	Ethernet cable
1	40	40				50	44	45	600	135	
2	30	30		20		40		35	480	105	
3	40		40			50		45	300	90	
4	10	10		10		20		15	120	30	
5	50		50			60		55	360	55	
6	10	10		20		20		15	120	15	
7	10	10				20	14	15			
8	20	20		10		30	24	25			
Total		2800	4100	900	0	290	82	250	1980	430	0

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15985
WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER

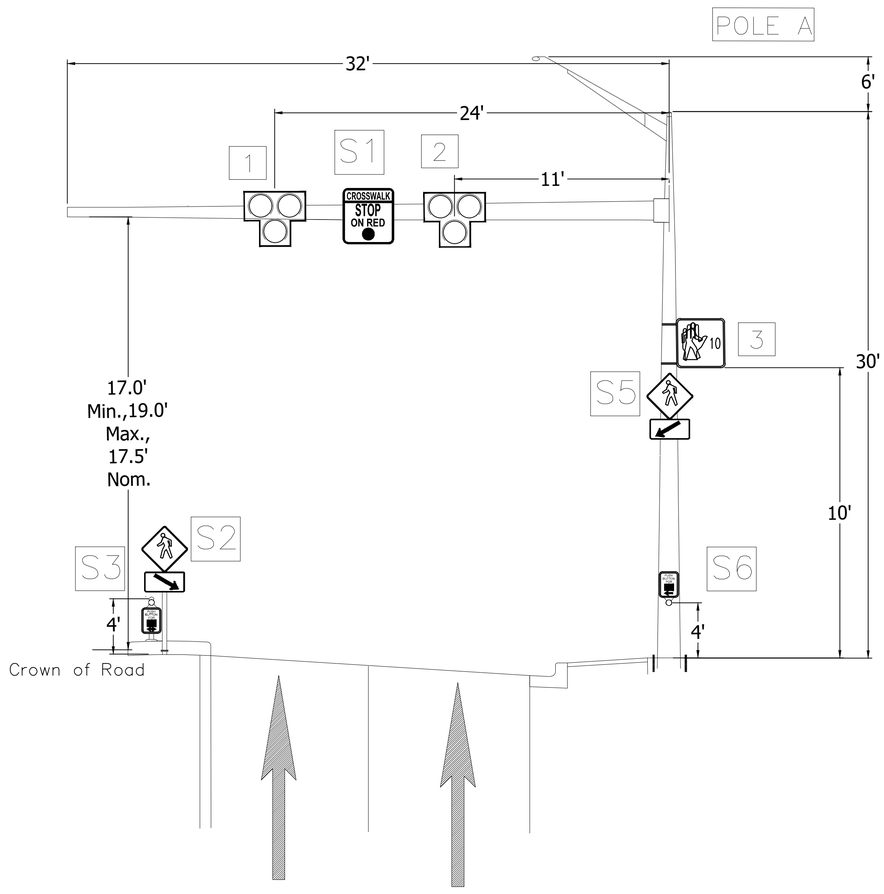
BROADWAY & OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

PROPOSED PEDESTRIAN HYBRID BEACON LAYOUT

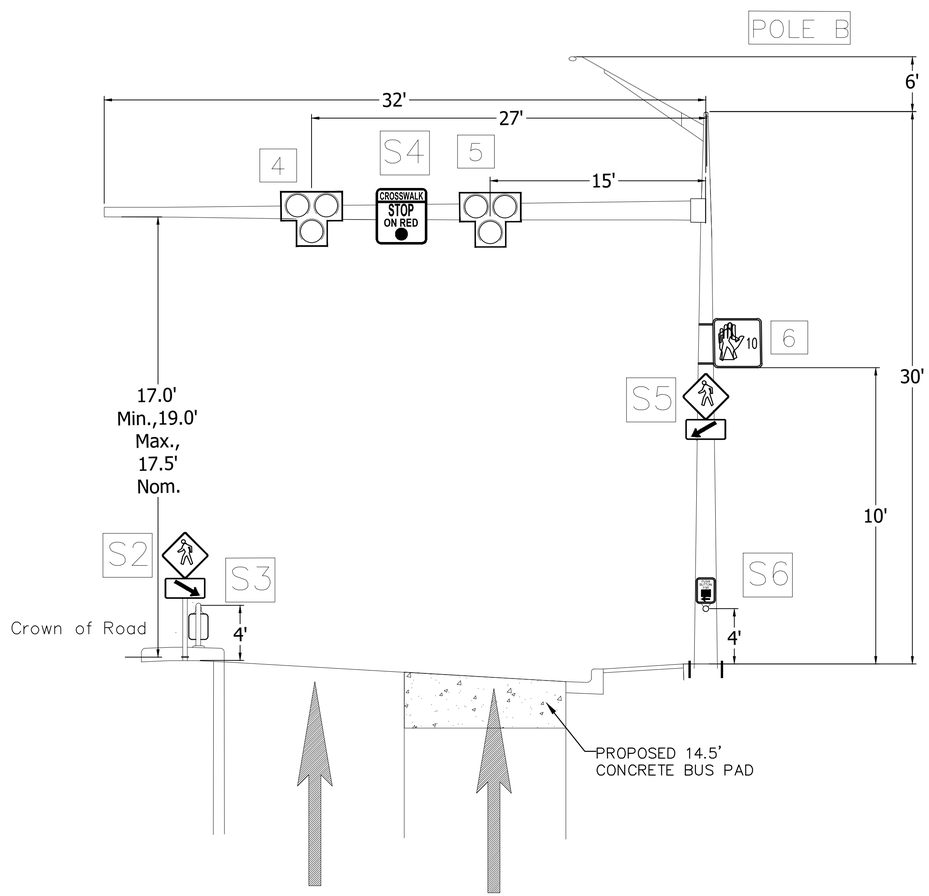
SHEET

C-118



NORTHWEST–BOUND BROADWAY

NOT TO SCALE



SOUTHEAST–BOUND BROADWAY

NOT TO SCALE

PROPOSED SIGNS



R10–3
(9" X 12")

S3
S6



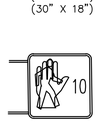
R10–23
(24" X 30")

S1
S4



W11–2
W16–7P
(30" X 30")
(30" X 18")

S2
S5



PEDESTRIAN
SIGNAL
HEAD

3
6



PEDESTRIAN
HYBRID
BEACON
SIGNAL

1
2
4
5

NOTE: CONTRACTOR TO INSTALL LED BEACONS TO ALIGN WITH THE CENTER OF TRAVEL LANE.

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO. F-15985
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED
PROFESSIONAL ENGINEER
1/30/26

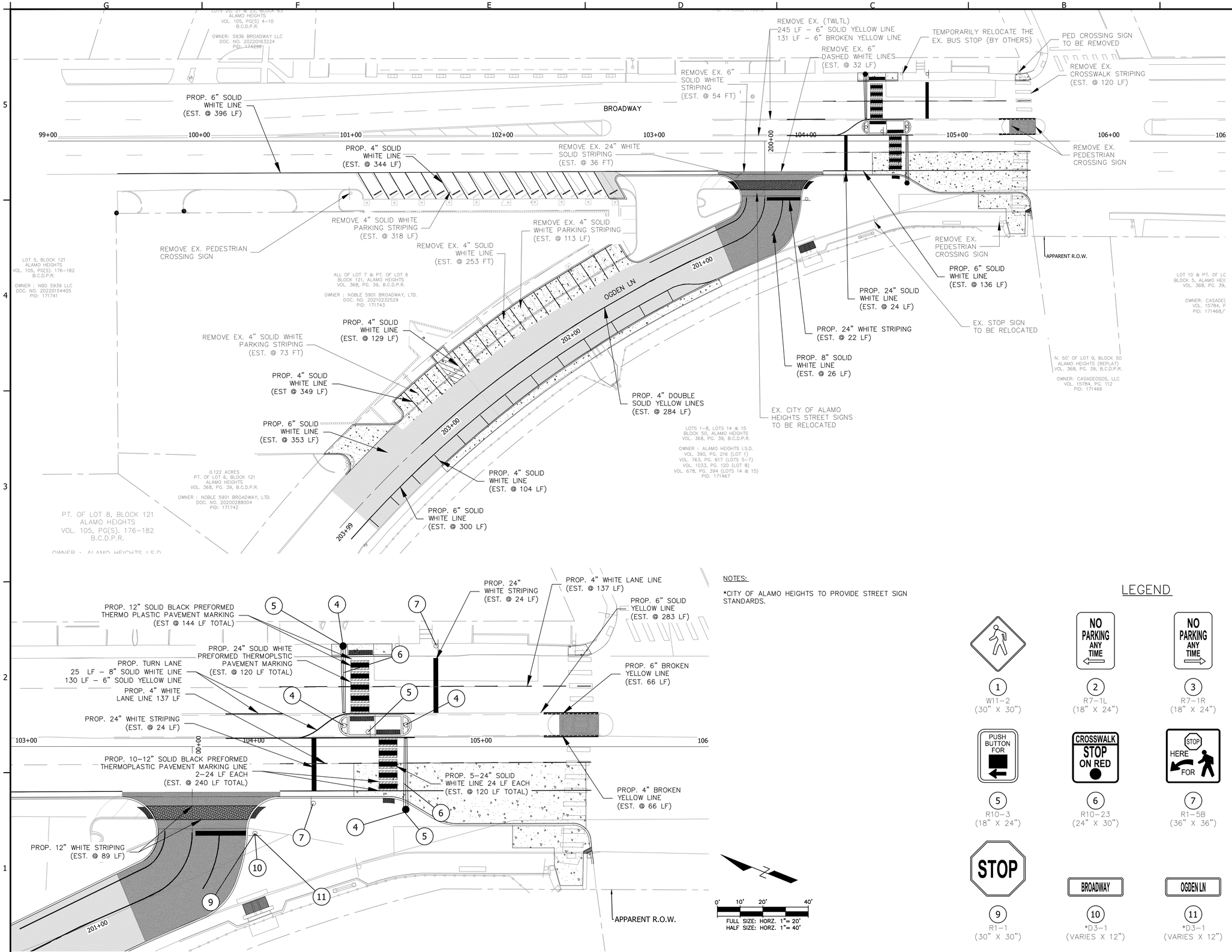
BROADWAY & OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

VERTICAL PROFILE

SHEET

C-119



NOTES:

*CITY OF ALAMO HEIGHTS TO PROVIDE STREET SIGN STANDARDS.

LEGEND

			
1 W11-2 (30" X 30")	2 R7-1L (18" X 24")	3 R7-1R (18" X 24")	4 W11-2 (30" X 30") W16-7P (12" X 24")
			
5 R10-3 (18" X 24")	6 R10-23 (24" X 30")	7 R1-5B (36" X 36")	8 W16-9P (24" X 12")
9 R1-1 (30" X 30")	10 *D3-1 (VARIES X 12")	11 *D3-1 (VARIES X 12")	

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15905
WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

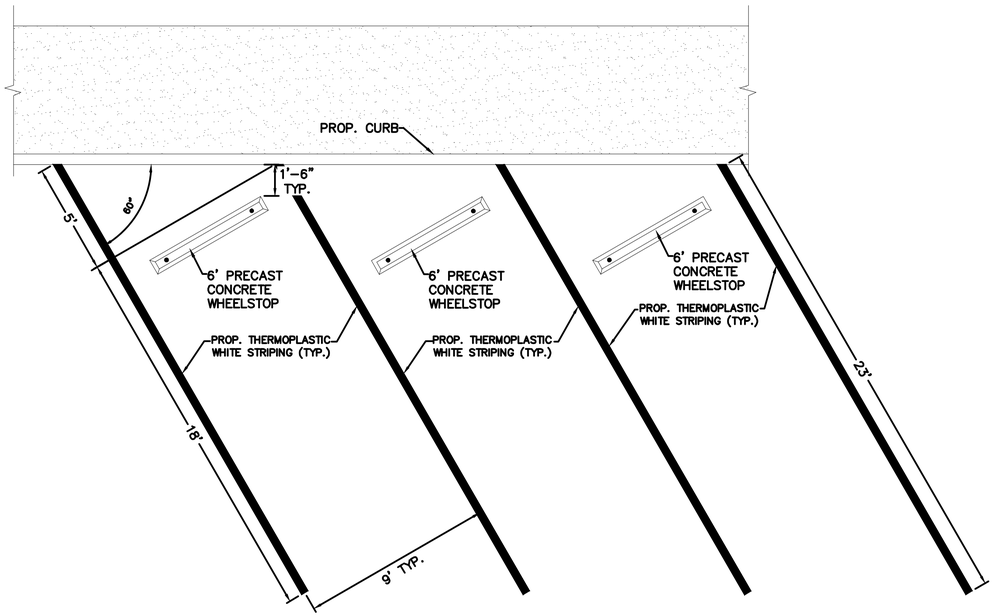
BROADWAY & OGDEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

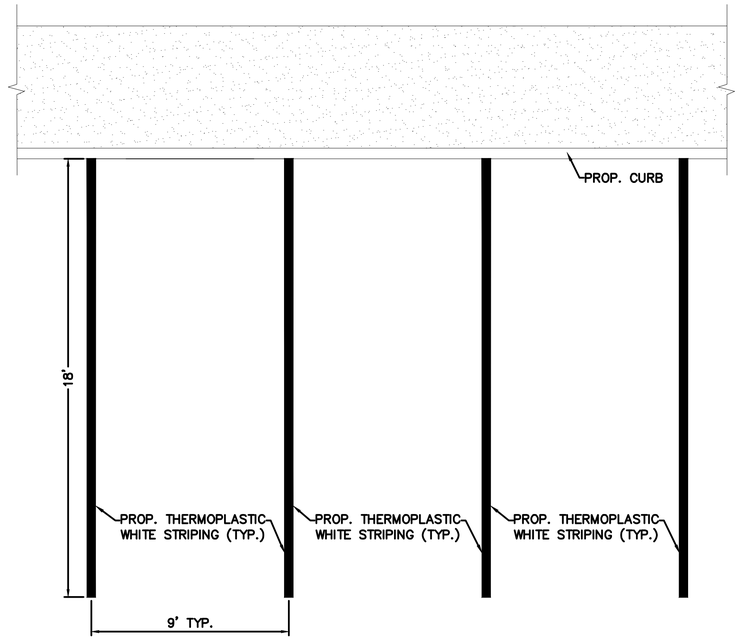
SIGNAGE & STRIPING LAYOUT

SHEET

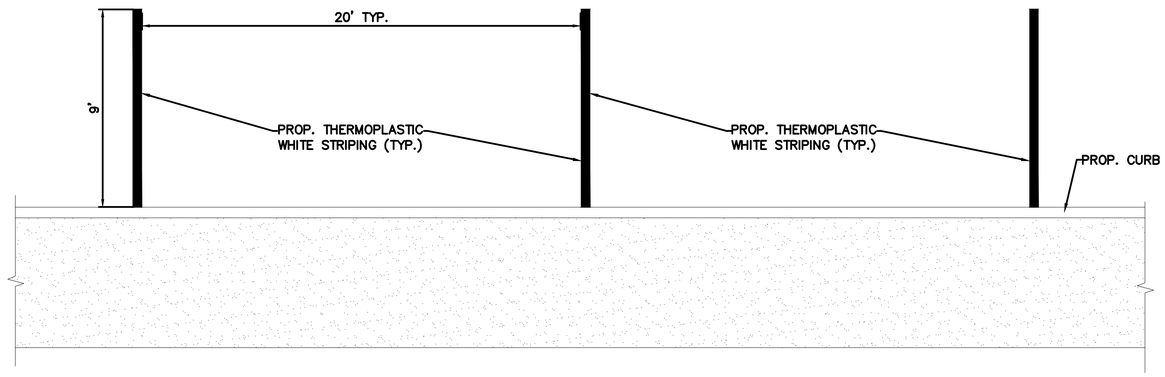
C-120



TYPICAL ANGLED PARKING DETAIL
(NOT TO SCALE)



TYPICAL HEAD-IN PARKING DETAIL
(NOT TO SCALE)



TYPICAL PARALLEL PARKING DETAIL
(NOT TO SCALE)

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO. F-15905
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

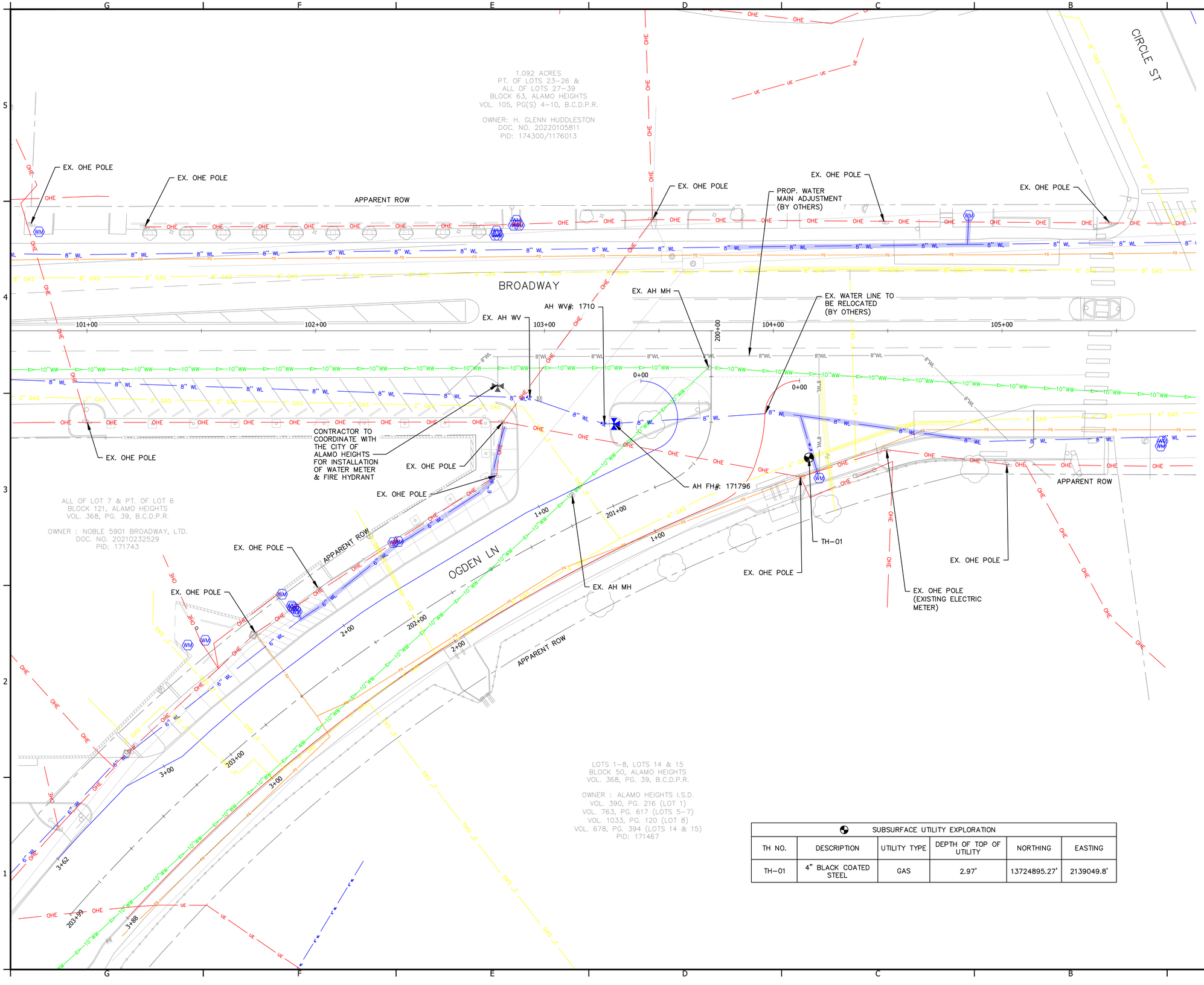
BROADWAY & ODGEN LN. INTERSECTION PLANS

ALAMO HEIGHTS, TX

PARKING DETAIL

SHEET

C-121



LEGEND

- TEST HOLE QL-A
- EX. WATER MAIN QL-B
- EX. GAS MAIN QL-B
- EX. WATER MAIN QL-C
- EX. GAS MAIN QL-C
- EX. OVERHEAD ELECTRIC QL-C
- EX. FIBER OPTIC CABLE QL-C
- EX. WASTEWATER QL-C
- EX. ROW LINE
- EX. UNDERGROUND ELECTRIC QL-C
- EX. POWER POLE
- EX. WATER METER
- EX. POWER LITE
- EX. FIRE HYDRANT
- EX. TELECOMMUNICATION
- EX. GAS VALVE

NOTES:

1. TEST HOLE DATA WAS RECEIVED MAY 2025.
2. THE CONTRACTOR IS REQUIRED TO VERIFY AND LOCATE EXISTING UTILITIES WITHIN THE PROJECT AREA PRIOR TO CONSTRUCTION (NSPI).

SUBSURFACE UTILITY EXPLORATION

TH NO.	DESCRIPTION	UTILITY TYPE	DEPTH OF TOP OF UTILITY	NORTHING	EASTING
TH-01	4" BLACK COATED STEEL	GAS	2.97'	13724895.27'	2139049.8'

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15985

STATE OF TEXAS
JOSHUA ALLEN
150742
LICENSED PROFESSIONAL ENGINEER
1/30/26

BROADWAY & OGDEN LN. INTERSECTION PLANS
ALAMO HEIGHTS, TX
EXISTING UTILITIES

SHEET
C-122

TRAFFIC NOTES

TRENCHING / EXCAVATING

The following notes shall apply to excavations of trenches or pits that are located in the pavement or are within six (6) feet of the edge of roadway:

1.) Trench walls shall not be closer than three (3) feet from the edge of the traveled way at any stage of construction.

2.) Traffic control devices shall be in place before starting any excavation.

3.) Trenches or pits will not be permitted to be bridged by steel plates and open to traffic unless they are temporarily backfilled to finished street grade.

4.) For pits or trenches along or in a roadway that are going to be left open over night that are zero to fifty (0 - 50) feet in length, the following applies. GUARD RAIL OR CONCRETE BARRIER SHALL BE USED.

5.) For pits or trenches along or in roadway that are going to be left open over night and are longer than 50 feet in length. CONCRETE BARRIERS MUST BE USED.

6.) Plastic construction fencing shall be required for any trench or pit left open over night.

7.) When using any guardrail or concrete barrier, protected end must be used as per the TEXAS-M.U.T.C.D.

8.) For vertical drop-offs greater than two (2) feet along roadway, low profile concrete with appropriate end protection must be installed.

9.) All concrete barriers placed on City R.O.W shall be low profile. No high profile barriers will be allowed.

REFLECTIVE SHEETING

The reflectorized white and reflectorized orange stripes for channelizing devices such as barricade drums and vertical panels shall be constructed of reflective sheeting meeting the color and retro-reflectivity requirements of high intensity, unless otherwise specified in the plans.

MAINTENANCE

1.) All traffic signs shall be kept in proper position, clean and legible at all times. Damaged barricades, signs, and other traffic control devices shall be replaced without undue delay.

2.) To ensure adequate maintenance, a suitable schedule for inspection, cleaning, and replacement of barricades, lights, and signs shall be established.

3.) Special attention and necessary action shall be taken to see that weeds, trees, shrubbery and construction materials do not obscure the face of any sign or barricades.

TRAINING

Each person whose actions affect maintenance and construction zone safety, from the upper-level management personnel through construction and maintenance field personnel, should receive training appropriate to the job decision each individual is required to make. Only those individuals who are qualified by means of adequate training in safe traffic control practices and have a basic understanding of the principles established by applicable standards and regulations, including those of the TEXAS M.U.T.C.D. should supervise the selection, placement, and maintenance of traffic control devices in maintenance and construction areas.

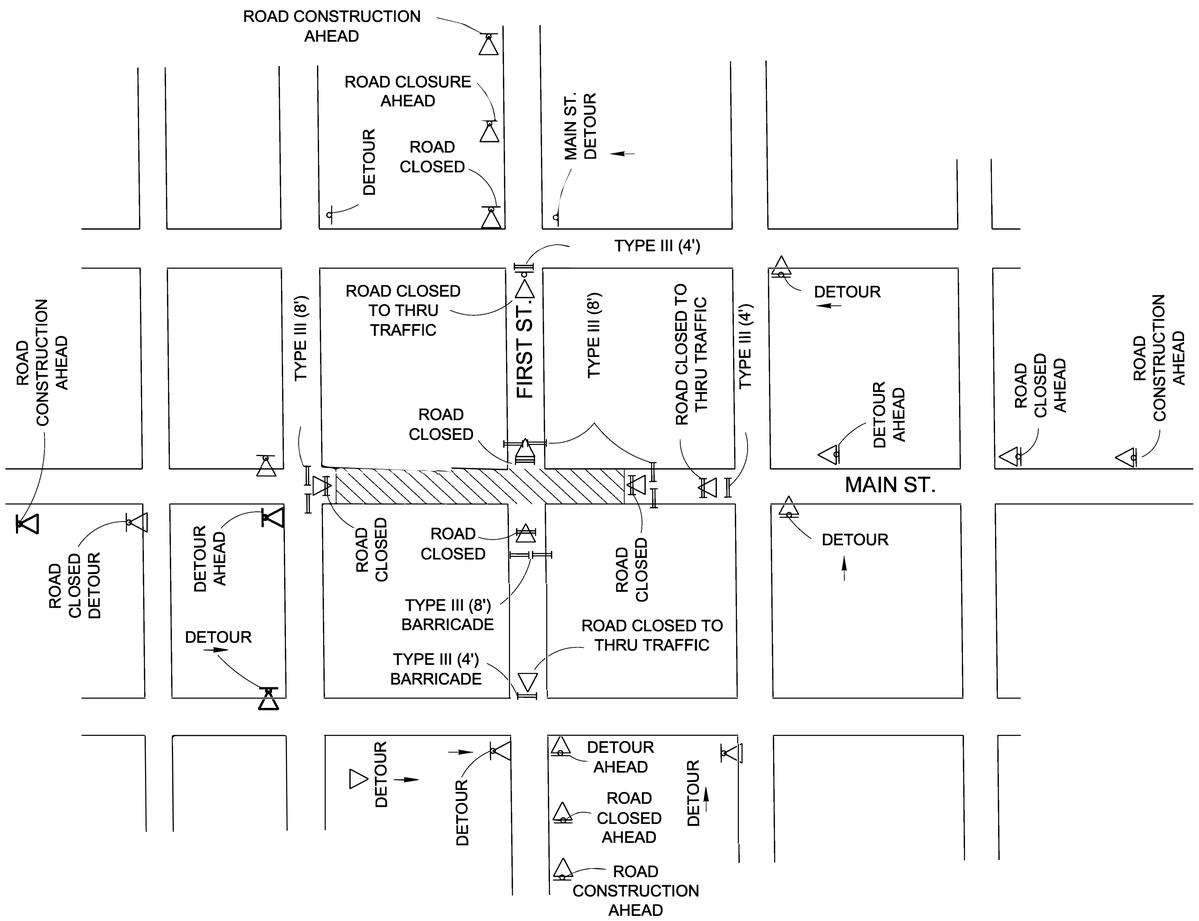
SPECIAL EVENTS BARRICADING

All Type I, (8') barricades used for special events (Dome, Runs, Walks, Parades etc.) shall be a minimum of 42" high and 96" wide. Any necessary signs will require proper sign stands.

USE OF CITY R.O.W.

The City of Alamo Heights reserves the right to allow contracting and barricading sub-contractors to use the City's R.O.W. The City also reserves the right to advise contractors and barricading sub-contractors to remove stored or unused traffic control devices from the City of Alamo Heights R.O.W. It is the barricading sub-contractor's responsibility to remove any traffic control device from City's R.O.W. when instructed to do so by a City representative.

CLOSURE DIAGRAMS



TYPICAL INTERSECTING STREET CLOSURE FOR TWO LANE STREETS

NOTE:
ALL SIGNS WILL BE MOUNTED ON SIGN SUPPORTS ONLY

TRAFFIC STANDARDS

BARRICADE AND CONSTRUCTION STANDARDS

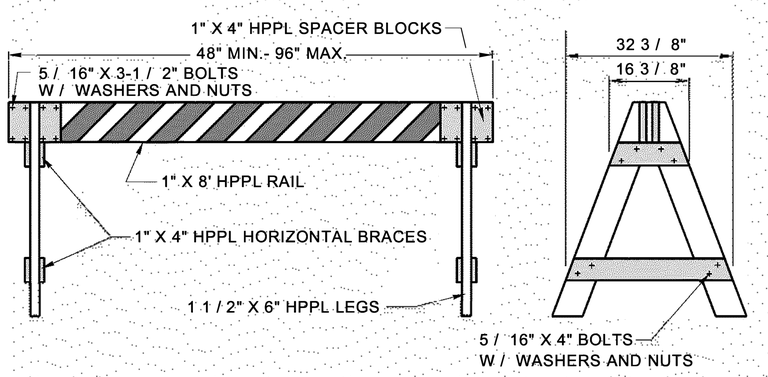
SHEET 1 OF 4

____% SUBMITTAL

DRWN. BY: A.F.G.

SHEET NO.: C-201

TYPE I BARRICADE



1.) Only the following Type I barricade shall be used in the City of Alamo Heights Right-Of-Way:

A. 1" x 8" plastic rail with 2" x 6" wooden legs.

B. 1" x 8" wooden rail with plastic legs.

C. 1" x 8" wooden rail with 2" x 6" wood legs.

D. No screws allowed for assembly of A-legs or rail.

E. Warning lights will be used as directed by the Traffic Engineer.

F. All Type I (4') barricades will be a minimum of 36" high and 60" wide. (For Construction Use Only)

G. All Type I (8') barricades with wooden legs shall be 2" X 6" wood only.

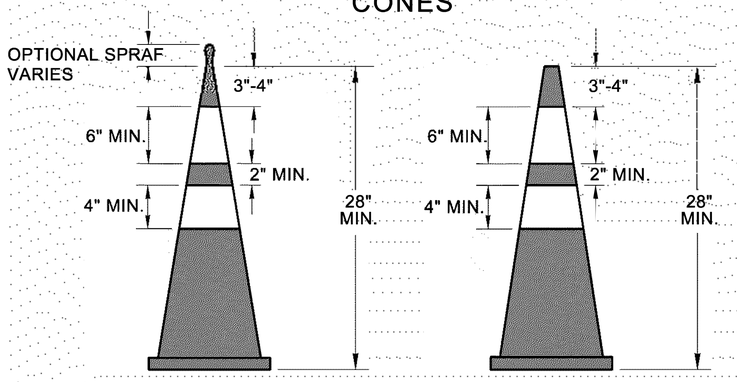
H. All Type I (4') barricades with wooden legs shall be 1" X 8" wood only.

2.) Type I Barricades shall not be used for partial and total street closures in construction work zones. Only Type III barricades shall be used for this purpose.

3.) Warning lights shall not be mounted on Type I barricades.

(See TxDOT BC-03 Sheets for specific construction information)

CONES

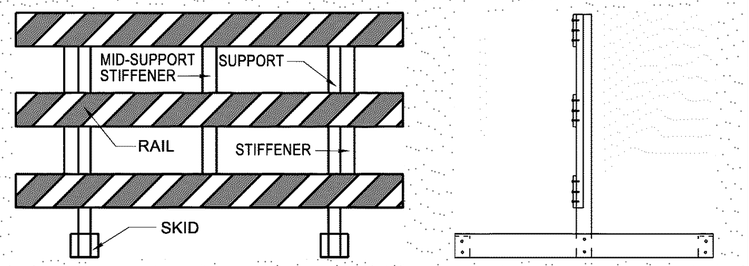


1.) Base for 28" high cones must weigh at least 9.5 lbs.

2.) Night time cones must have reflective collars.

(See TxDOT BC-03 Sheets for specific construction information)

Type III BARRICADE



1.) Only the following Type III barricade shall be used in the City of Alamo Heights Right-Of-Way.

A. Hollow polyvinyl or fiberglass tubing post with 1" X 8" wooden rails.

B. Hollow polyvinyl or fiberglass tubing post with plastic rails.

C. Skids must be wood or solid plastic only.

D. Warning lights shall not be mounted on Type III barricades.

(See TxDOT BC-03 Sheets for specific construction information)

TEMPORARY MARKINGS

1.) Solid double yellow painted lines shall be installed for temporary division of traffic or construction duration longer than five (5) days, with repainting to occur once monthly or at the discretion of the Traffic Engineer. (All cost of upkeep will be at the contractor's expense.)

2.) Solid double yellow tabs, or V/P panels shall be installed for temporary division of traffic for construction duration less than five (5) days, with re-tabbing to occur at the discretion of the Traffic Engineer.
NAILS SHALL NOT BE USED TO FIX TABS TO CEMENT OR BASE
(All cost of upkeep will be at the contractor's expense.)

(See TxDOT BC-03 Sheets for specific construction information.)

TEMPORARY CONCRETE BARRIER

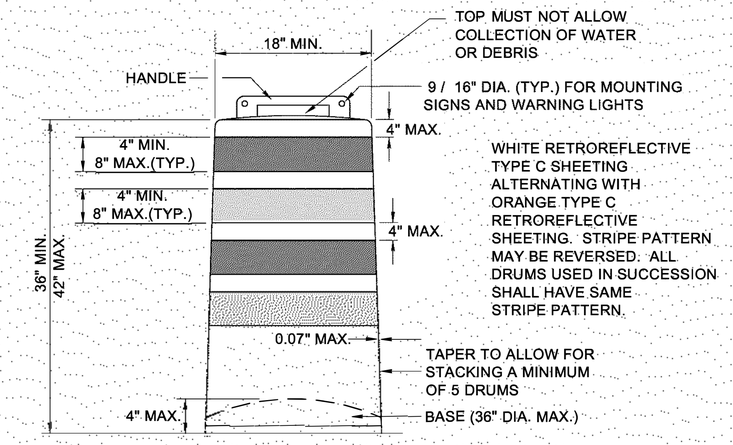
1.) All concrete barriers placed on City R.O.W. shall be low profile.

2.) No high profile barriers will be allowed.

3.) Reflectors will be required on each concrete barrier.

(See TxDOT BC-03 Sheets for specific construction information)

PLASTIC DRUMS



1.) Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).

2.) Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.

3.) The Engineer/Inspector shall provide written notice to the Contractor regarding the replacement of drums or other traffic control devices. The Contractor shall have a maximum of 24 hours to replace any plastic drums or other traffic control devices identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

4.) Each drum must have a 40 lb. rubber or plastic snap on.

5.) No signs larger than 18" X 24" will be allowed to be mounted on plastic drums.

6.) No warning lights will be allowed to be mounted on plastic barrels.

7.) In lieu of a warning light, a yellow reflector will be acceptable.

(See TxDOT BC-03 Sheets for specific construction information)

TRAFFIC STANDARDS

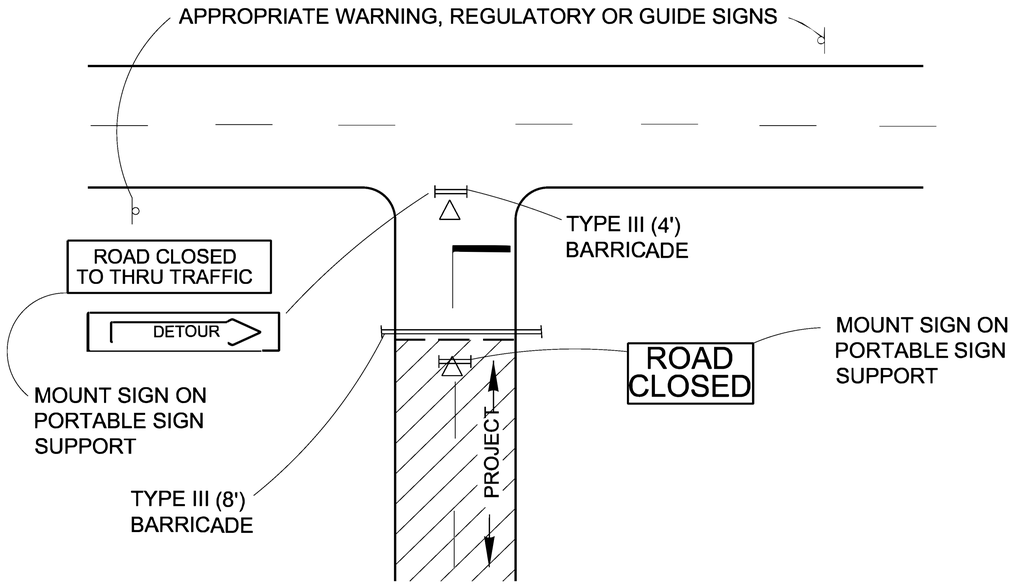
BARRICADE AND CONSTRUCTION STANDARDS

SHEET 3 OF 4

% SUBMITTAL

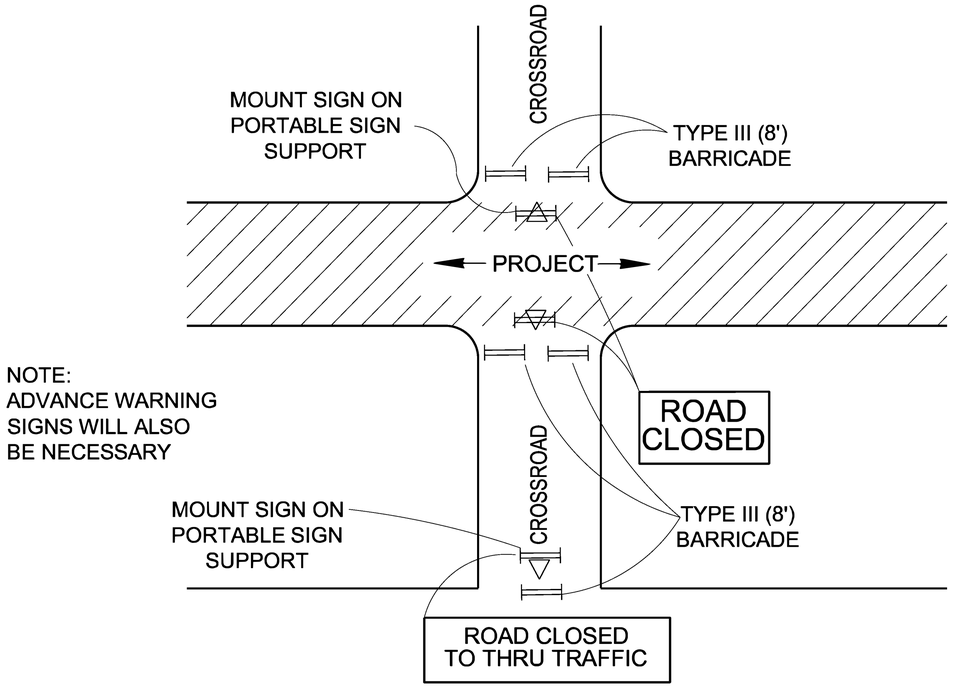
DRWN. BY: A.F.G.

SHEET NO.: C-202

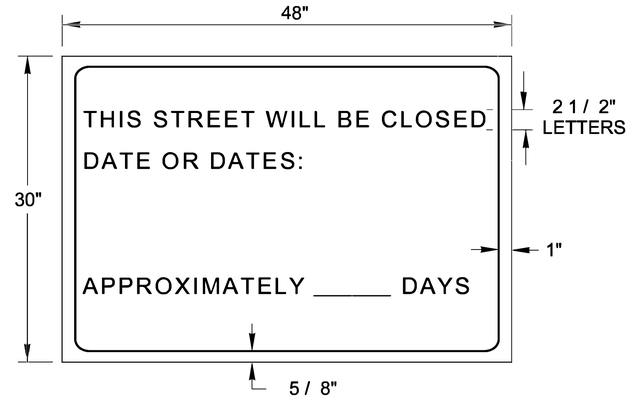


PROJECT LIMITS FOR CLOSED ROADWAY

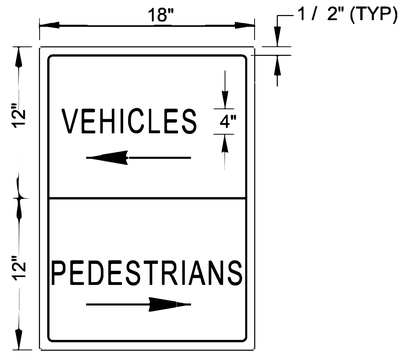
BARRICADES SHALL BE ERECTED COMPLETELY ACROSS ROADWAY. CHANNELIZING DEVICES MAY BE DRUMS, VERTICAL PANELS OR CONES AS SPECIFIED IN THE PLANS



CROSS STREET SIGNING AND BARRICADING TOTALLY CLOSED

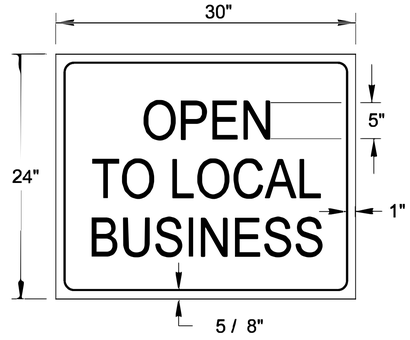


LETTERS- BLACK
BORDER- BLACK
BACKGROUND- ORANGE



LETTERS- BLACK
BORDER- BLACK
BACKGROUND- ORANGE
SPACING-3 SIGNS PER BLOCK

DIRECTION OF ARROWS
ARE REVERSIBLE



LETTERS- WHITE
BORDER- WHITE
BACKGROUND- BLUE REFLECTIVE

TRAFFIC STANDARDS

BARRICADE AND CONSTRUCTION STANDARDS

SHEET 2 OF 4

% SUBMITTAL

DRWN. BY: A.F.G.

SHEET NO.: C-203

SIGNS

1.) A maximum of two signs can be mounted on any one Long / Intermediate Term Stationary Portable Sign Support.

2.) 48" X 48" signs shall be mounted separately on the Long / Intermediate Term Stationary Portable Sign Support.

3.) For Short Term Stationary Portable Sign Support the distance from the bottom of the vinyl sign to the exiting ground must be one (1) foot.

4.) Long / Intermediate Term Stationary Portable Signs must be made of wood or plastic only.

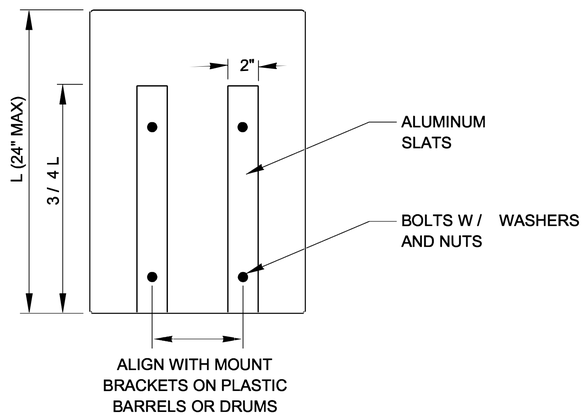
5.) No signs shall be mounted to any Type I, Type III, or folding barricades.

6.) Signs shall be mounted only on TxDOT approved sign supports.

7.) Detour signs will be mounted on single "D" legs w / 7' clearance from the bottom of the sign.

8.) WORK DURATION TERMINOLOGY
Long Term Stationary = occupies a location 3 or more days.
Intermediate-Term Stationary = occupies a location for overnight to 3 days.
Short Term Stationary = daylight work that occupies a location from 1 to 12 hours.
Short Duration = occupies a location up to 1 hour.

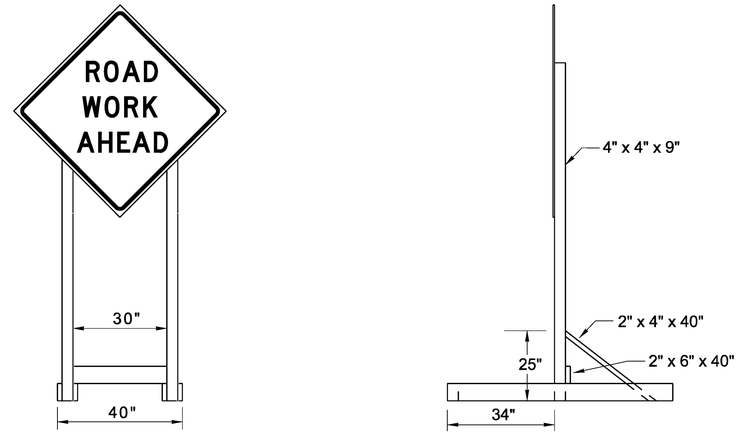
9.) Signs shall adhere to the following requirements:
- Signs placed on plastic barrels or drums shall be made of ABS plastic or plywood.
- Signs placed on skids shall be made of plywood or aluminum.
- Aluminum signs shall have a minimum thickness of 0.08".
- Plywood signs shall have a minimum thickness of 1 / 2".
- ABS Plastic signs shall have a minimum thickness of 0.13". Plastic signs cannot exceed 18" by 24" in size and shall be reinforced with 2" wide, 0.08" thick aluminum slats, as depicted below:



- No other material shall be accepted without the express written approval of the Traffic Engineer.

(See TxDOT BC-03 Sheets for specific construction information.)

LONG TERM / INTERMEDIATE TERM SIGN SUPPORT



1.) 48" X48" signs must be mounted independently.

2.) A maximum of two signs can be mounted on any one long term / intermediate sign support.

3.) Sand bag all sign supports.

4.) Distance from the bottom of the sign to the existing ground shall be 7'.

5.) Distance from the header barricade rail to the face of the sign panel shall be 2' min. and 10' max.

6.) Steel tripods shall not be allowed.

(See TxDOT BC-03 Sheets for specific construction information)

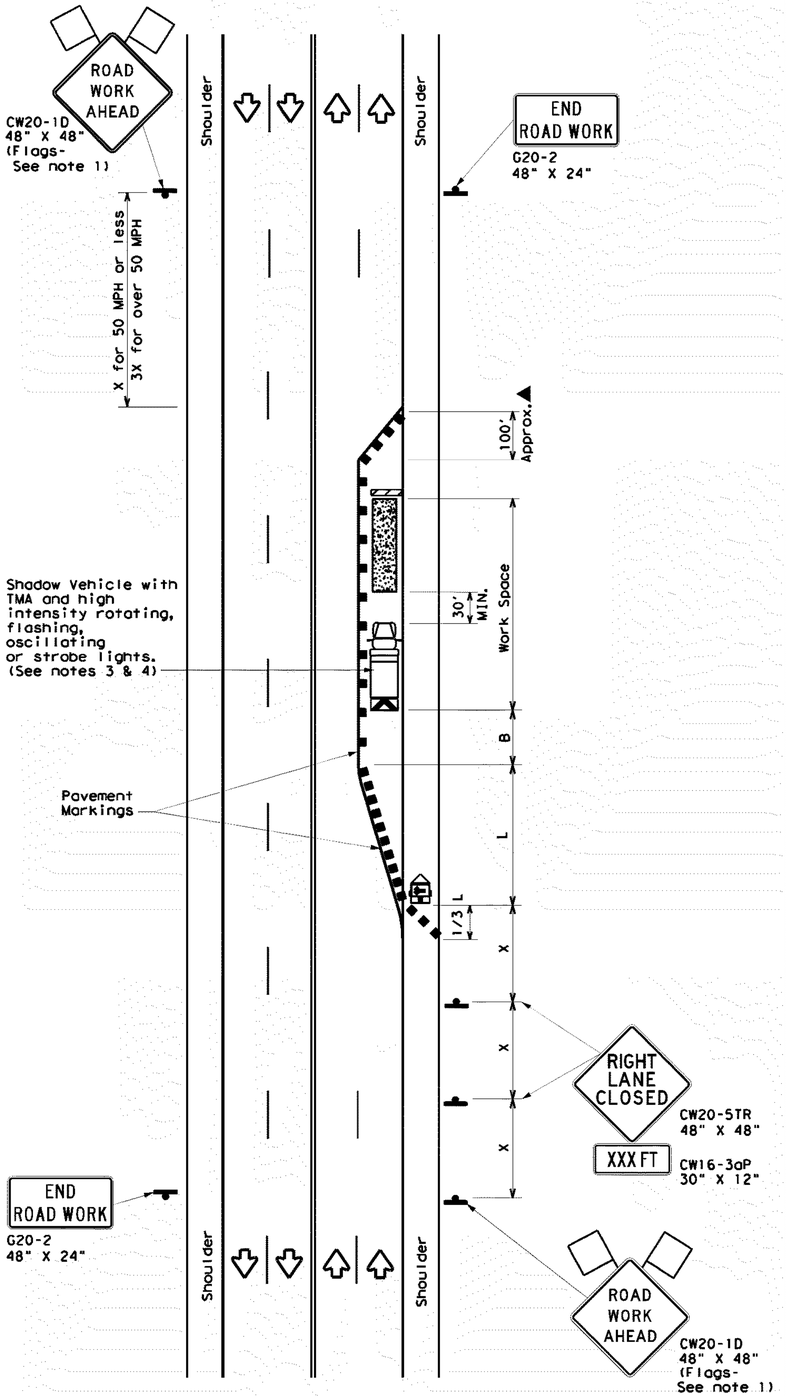
TRAFFIC STANDARDS
BARRICADE AND CONSTRUCTION STANDARDS
SHEET 4 OF 4

_____% SUBMITTAL
DRWN. BY:__A.F.G.__

SHEET NO.: C-204

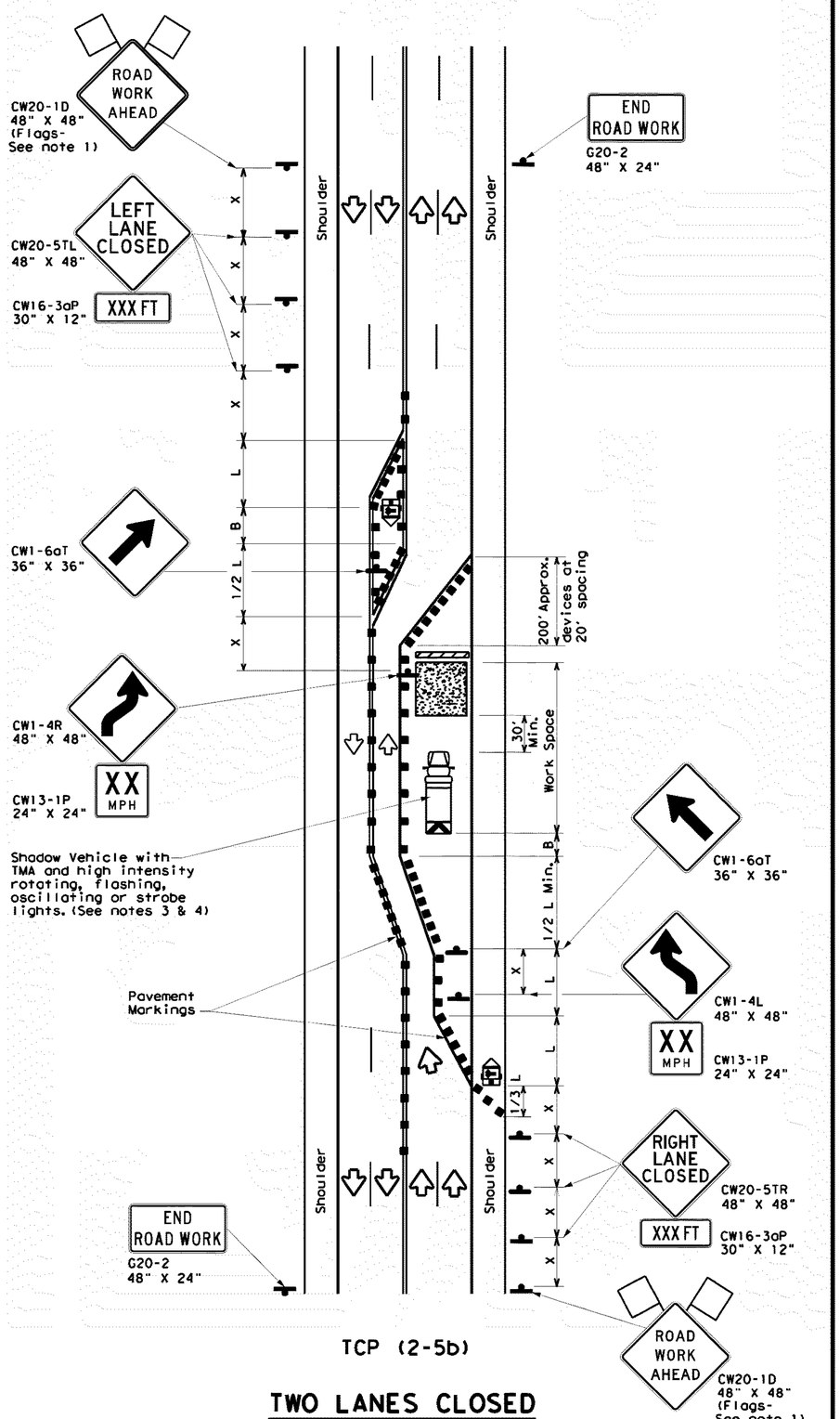
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew eposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

6. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LONG TERM LANE CLOSURES
MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

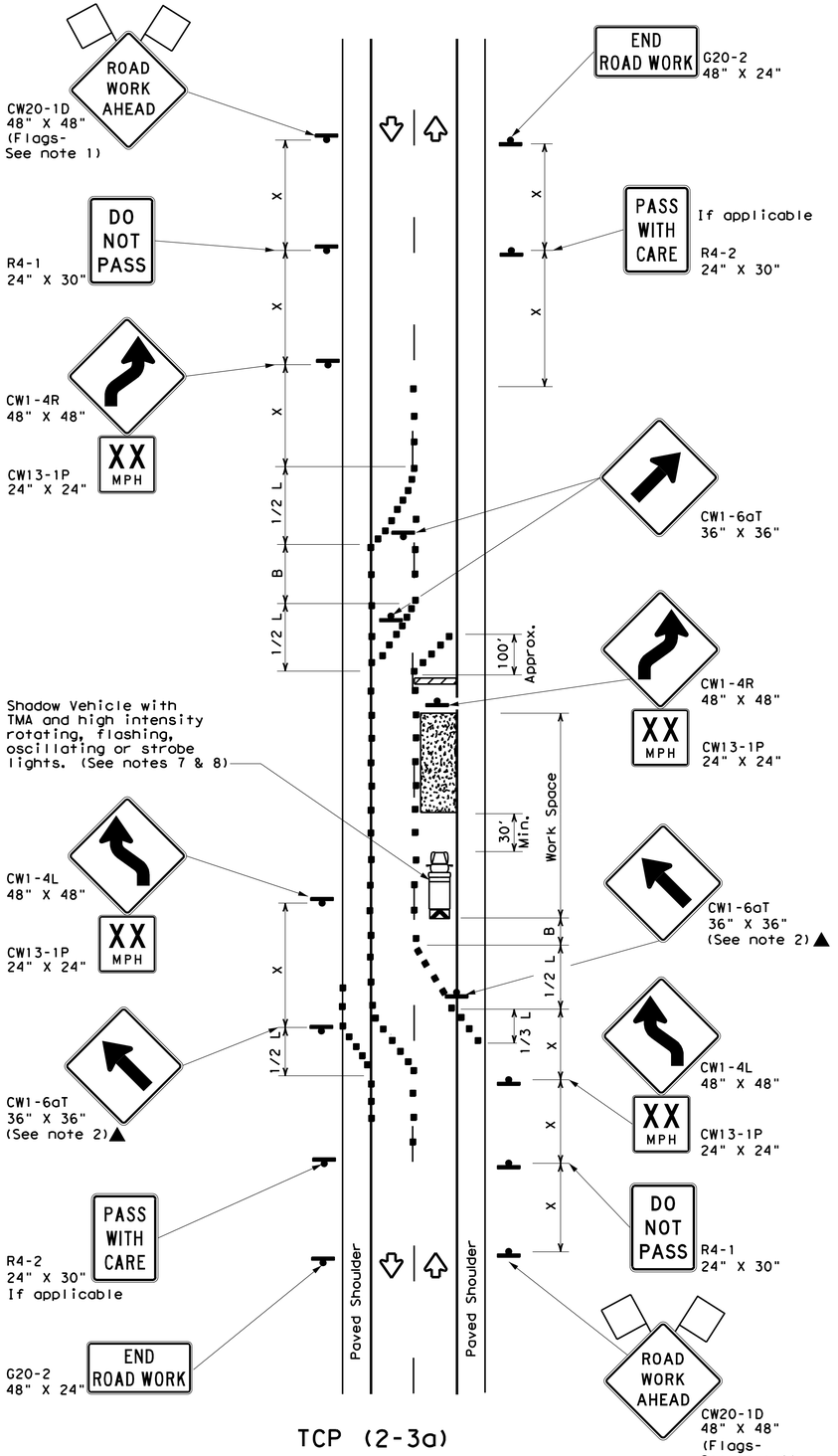
FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY

REVISIONS
8-95 2-12
1-97 3-03
4-98 2-18

SHEET NO.: C-205

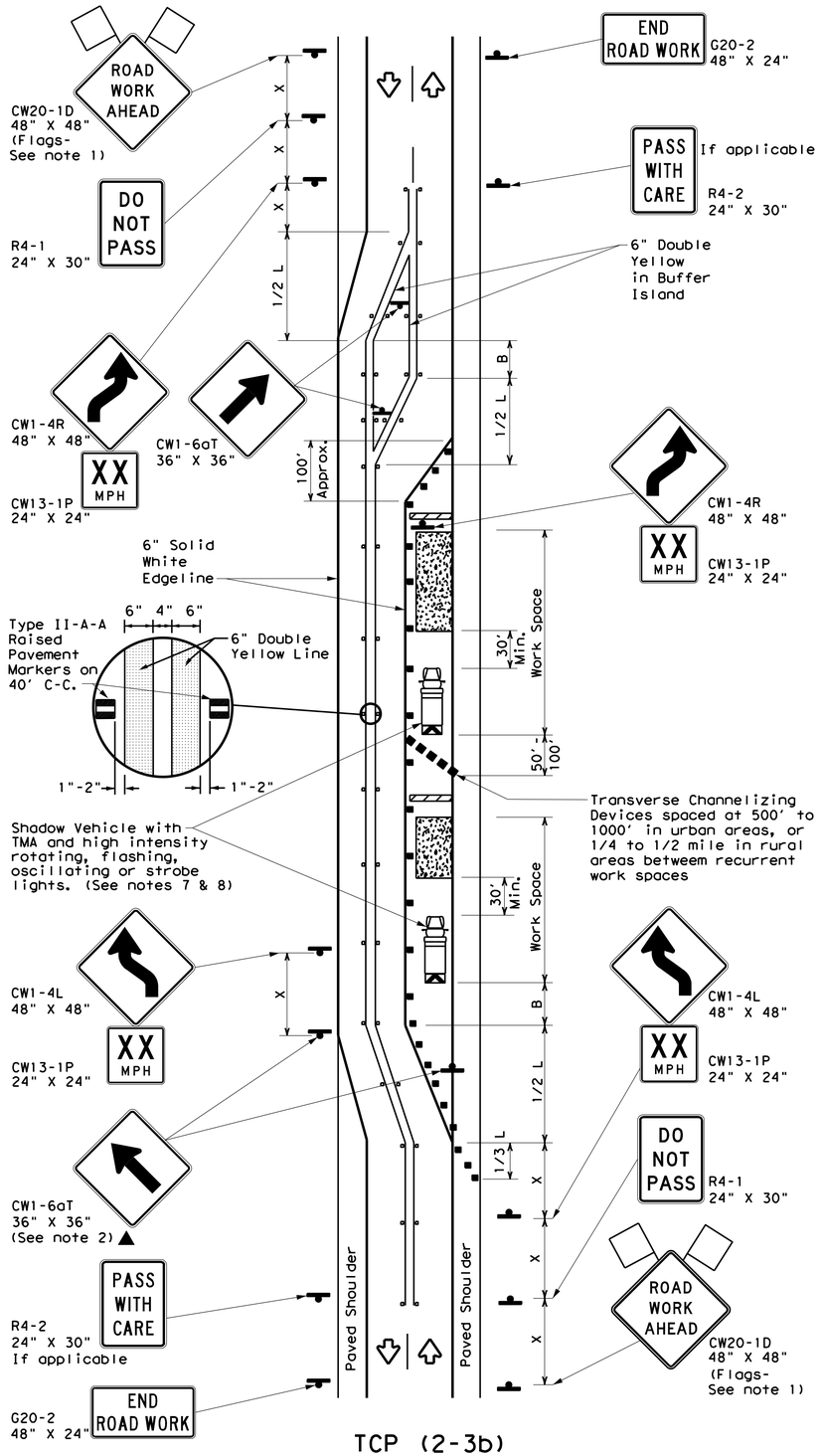
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade	■ ■	Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	....	Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
				TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

9. Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Safety Division Standard

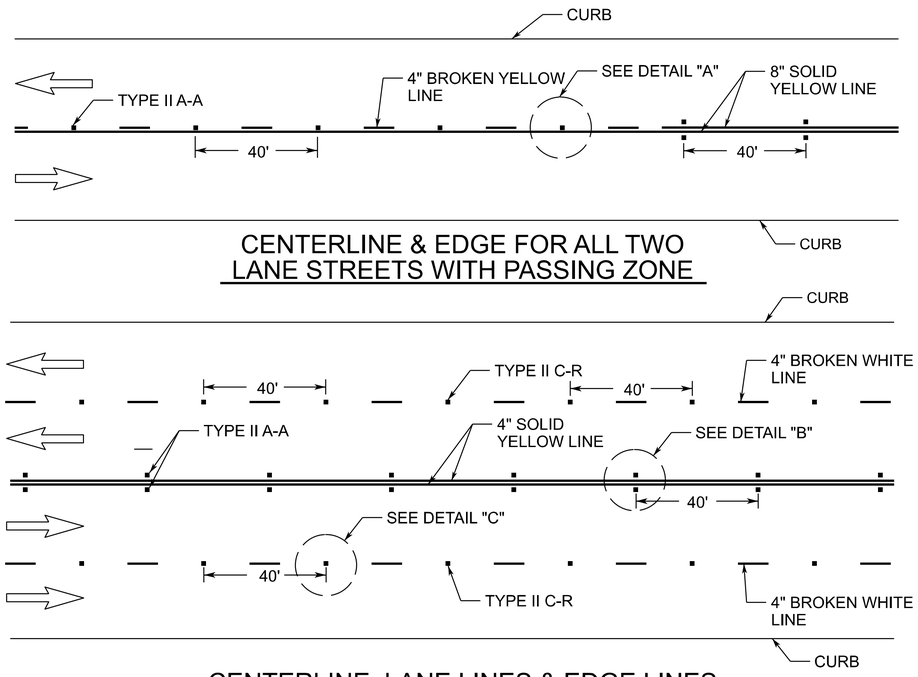
TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-23

FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:
©TxDOT April 2023	CONT	SECT	JOB	HIGHWAY

REVISIONS
12-85 4-98 2-18
8-95 3-03 4-23
1-97 2-12

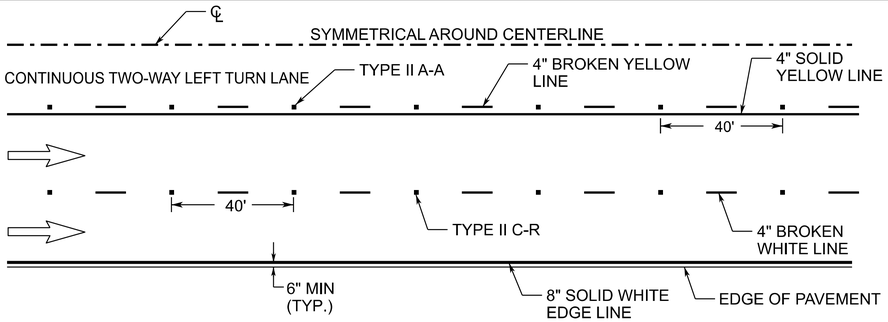
SHEET NO.: C-206



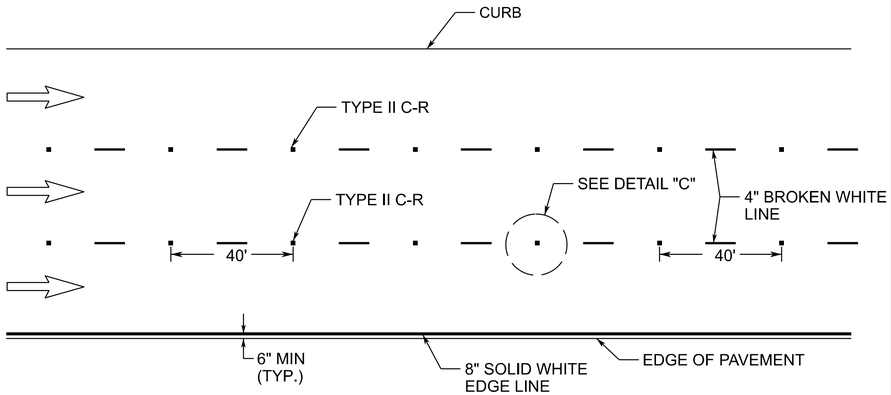
CENTERLINE & EDGE FOR ALL TWO LANE STREETS WITH PASSING ZONE

CENTERLINE, LANE LINES & EDGE LINES FOR FOUR LANE TWO-WAY STREETS

RAISED PAVEMENT MARKERS TYPE II C-R SHALL HAVE CLEAR FACE TOWARD NORMAL TRAFFIC AND RED FACE TOWARD WRONG-WAY TRAFFIC.



CENTERLINE, LANE LINES, & EDGE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES & EDGE LINES FOR ONE-WAY MULTILANE STREET

RAISED PAVEMENT MARKERS TYPE II C-R SHALL HAVE CLEAR FACE TOWARD NORMAL TRAFFIC AND RED FACE TOWARD WRONG-WAY TRAFFIC.

*POSTED SPEED	FORMULA
<45	$L=\frac{WS^2}{60}$
≥45	L= WS

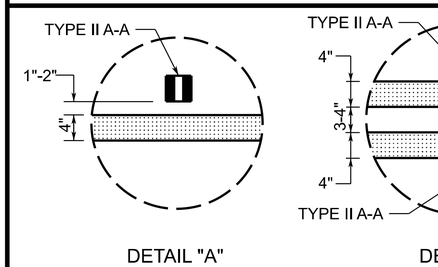
TABLE 1 - TYPICAL LENGTH (L)

*85TH PERCENTILE SPEED MAY BE USED ON ROADS WHERE TRAFFIC SPEEDS NORMALLY EXCEED THE POSTED SPEED LIMIT. CROSSHATCHING LENGTH SHOULD BE ROUNDED UP TO NEAREST 5 FOOT INCREMENT.

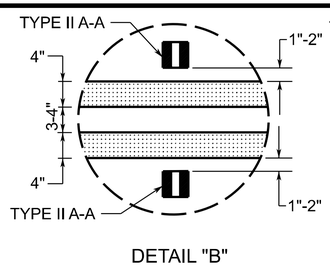
L= LENGTH OF CROSSHATCHING (FT)
W= WIDTH OF OFFSET (FT)
S= POSTED SPEED (MPH)

GENERAL NOTES:

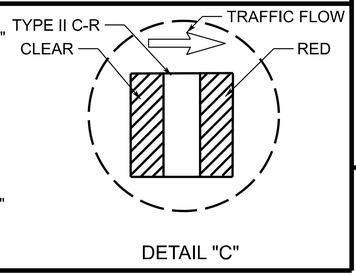
1. EDGELINE ADJACENT TO CURB AND GUTTER IS NOT REQUIRED IN ALL CASES, HOWEVER SHALL BE PLACED AS DIRECTED BY THE ENGINEER.
2. THE TRAVELED WAY INCLUDES ONLY THAT PORTION OF THE ROADWAY USED FOR VEHICULAR TRAVEL AND NOT THE PARKING LANES, SIDEWALKS, BERMS AND SHOULDERS. THE TRAVELED WAYS SHALL BE MEASURED FROM THE INSIDE OF EDGELINE TO INSIDE OF EDGELINE OF A TWO LANE ROADWAY.
3. ALL RAISED PAVEMENT MARKERS PLACED IN BROKEN LINES SHALL BE PLACED IN LINE WITH AND MIDWAY BETWEEN THE STRIPES.
4. ON CONCRETE PAVEMENTS THE RAISED PAVEMENT MARKERS SHOULD BE PLACED TO ONE SIDE OF THE LONGITUDINAL JOINTS.
5. ALL PAVEMENT MARKING MATERIAL SHALL MEET THE REQUIRED MATERIAL SPECIFICATIONS AS SPECIFIED BY CITY OF SAN ANTONIO STANDARD SPECIFICATIONS.
6. ASIDE FROM LONG LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PREFORMED MATERIAL. HOT-APPLIED MARKINGS MAY BE USED ONLY IF APPROVED BY PWD - TRAFFIC ENGINEERING AND OPERATIONS.
7. FOR GUARD FENCE DETAILS, REFER ELSEWHERE IN THE PLANS.
8. YELLOW EDGE LINES ADJACENT TO RAISED ISLAND ARE REQUIRED. REF TRMRM-24



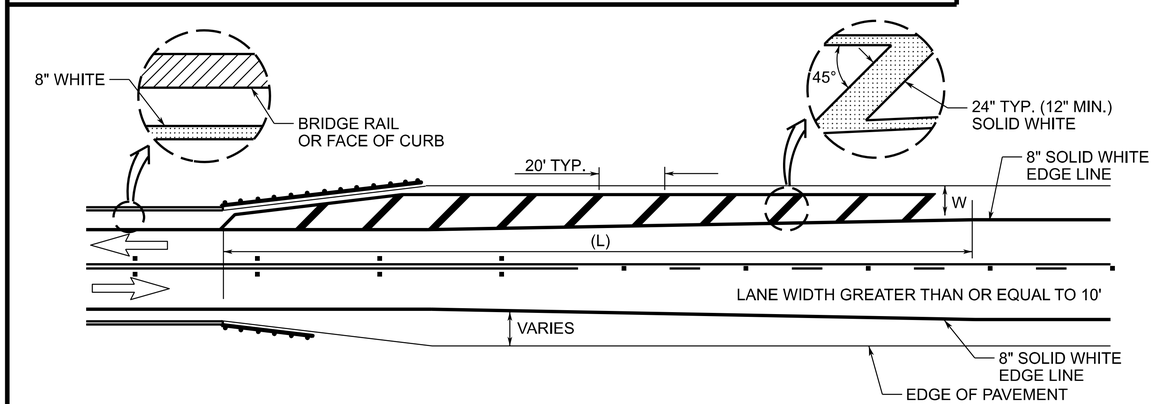
DETAIL "A"



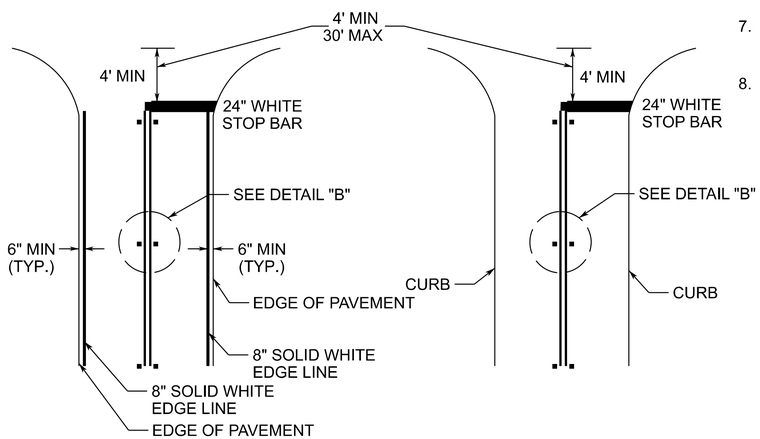
DETAIL "B"



DETAIL "C"



ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

SEPTEMBER 2024

CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

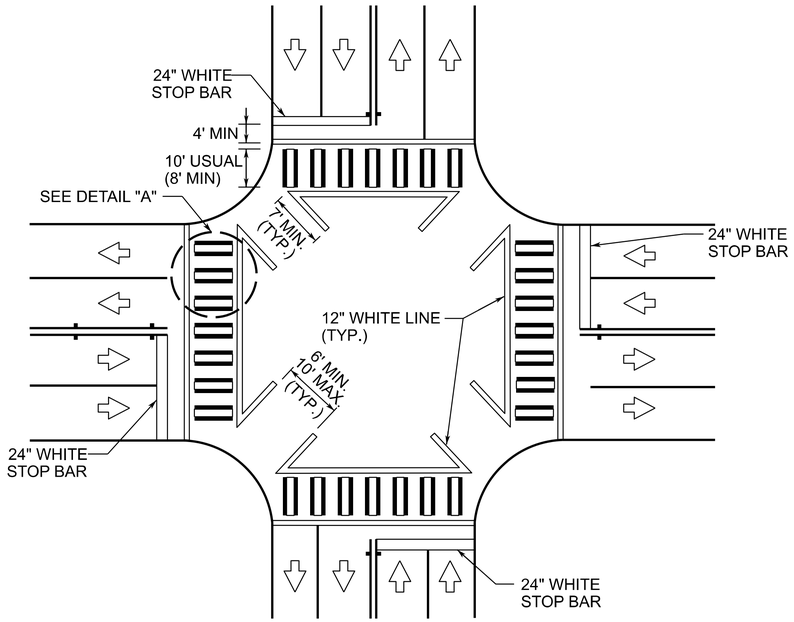
PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

SHEET 01 OF 01

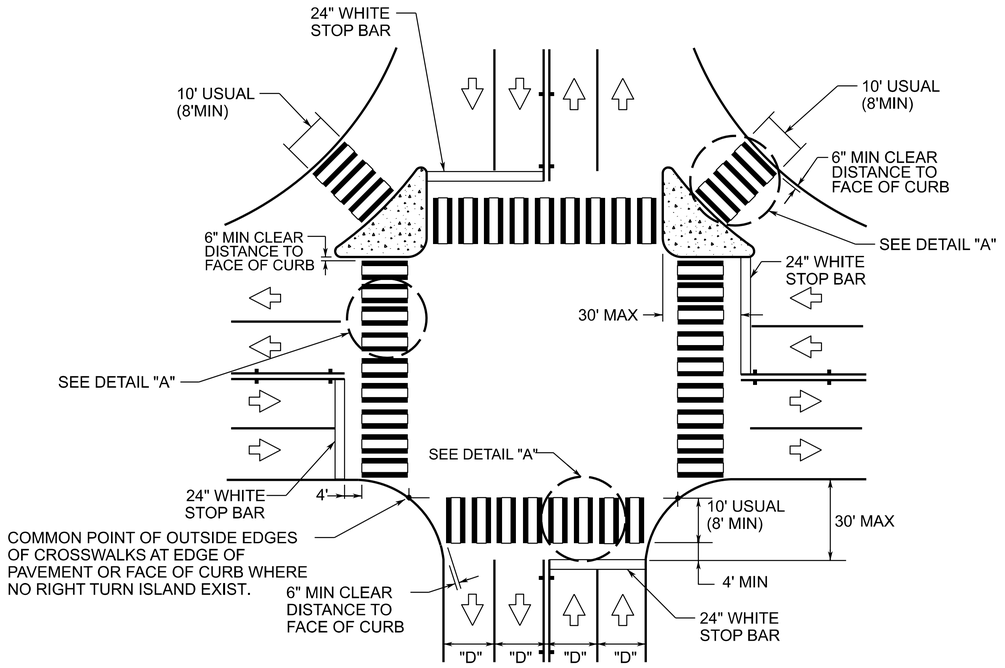
PM&RPM-24

_____% SUBMITTAL
DRWN. BY:_____

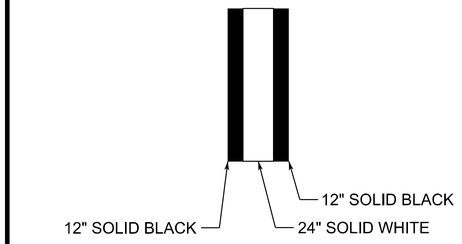
SHEET NO.: C-207



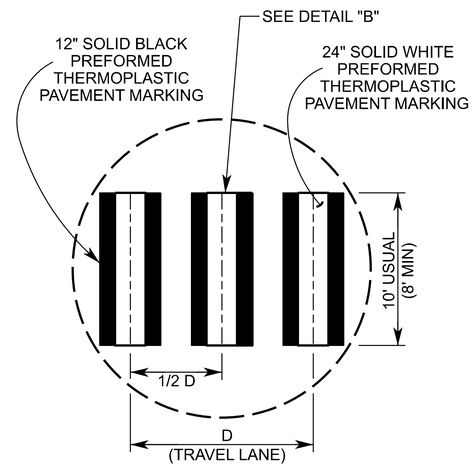
EXCLUSIVE PEDESTRIAN PHASE



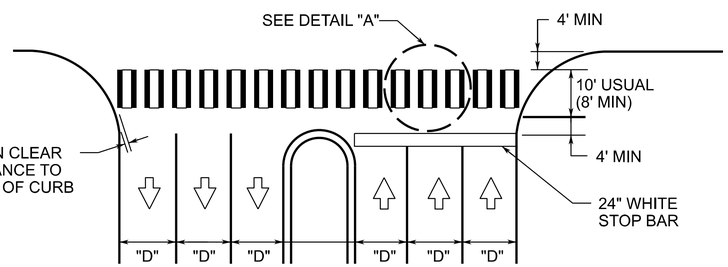
INTERSECTION WITH RIGHT TURN ISLANDS



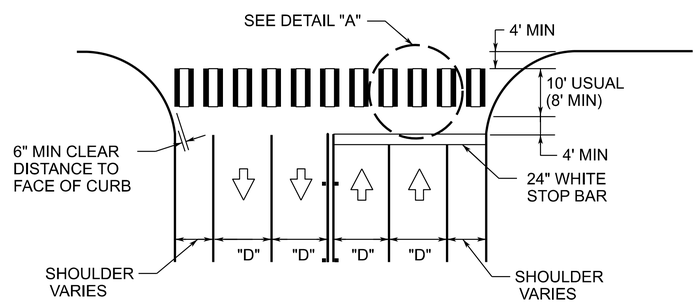
DETAIL B



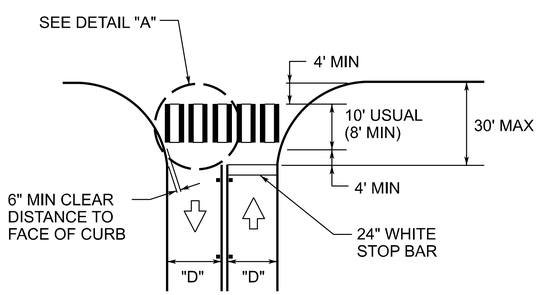
DETAIL A



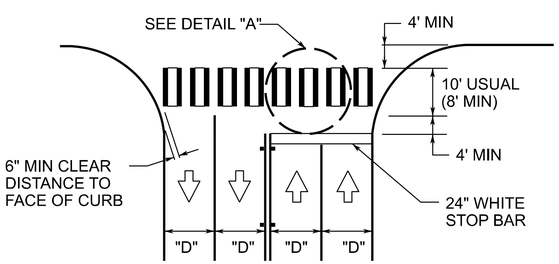
MULTI - LANES



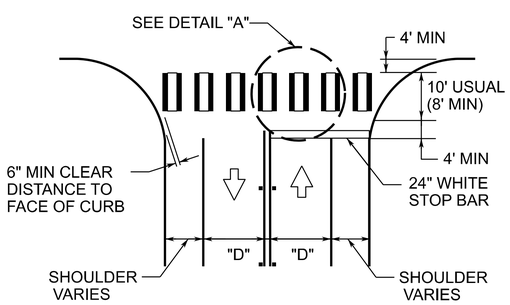
FOUR LANES WITH SHOULDERS



TWO LANES



FOUR LANES



TWO LANES WITH SHOULDERS

GENERAL NOTES

1. "D" IS EQUAL TO THE WIDTH OF TRAVEL LANE. SEE TEXAS MUTCD 3B.18
2. PREFORMED THERMOPLASTIC SHALL BE USED FOR ALL CROSSWALK PAVEMENT MARKINGS.
3. PREFORMED THERMOPLASTIC MATERIAL SHALL BE SUPPLIED BY A MANUFACTURER LISTED ON TxDOT'S MATERIAL PRODUCER LIST (MPL).

SEPTEMBER 2024

CITY OF SAN ANTONIO

PUBLIC WORKS DEPARTMENT

TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

TYPICAL CROSSWALK DETAILS

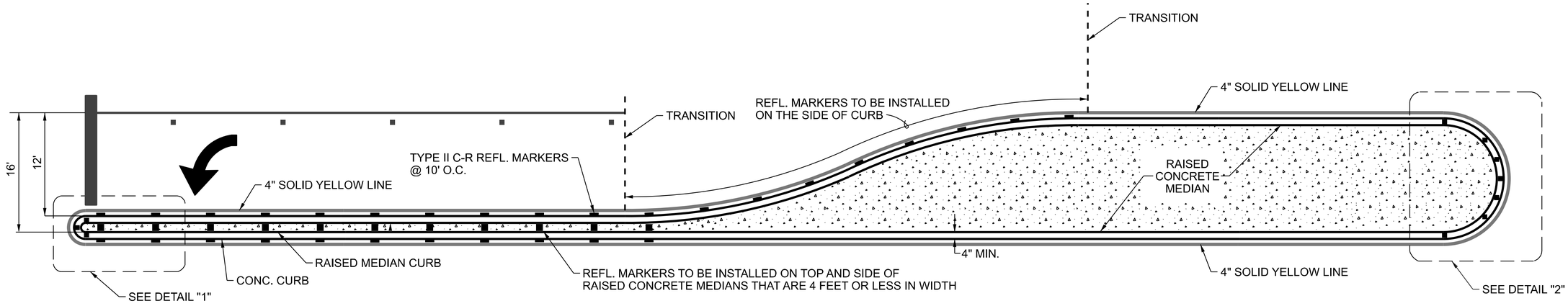
SHEET 01 OF 01

TCD-24

_____% SUBMITTAL

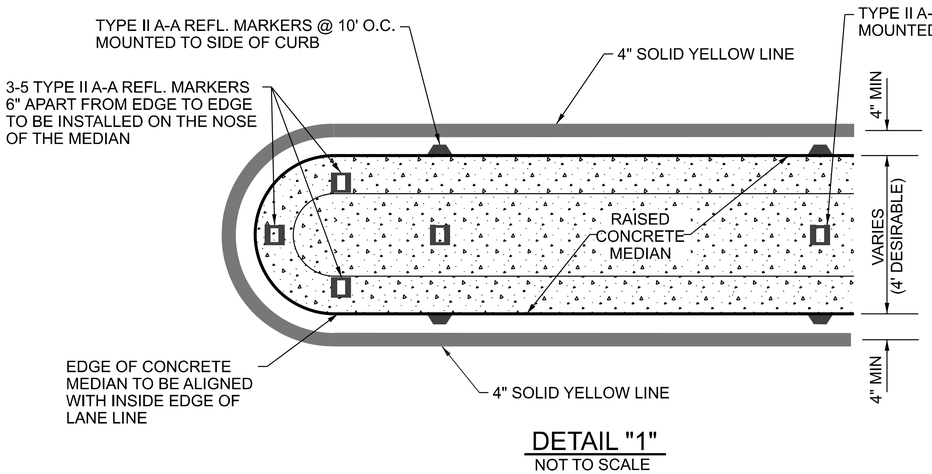
DRWN. BY:_____

SHEET NO.: C-208



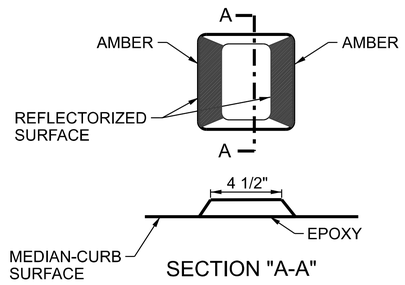
TYPICAL RAISED CONCRETE MEDIAN

NOT TO SCALE



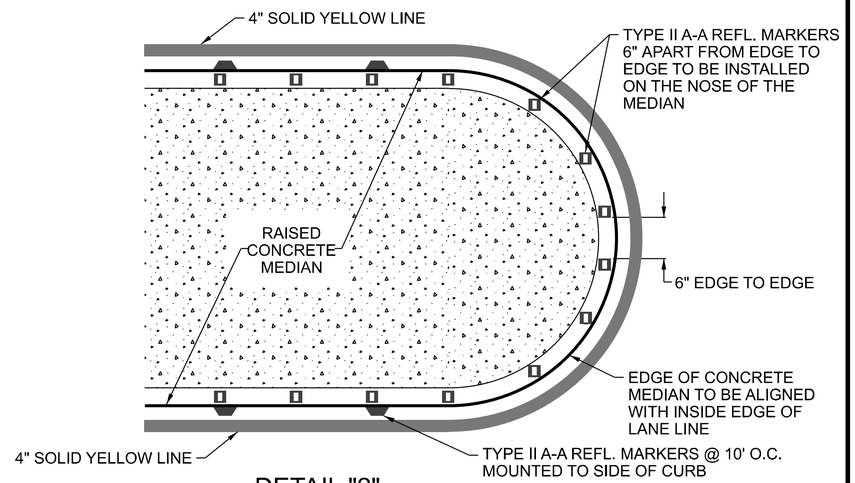
DETAIL "1"

NOT TO SCALE



TYPE II A-A REFLECTIVE MARKERS

NOT TO SCALE

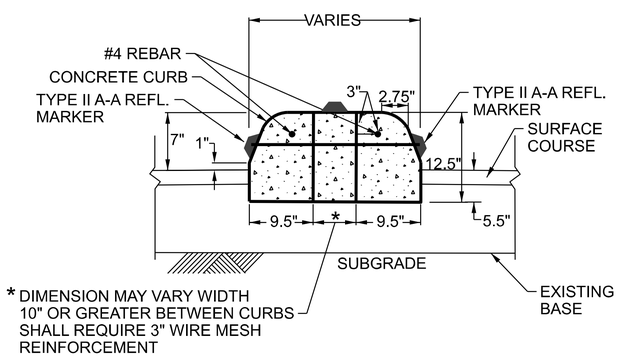


DETAIL "2"

NOT TO SCALE

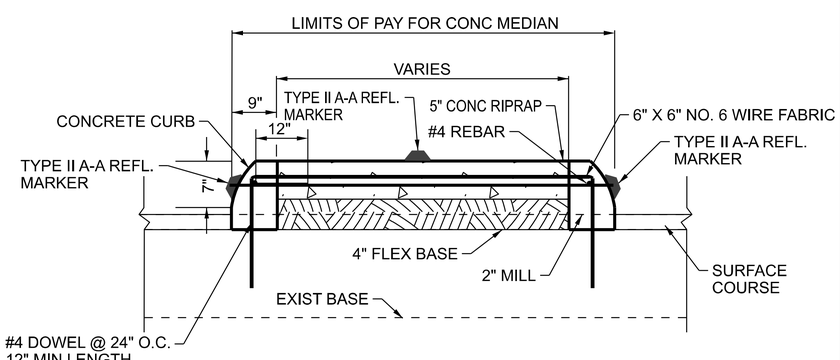
NOTES:

1. NEW CURBING SHALL EXTEND 5.5" INTO EXISTING PAVEMENT STRUCTURE.
2. IF FLEXIBLE BASE IS ENCOUNTERED, IT SHALL BE RECOMPACTED USING A HANDHELD VIBRATORY COMPACTOR.
3. REFLECTORS SHALL BE MOUNTED TO THE TOP OF BACK TO BACK CURB AT 10' SPACING. SEE MEDIAN DETAIL ON THIS SHEET.



BACK-TO-BACK CURB DETAIL FOR RETROFIT ON EXISTING ROADWAY

NOT TO SCALE



BACK-TO-BACK CURB ALTERNATE OPTION DOWELED MEDIAN

NOT TO SCALE

GENERAL NOTES:

1. ASIDE FROM LONG LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PREFORMED MATERIAL. HOT-APPLIED MARKINGS MAY BE USED ONLY IF APPROVED BY PWD - TRAFFIC ENGINEERING & OPERATIONS.
2. YELLOW EDGE LINES ADJACENT TO RAISED ISLAND ARE REQUIRED , REFER TO TRMRM-24.
3. SIDE MOUNT RPM SHALL BE APPLIED WITH EPOXY, TOP MOUNT RPM WITH EPOXY OR BITUMINOUS.

SEPTEMBER 2024

CITY OF SAN ANTONIO

PUBLIC WORKS DEPARTMENT

TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

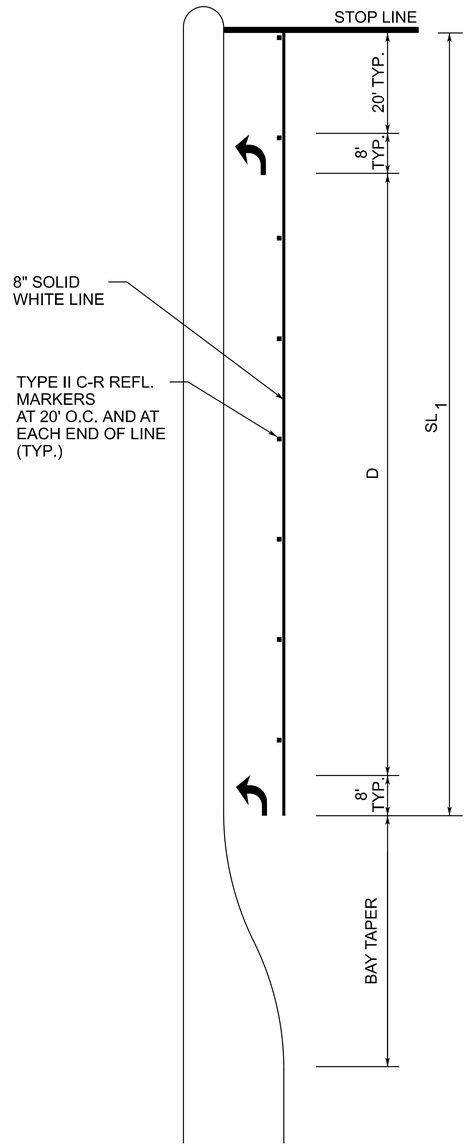
TYPE II A-A REFELECTIVE MARKERS ON RAISED MEDIAN

SHEET 01 OF 01 TRMRM-24

_____% SUBMITTAL

DRWN. BY:_____

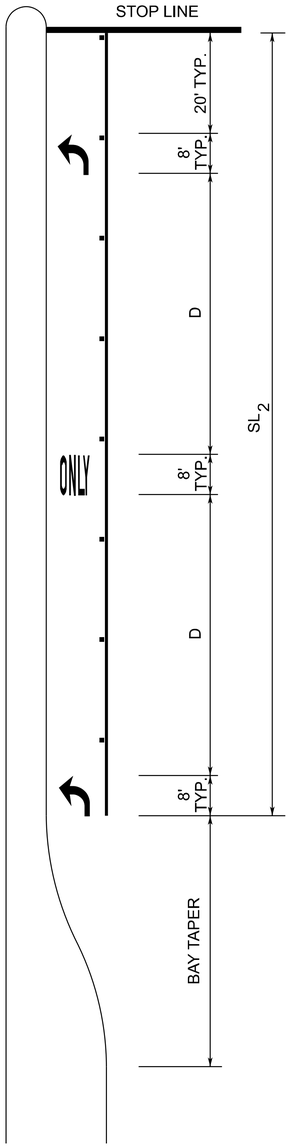
SHEET NO.: C-209



CASE 1

SL < 110'

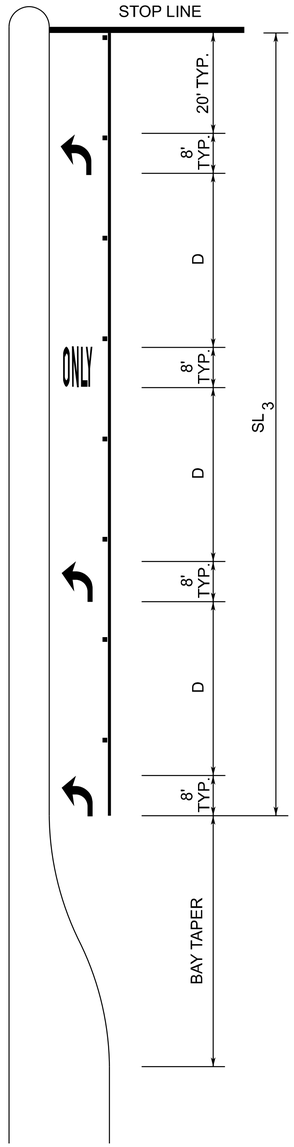
D = SL - 36



CASE 2

110' < SL < 200'

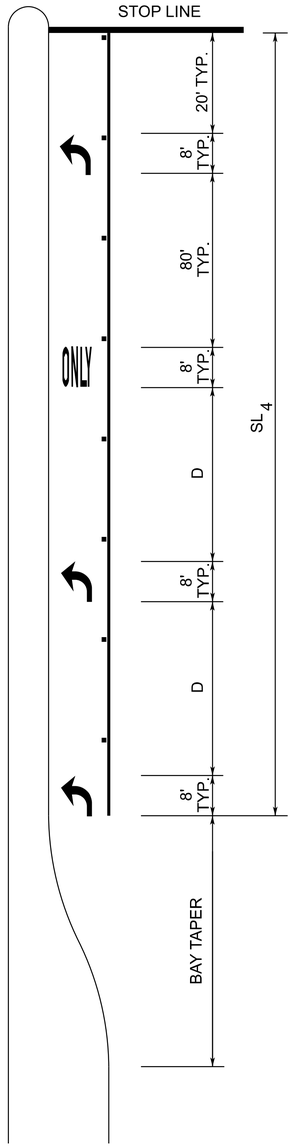
$D = \frac{(SL - 44)}{2}$



CASE 3

201' < SL < 300'

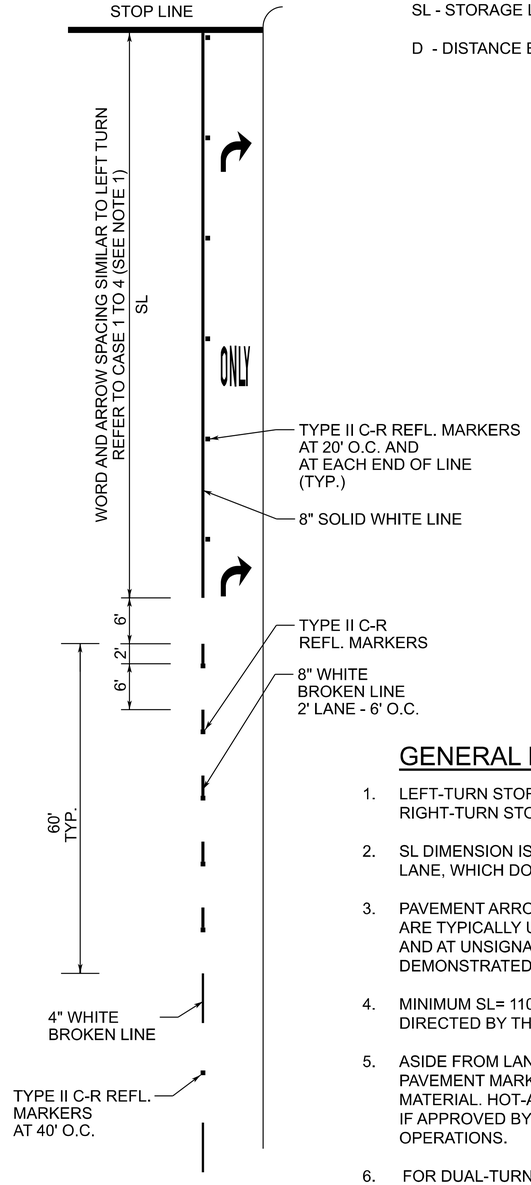
$D = \frac{(SL - 52)}{3}$



CASE 4

SL > 300'

$D = \frac{(SL - 132)}{2}$



RIGHT TURN LANE DROP

KEY

SL - STORAGE LENGTH (FEET)

D - DISTANCE BETWEEN ARROWS AND LEGENDS (FEET)

GENERAL NOTES:

1. LEFT-TURN STORAGE LANE DETAILS ALSO APPLY TO RIGHT-TURN STORAGE LANES.
2. SL DIMENSION IS FROM STOP LINE TO END OF TURN LANE, WHICH DOES NOT INCLUDE TAPER LENGTH.
3. PAVEMENT ARROWS AND “ONLY”LEGEND MARKINGS ARE TYPICALLY USED AT SIGNALIZED INTERSECTIONS AND AT UNSIGNALIZED INTER - SECTIONS WHERE A DEMONSTRATED NEED EXISTS.
4. MINIMUM SL= 110’. SL MAY BE LESS THAN 110 FEET AS DIRECTED BY THE CITY TRAFFIC ENGINEER.
5. ASIDE FROM LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PREFORMED MATERIAL. HOT-APPLIED MARKINGS MAY BE USED ONLY IF APPROVED BY PWD TRAFFIC ENGINEERING & OPERATIONS.
6. FOR DUAL-TURN LANES, DIMENSIONS SHALL BE THE SAME FOR EACH LANE.
7. YELLOW EDGE LINES ADJACENT TO RAISED ISLAND ARE REQUIRED, REFER TO TRMRM-24.

SEPTEMBER 2024

CITY OF SAN ANTONIO

PUBLIC WORKS DEPARTMENT

TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

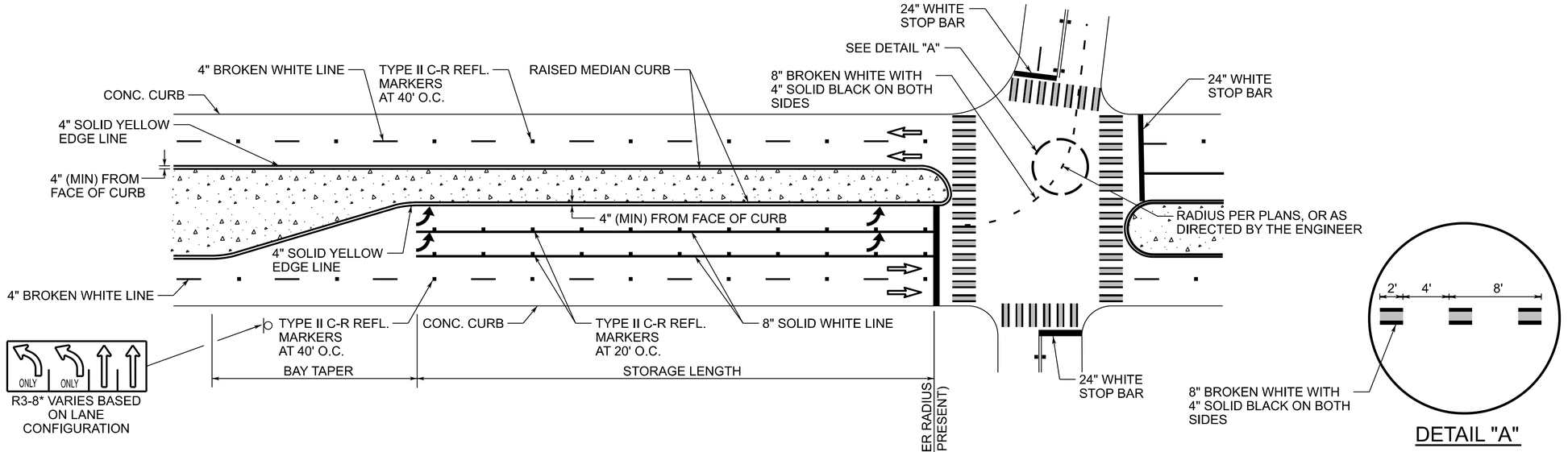
TURN LANE PAVEMENT MARKINGS

SHEET 01 OF 01 TLPM-24

_____% SUBMITTAL

DRWN. BY:_____

SHEET NO.: C-210

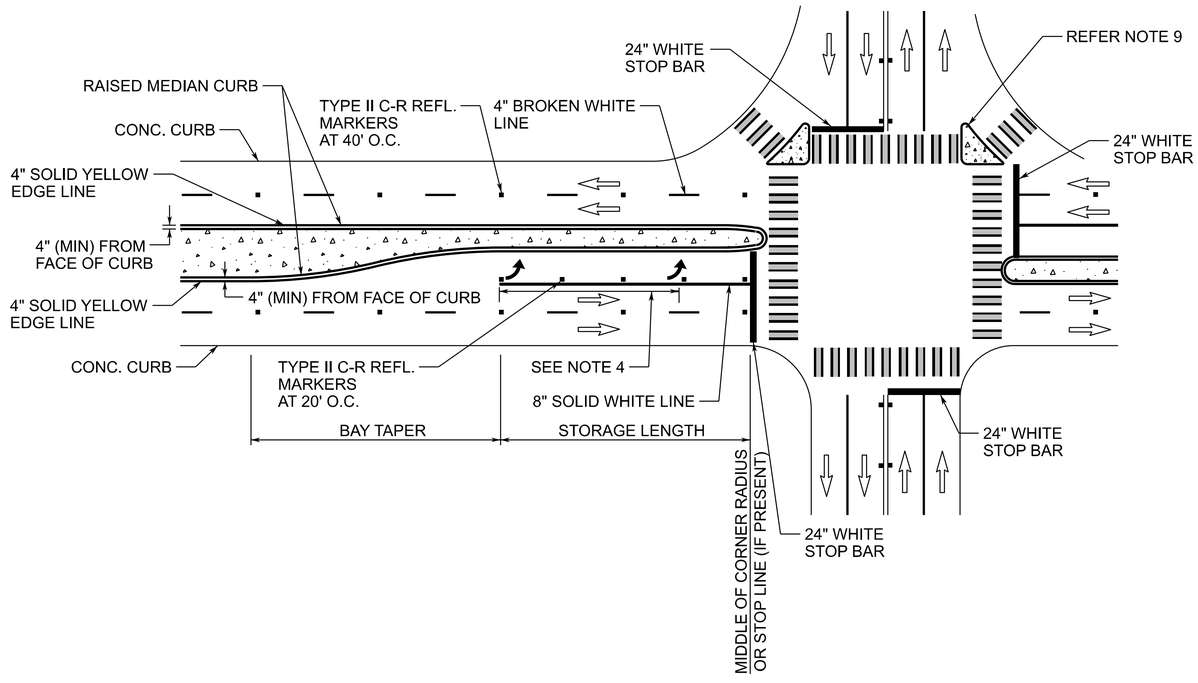


DETAIL "A"

MINIMUM TURN BAY REVERSE CURVE TAPER LENGTHS	
POSTED SPEED (MPH)	DUAL LT LANES (FT)
25-35	150'
40-45	150'
50-55	250'

MINIMUM STORAGE LENGTH	
POSTED SPEED (MPH)	MINIMUM LENGTH (FT)
40 OR LESS	110'
45 OR MORE	150'

DUAL LEFT (RAISED MEDIAN)



LEFT-TURN LANE (RAISED MEDIAN)

GENERAL NOTES:

1. THE POSTED SPEED LIMIT IS TYPICALLY EQUAL TO THE DESIGN SPEED MINUS 5 MPH.
2. THE DIMENSIONS GIVEN FOR DUAL LEFT (RAISED MEDIAN) IN THE MINIMUM LENGTH TABLES ON THIS SHEET ARE ALSO APPLICABLE FOR DUAL RIGHT-TURN LANES.
3. STORAGE LENGTHS LONGER THAN THE MINIMUMS LISTED ON THIS DRAWING MAY BE DETERMINED USING TRAFFIC ENGINEERING ANALYSIS.
4. FOR THE PLACEMENT OF PAVEMENT ARROWS AND WORDS SEE THE TURN LANE PAVEMENT MARKING STANDARD SHEET, REFER TO TLPM-24.
5. REFER TO STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS AND TURN LANE DETAILS STANDARD SHEETS.
6. REFER TO TYPICAL CROSSWALK DETAILS STANDARD FOR CROSSWALK DETAILS.
7. WHITE EDGE LINES AT EDGE OF PAVEMENT ARE REQUIRED WHERE CURBS ARE NOT PRESENT.
8. WHITE EDGE LINE ADJACENT TO CURB AND GUTTER IS NOT REQUIRED.
9. YELLOW EDGE LINES ADJACENT TO RAISED ISLAND ARE REQUIRED, REFER TO TRMRM-24.
10. ASIDE FROM LONG LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PREFORMED MATERIAL. HOT-APPLIED MARKINGS MAY BE USED ONLY IF APPROVED BY PWD - TRAFFIC ENGINEERING AND OPERATIONS.

SEPTEMBER 2024

CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

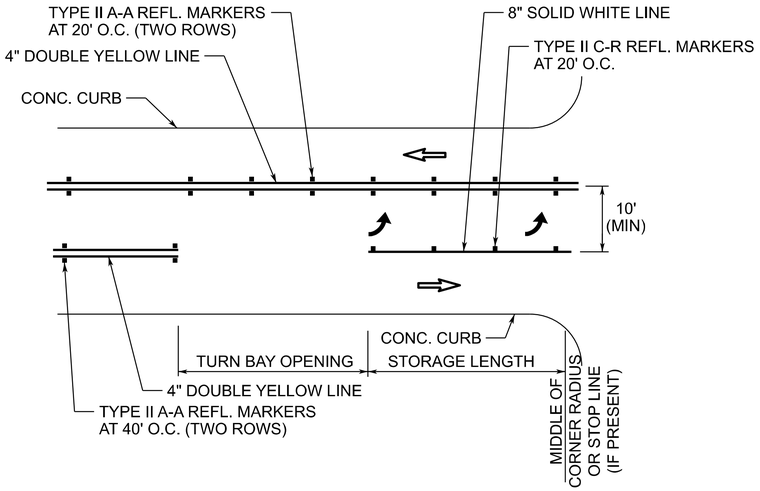
TURN LANE DETAILS 1

SHEET 01 OF 02 TLD-(1)-24

_____% SUBMITTAL

DRWN. BY:_____

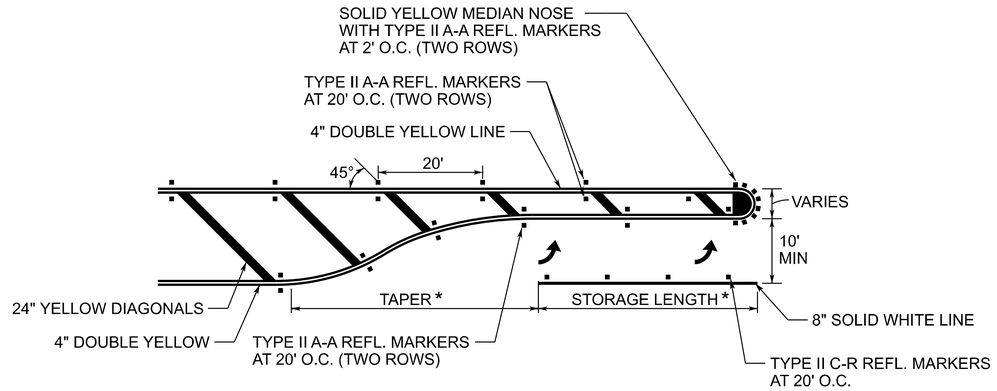
SHEET NO.: C-211

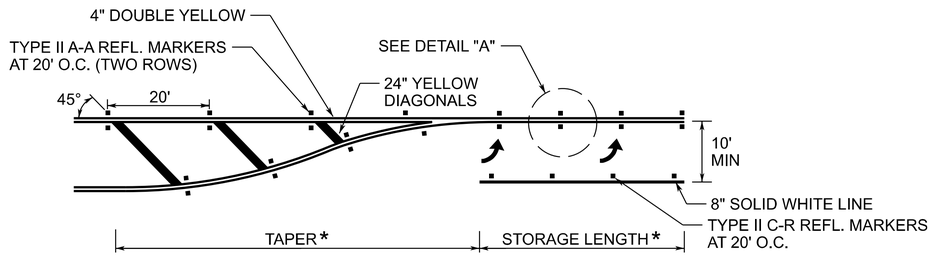


MINIMUM TURN BAY OPENINGS	
POSTED SPEED (MPH)	MINIMUM OPENING (FT)
25-35	60'
≥ 40	100'

MINIMUM STORAGE LENGTH	
POSTED SPEED (MPH)	MINIMUM OPENING (FT)
40 OR LESS	110'
45 OR MORE	150'

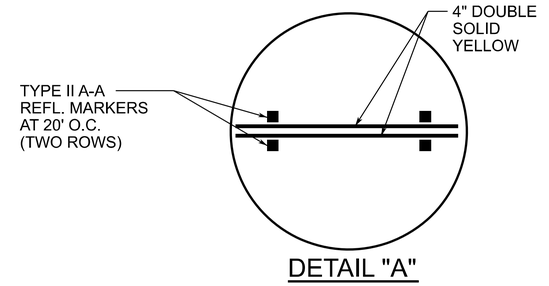
LEFT-TURN LANE





PAINTED MEDIAN LEFT TURN BAY DETAILS

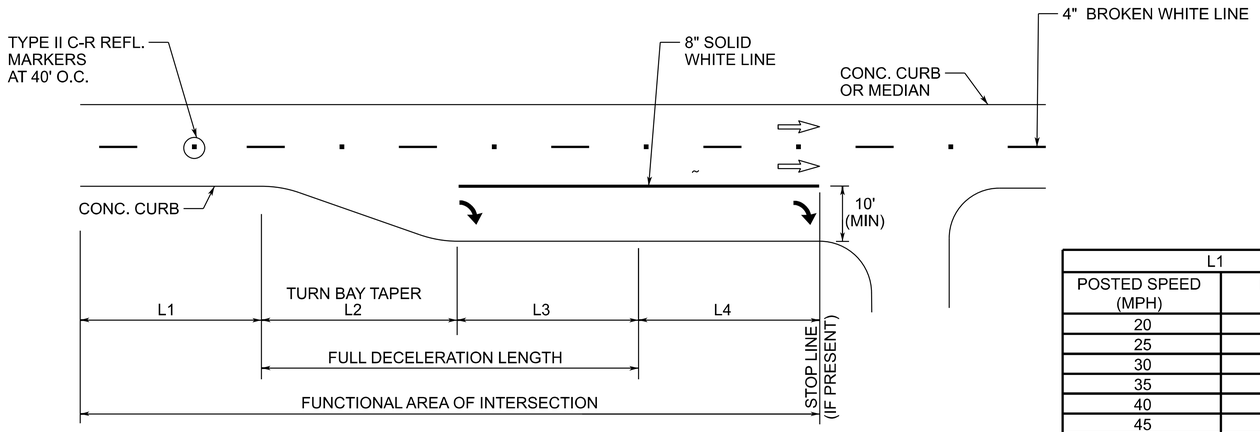
* USE MINIMUM TURN BAY REVERSE CURVE TAPER LENGTH AND MINIMUM STORAGE LENGTH TABLES FOR "LEFT-TURN LANE (RAISED MEDIAN)".



DETAIL "A"

GENERAL NOTES:

1. THE POSTED SPEED LIMIT IS TYPICALLY EQUAL TO THE DESIGN SPEED MINUS 5 MPH.
2. STORAGE LENGTHS LONGER THAN THE MINIMUMS LISTED ON THIS DRAWING MAY BE DETERMINED USING TRAFFIC ENGINEERING ANALYSIS OR APPROXIMATE CALCULATIONS.
3. FOR THE PLACEMENT OF PAVEMENT ARROWS AND WORDS SEE TURN LANE PAVEMENT MARKINGS STANDARD SHEET.
4. REFER TO APPLICABLE STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS AND TURN LANE DETAILS STANDARD SHEETS.
5. REFER TO BICYCLE PAVEMENT MARKINGS STANDARD SHEET FOR TYPE AND PLACEMENT.
6. WHITE EDGE LINES AT EDGE OF PAVEMENT ARE REQUIRED WHERE CURBS ARE NOT PRESENT.
7. WHITE EDGE LINE ADJACENT TO CURB AND GUTTER IS NOT REQUIRED.
8. BICYCLE SYMBOL MARKING SHALL FACE THRU LANE OF TRAFFIC.
9. ASIDE FROM LONG LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PERFORMED. HOT-APPLIED PAVEMENT MARKINGS MAY BE USED ONLY IF APPROVED BY PWD TRAFFIC ENGINEERING & OPERATIONS.
10. ASSUMES A TURNING VEHICLE HAS "CLEARED THE THROUGH LANE" WHEN IT HAS MOVED LATERALLY APPROXIMATELY 9 FT SO THAT A FOLLOWING THROUGH VEHICLE CAN PASS WITHOUT ENCROACHING UPON THE ADJACENT TRAFFIC LANE.
11. THE SPEED DIFFERENTIAL BETWEEN THE TURNING VEHICLE AND FOLLOWING THROUGH VEHICLES IS 10 MPH WHEN THE TURNING VEHICLE "CLEARS THE THROUGH TRAFFIC LANE".
12. 5.8 FT/S^2 DECELERATION WHILE MOVING FROM THE THROUGH LANE INTO THE TURN LANE; 6.5 FT/S^2 AVERAGE DECELERATION AFTER COMPLETING LATERAL SHIFT INTO THE TURN LANE.
13. YELLOW EDGE LINES ADJACENT TO RAISED ISLAND ARE REQUIRED, REFER TO TRMRM-24.



UNSIGNALIZED RIGHT-TURN LANE

L1	
POSTED SPEED (MPH)	LENGTH (FT)
20	75'
25	95'
30	115'
35	130'
40	150'
45	170'
50	185'
55	205'
60	225'
65	240'
70	260'

DESIRABLE FULL DECELERATION LENGTHS	
(L2+L3)	
POSTED SPEED (MPH)	LENGTH (FT)
20	70'
25	115'
30	160'
35	220'
40	275'
45	350'
50	425'
55	515'
60	605'
65	720'
70	820'

SEPTEMBER 2024

CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

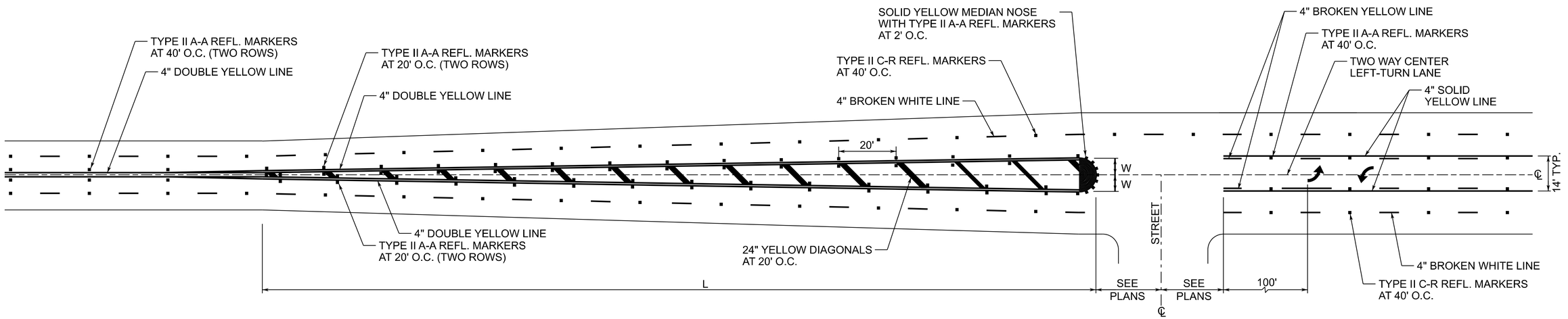
TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

TURN LANE DETAILS 2

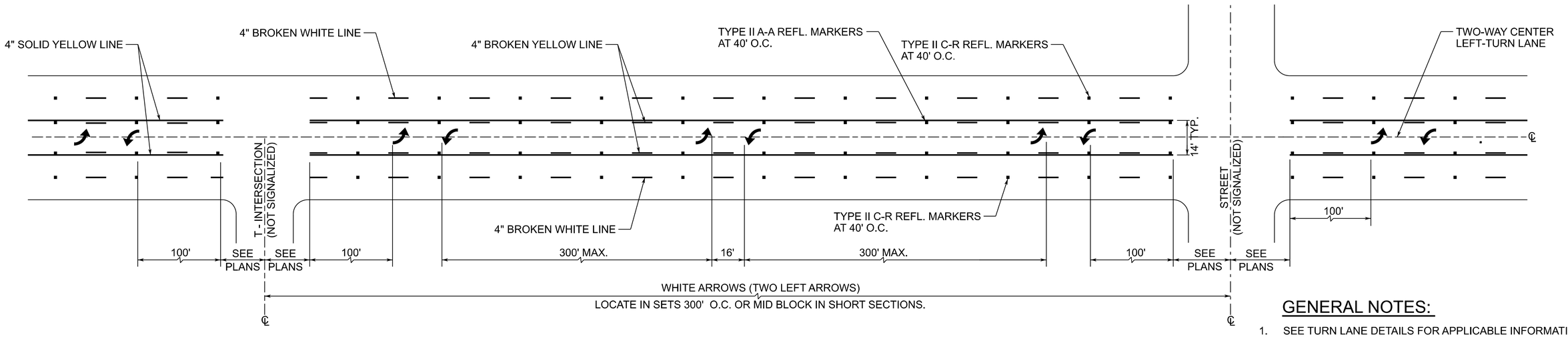
SHEET 02 OF 02 TLD-(2)-24

_____% SUBMITTAL
DRWN. BY:_____

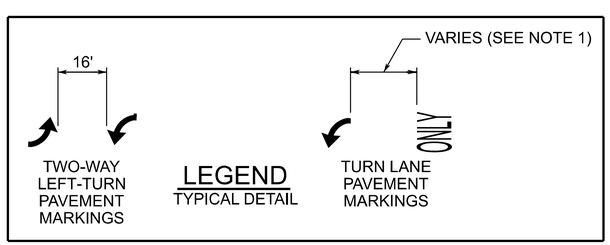
SHEET NO.: C-212



TYPICAL TRANSITION AT BEGINNING AND END OF TWO-WAY CENTER LEFT-TURN LANE



TWO-WAY LEFT-TURN LANE DETAILS NON-SIGNALIZED INTERSECTIONS



POSTED SPEED *	FORMULA
< 45	$L=\frac{WS^2}{60}$
≥ 40	L= WS

TABLE 1 - TYPICAL LENGTH (L)

* 85TH PERCENTILE SPEED MAY BE USED ON ROADS WHERE TRAFFIC SPEEDS NORMALLY EXCEED THE POSTED SPEED LIMIT. CROSSHATCHING LENGTH SHOULD BE ROUNDED UP TO NEAREST 5 FOOT INCREMENT.

L= LENGTH OF CROSSHATCHING (FT)
W= WIDTH OF OFFSET (FT)
S= POSTED SPEED (MPH)

GENERAL NOTES:

1. SEE TURN LANE DETAILS FOR APPLICABLE INFORMATION (TLPM-24).
2. SEE "PAINTED MEDIAN LEFT - TURN BAY DETAILS" ON LEFT TURN AND RIGHT TURN LANE DESIGN STANDARD SHEET 2 FOR APPLICABLE STANDARDS.
3. ASIDE FROM LONG LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PREFORMED MATERIAL. HOT-APPLIED MARKINGS MAY BE USED ONLY IF APPROVED BY PWD TRAFFIC ENGINEERING & OPERATIONS.

SEPTEMBER 2024

CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

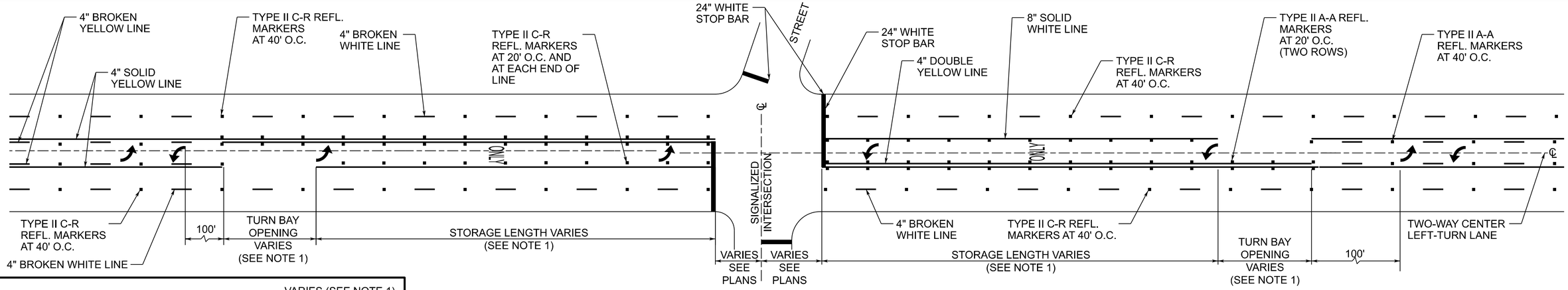
TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

TWO-WAY LEFT-TURN LANE DETAILS 1

SHEET 01 OF 02 TWLTLD-(1)-24

_____% SUBMITTAL
DRWN. BY:_____

SHEET NO.: C-213



16'

TWO-WAY LEFT-TURN PAVEMENT MARKINGS

LEGEND
TYPICAL DETAIL

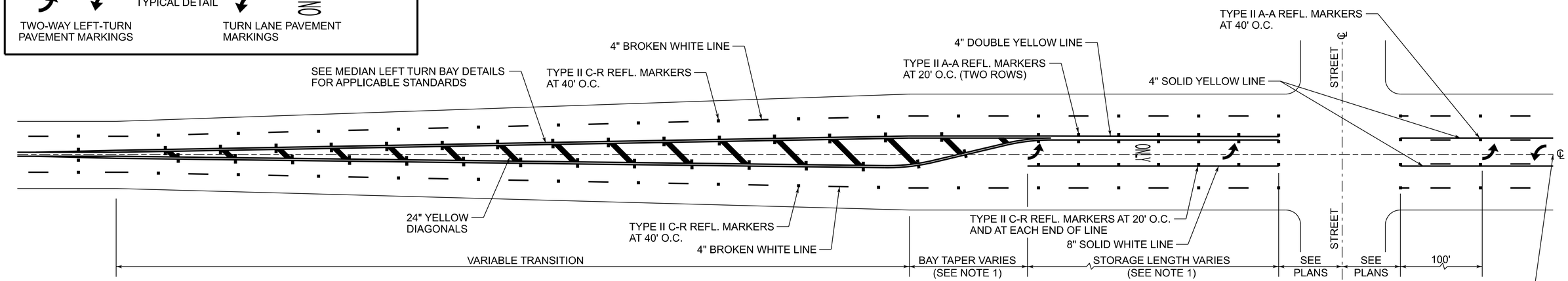
VARIES (SEE NOTE 1)

ONLY

TURN LANE PAVEMENT MARKINGS

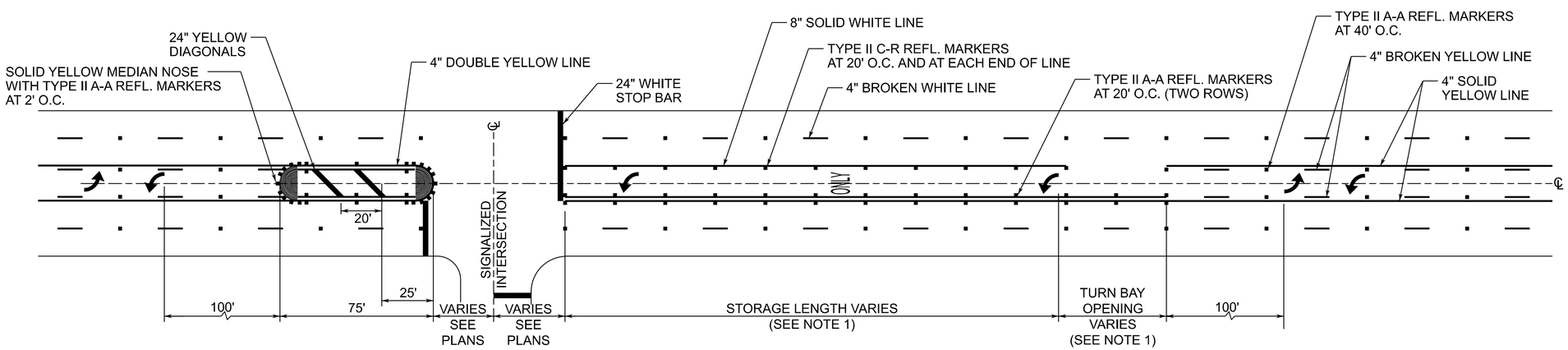
TYPICAL TWO-WAY LEFT-TURN LANE DETAILS

SIGNALIZED INTERSECTION



TYPICAL MEDIAN LEFT TURN BAY

SIGNALIZED AND NON-SIGNALIZED CROSS STREETS AT BEGINNING AND END OF TWO-WAY CENTER LEFT-TURN LANE



TYPICAL TWO-WAY LEFT-TURN LANE DETAILS

SIGNALIZED T INTERSECTION

GENERAL NOTES:

1. SEE TURN LANE DESIGN DETAILS FOR APPLICABLE INFORMATION, REFER TLPM-24
2. ASIDE FROM LONG LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PREFORMED MATERIAL. HOT-APPLIED MARKINGS MAY BE USED ONLY IF APPROVED BY PWD TRAFFIC ENGINEERING & OPERATIONS.
3. YELLOW EDGE LINES ADJACENT TO RAISED ISLAND ARE REQUIRED, REFER TO TRMRM-24.

SEPTEMBER 2024

CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

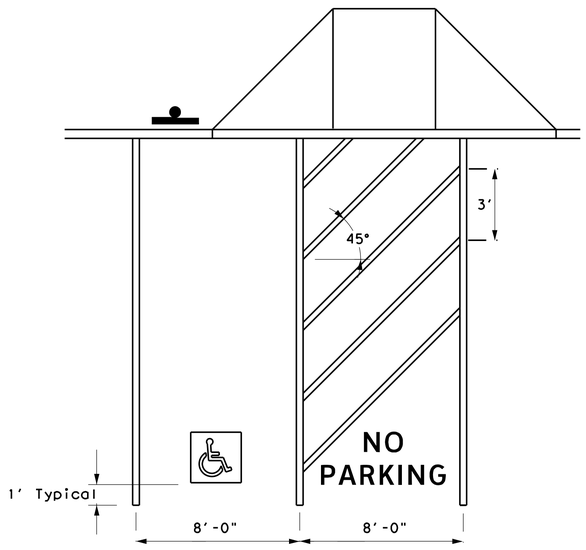
TWO-WAY LEFT-TURN LANE DETAILS 2

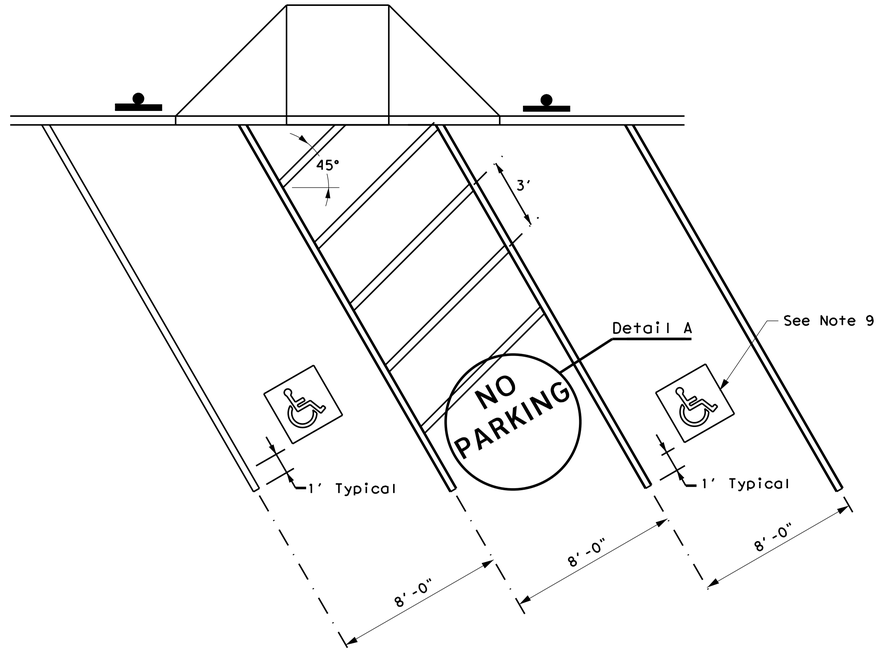
SHEET 02 OF 02 TWLTLD-(2)-24

_____% SUBMITTAL
DRWN. BY:_____

SHEET NO.: C-214

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.





PERPENDICULAR OR ANGLED ACCESSIBLE PARKING SPACE DIMENSIONS

GENERAL NOTES:

1. All paved accessible parking space limit lines shall be 4" solid white lines.
2. Paved accessible parking spaces must include a white International Symbol of Accessibility applied conspicuously on the surface in a color that contrasts the pavement. A blue background with white border may supplement the symbol for additional contrast.
3. The words "NO PARKING" must be applied on any access aisle adjacent to the parking space. The words must be white, applied:
   a) in all capital letters.
   b) centered within each access aisle adjacent to the parking space.
4. RESERVED PARKING (R7-8T) sign including the International Symbol of Accessibility.
   a) shall be REQUIRED for each accessible parking space.
   b) shall NOT be placed between two accessible parking spaces.
   c) shall NOT be placed in a location that restricts movement of wheelchairs within the adjacent sidewalk.
   d) shall have a mounting height of 7 feet to the bottom of the sign.
5. A sign identifying the consequences of parking illegally in a paved accessible parking space. Must:
   a) at a minimum state "VIOLATORS SUBJECT TO FINE AND TOWING" (Plaque)(R7-8aPT).
   b) be mounted on a pole, post, wall or freestanding board.
   c) be no more than eight inches (8") below sign R7-8T a sign required by the Texas Accessibility Standards, 502.6.
   d) be installed so that the bottom edge of the sign is no lower than 48 inches and no higher than 80 inches above the ground level.
6. Signs identifying van parking spaces shall contain the designation "VAN ACCESSIBLE" (R7-8P) Signs shall be 60 inches minimum above the ground level measured to the bottom of the sign.
7. Perpendicular or angled parking spaces shall be 8 feet wide minimum with an access aisle 8 feet minimum wide (van accessible). Two parking spaces are permitted to share a common access aisle.
8. Access aisles shall be at street level, extend the full length of the parking space they serve, follow ADA surface requirements, and marked to discourage parking in the access aisle. Curb ramps shall connect the access aisle to the adjacent pedestrian access route. Curb ramps shall not be located within the access aisle.
9. International Symbol of Accessibility Parking Space Marking and sign details can be found in The Standard Highway Sign Designs for Texas (SHSD) at the following website. http://www.txdot.gov/



R7-8T



R7-8P



R7-8aPT



Detail A

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
SIGN FACE MATERIALS	DMS-8300

ACCESSIBLE
PARKING SIGNS

DATE:
FILE:

Texas Department of Transportation

Traffic Safety Division Standard

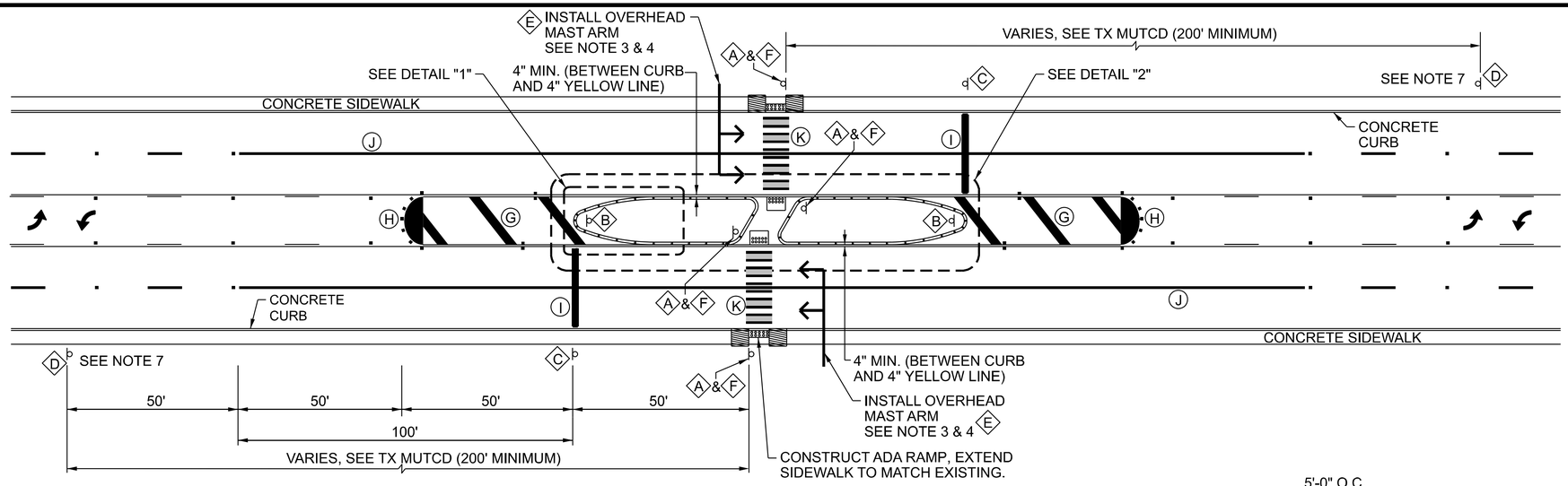
PAVEMENT MARKINGS AND SIGNING FOR ACCESSIBLE PARKING

PM(AP)-21

FILE: pm(ap)-21	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS				

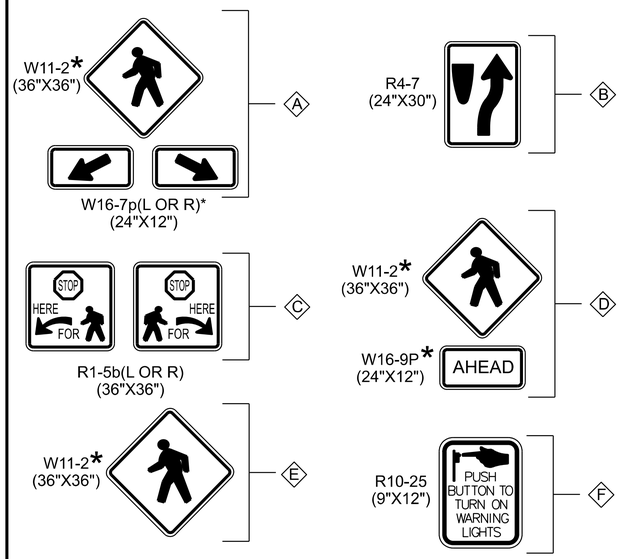
SHEET NO.: C-215

22F



TYPICAL MEDIAN
NOT TO SCALE

SIGNS
NOT TO SCALE

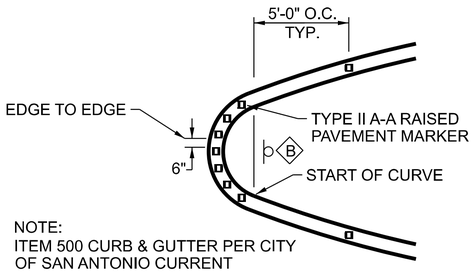


NOTE:

* 1. SIGNS SHALL BE FLOURESCENT YELLOW GREEN

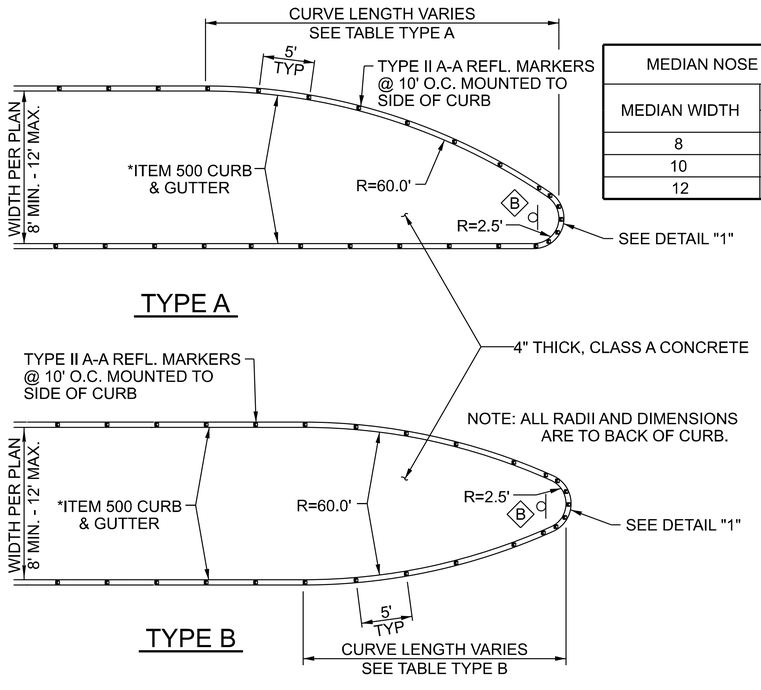
- G 24" SOLID YELLOW LINE @ 20' O.C.
- H SOLID YELLOW MEDIAN NOSE WITH TYPE II A-A REFL. MARKERS @ 2' O.C.
- I 24" WHITE STOP BAR
- J 8" SOLID WHITE LINE
- K HIGH CONTRAST CROSSWALK MARKINGS (SEE NOTE 6)

NOTE: MEDIAN WIDTH SHALL BE AT LEAST 18" LESS THAN THE TOTAL WIDTH OF THE CENTER TURNING LANE.



NOTE:
ITEM 500 CURB & GUTTER PER CITY OF SAN ANTONIO CURRENT CONSTRUCTION STANDARDS

DETAIL "1"
NOT TO SCALE

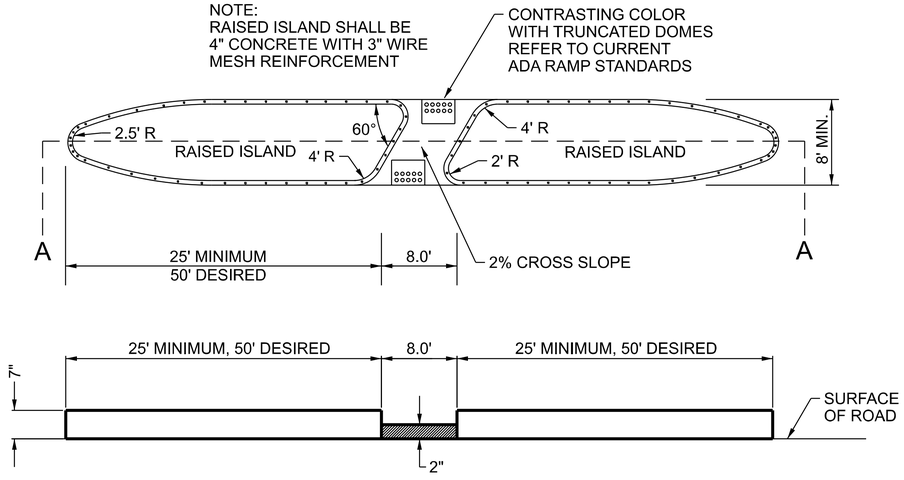


MEDIAN NOSE CURVE LENGTH (FT)		
MEDIAN WIDTH	MEDIAN TYPE	
	A	B
8	19	13
10	24	17
12	29	20

TYPE A

TYPE B

MEDIAN NOSE DETAILS
NOT TO SCALE



TYPICAL SECTION A-A

DETAIL "2"
NOT TO SCALE

GENERAL NOTES:

1. SEE TWO-WAY LEFT-TURN LANE DETAILS AND STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR PAVEMENT MARKING DETAILS.
2. ASIDE FROM LONG LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PREFORMED MATERIAL. HOT-APPLIED MARKINGS MAY BE USED ONLY IF APPROVED BY PWD - TRAFFIC ENGINEERING & OPERATIONS.
3. WIG-WAG OR BOUNCING BALL BEACONS MOUNTED ON A MAST ARM TO BE USED AT THE CROSSING FOR MULTI-LANE ROADWAYS AND / OR ROADWAYS WITH POSTED SPEEDS GREATER THAN 35 MPH. FOR OTHER LOCATIONS THE ROADSIDE FLASHER ASSEMBLY SHOULD BE USED.
4. DIRECTION ON MAST-ARM MOUNTED DETAIL SHALL BE PROVIDED BY TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO).
5. SEE "PEDESTRIAN REFUGE ISLAND" FOR MEDIAN DETAILS.
6. HIGH CONTRAST CROSSWALK, SEE DETAIL "A" CITY OF SAN ANTONIO STANDARDS - TYPICAL CROSSWALK DETAILS.
7. ROADSIDE FLASHER TO BE USED IN ADVANCE OF THE CROSSING FOR MULTI-LANE ROADWAYS AND / OR ROADWAYS WITH POSTED SPEEDS GREATER THAN 35 MPH.
8. MEDIAN WIDTH SHALL BE 18" LESS THAN THE WIDTH OF THE CENTER TURNING LANE.
9. DESIGN ENGINEER SHOULD REVIEW LIGHTING IN THE AREA OF THE CROSSING AND ADD ILLUMINATION TO THE MAST ARM POLE.
10. SIDE MOUNT RPM SHALL BE APPLIED WITH EPOXY AND TOP MOUNT RPM WITH EPOXY OR BITUMINOUS.

SEPTEMBER 2024

CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

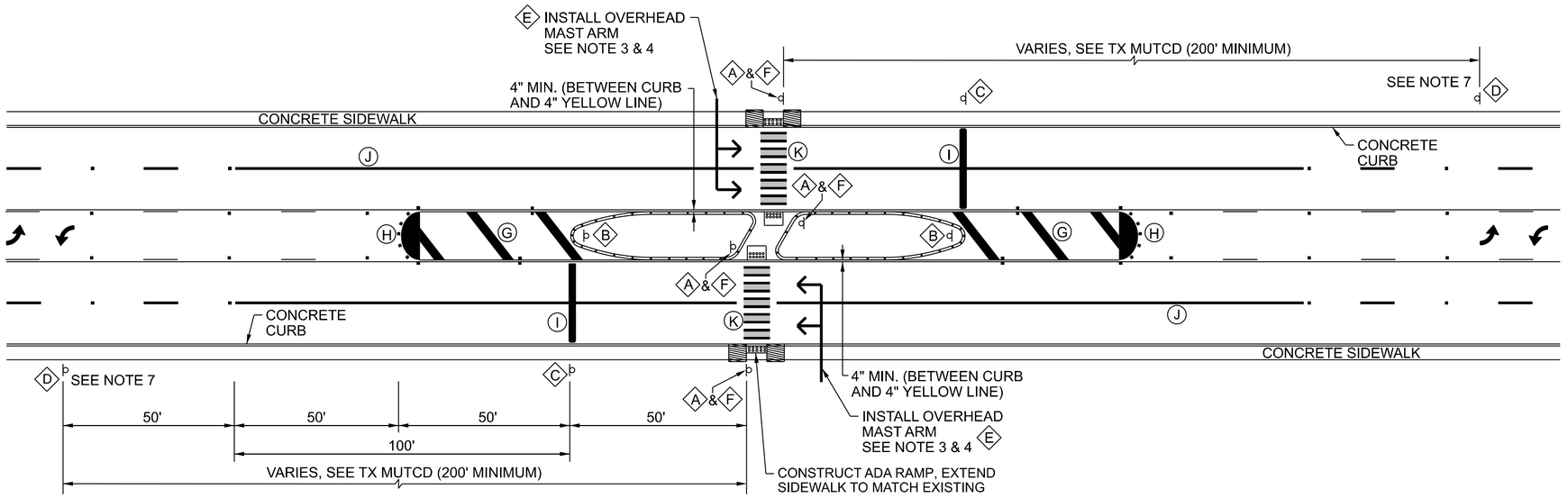
TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

PEDESTRIAN REFUGE ISLAND

SHEET 01 OF 01 PRI-24

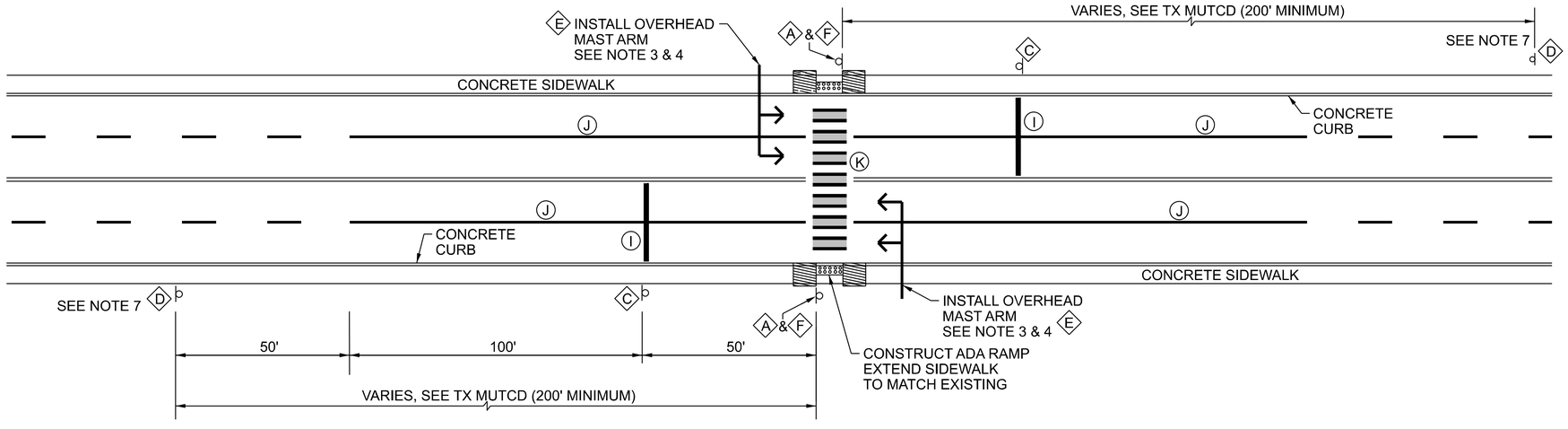
_____% SUBMITTAL
DRWN. BY:_____

SHEET NO.: C-216



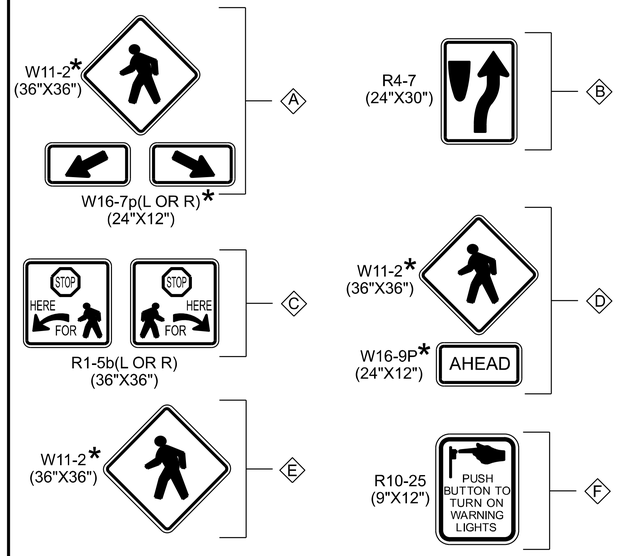
NOTE:
MEDIAN WIDTH SHALL BE AT LEAST 18" LESS THAN THE TOTAL WIDTH OF THE CENTER TURN LANE

CROSSWALK ON ROADWAY W/CENTER TURN LANE
NOT TO SCALE



CROSSWALK ON UNDIVIDED ROADWAY
NOT TO SCALE

SIGNS
NOT TO SCALE



NOTE:
* 1. SIGNS SHALL BE FLOURESCENT YELLOW GREEN

- G 24" SOLID YELLOW LINE @ 20' O.C.
- H SOLID YELLOW MEDIAN NOSE WITH TYPE II A-A REFL. MARKERS @ 2' O.C.
- I 24" WHITE STOP BAR
- J 8" SOLID WHITE LINE
- K HIGH CONTRAST CROSSWALK MARKINGS (SEE NOTE 6)

GENERAL NOTES:

1. SEE TWO-WAY LEFT-TURN LANE DETAILS AND STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR PAVEMENT MARKING DETAILS.
2. ASIDE FROM LONG LANE LINE MARKINGS, ALL OTHER PAVEMENT MARKINGS SHALL BE PREFORMED MATERIAL. HOT-APPLIED MARKINGS MAY BE USED ONLY IF APPROVED BY PWD - TRAFFIC ENGINEERING & OPERATIONS.
3. WIG-WAG OR BOUNCING BALL BEACONS MOUNTED ON A MAST ARM TO BE USED AT THE CROSSING FOR MULTI-LANE ROADWAYS AND / OR ROADWAYS WITH POSTED SPEEDS GREATER THAN 35 MPH. FOR OTHER LOCATIONS THE ROADSIDE FLASHER ASSEMBLY SHOULD BE USED.
4. DIRECTION ON MAST-ARM MOUNTED DETAIL SHALL BE PROVIDED BY TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO).
5. SEE "PEDESTRIAN REFUGE ISLAND" FOR MEDIAN DETAILS. (PRI-24)
6. HIGH CONTRAST CROSSWALK, SEE DETAIL "A" CITY OF SAN ANTONIO STANDARDS - TYPICAL CROSSWALK DETAILS. (TCD-24)
7. ROADSIDE FLASHER TO BE USED IN ADVANCE OF THE CROSSING FOR MULTI-LANE ROADWAYS AND / OR ROADWAYS WITH POSTED SPEEDS GREATER THAN 35 MPH.
8. MEDIAN WIDTH SHALL BE AT LEAST 18" LESS THAN THE WIDTH OF THE CENTER TURNING LANE.
9. DESIGN ENGINEER SHALL REVIEW LIGHTING IN THE AREA OF THE CROSSING AND ADD ILLUMINATION TO THE MAST ARM POLE.
10. SIDE MOUNT RPM SHALL BE APPLIED WITH EPOXY AND TOP MOUNT RPM WITH EPOXY OR BITUMINOUS.

SEPTEMBER 2024

CITY OF SAN ANTONIO
PUBLIC WORKS DEPARTMENT

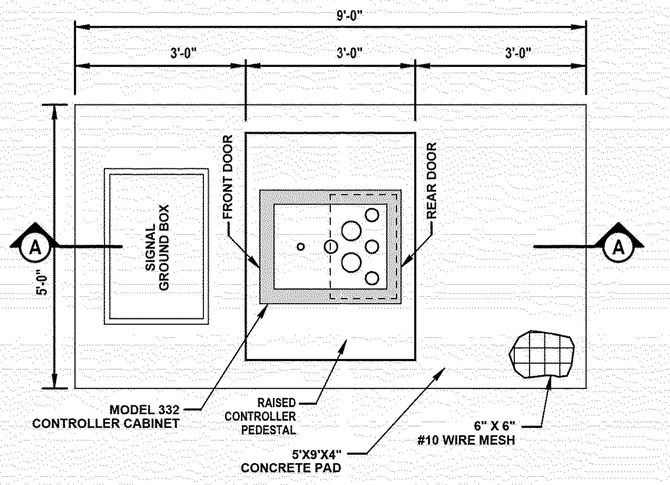
TRAFFIC ENGINEERING AND OPERATIONS STANDARDS

MIDBLOCK CROSSING

SHEET 01 OF 01 MC(1)-24

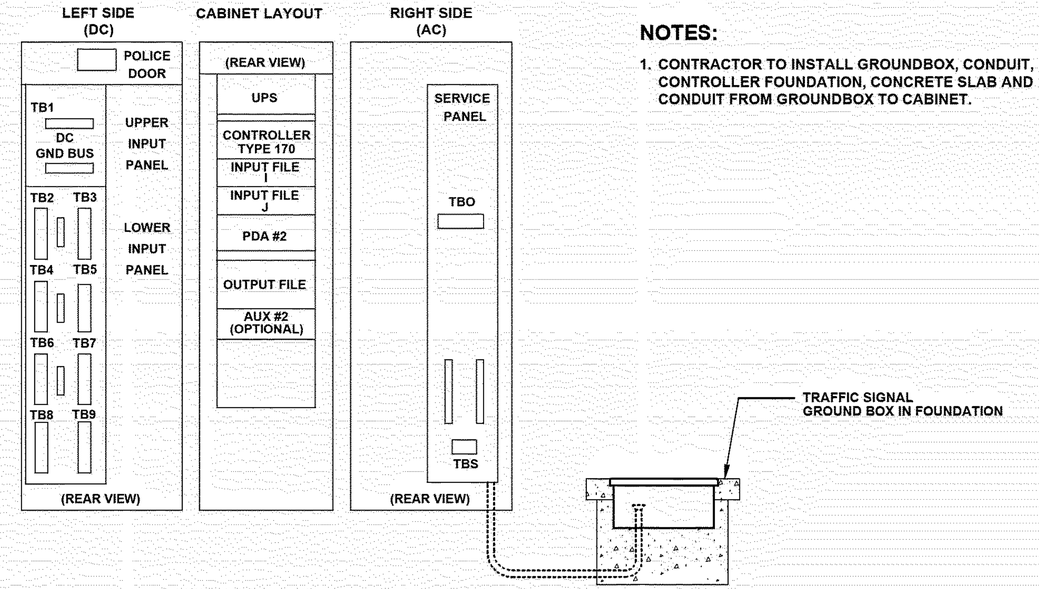
_____% SUBMITTAL
DRWN. BY:_____

SHEET NO.: C-217



TOP VIEW

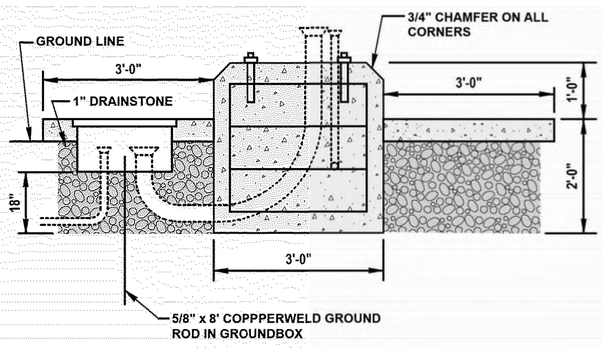
(NEW FOUNDATION)



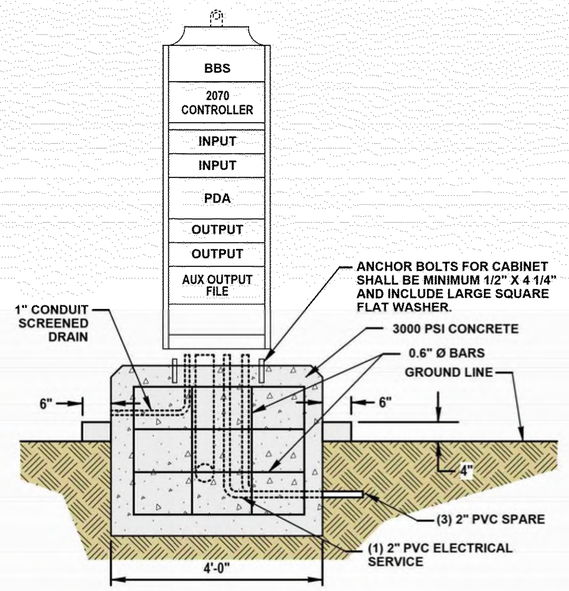
NOTES:

1. CONTRACTOR TO INSTALL GROUNDBOX, CONDUIT, CONTROLLER FOUNDATION, CONCRETE SLAB AND CONDUIT FROM GROUNDBOX TO CABINET.

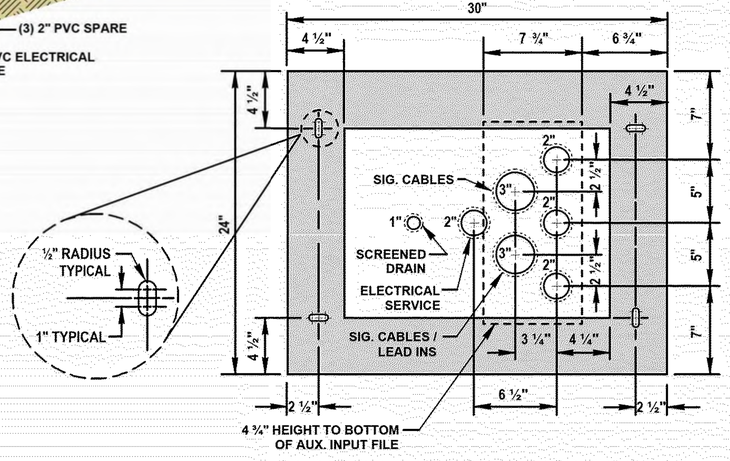
REAR VIEW SCHEMATIC



SECTION A-A



REAR VIEW



BASE PLATE TEMPLATE

MARCH 2017

CITY OF SAN ANTONIO
TRANSPORTATION & CAPITAL IMPROVEMENTS DEPARTMENT

TRAFFIC STANDARDS

TYPE 332 CABINET FOUNDATION

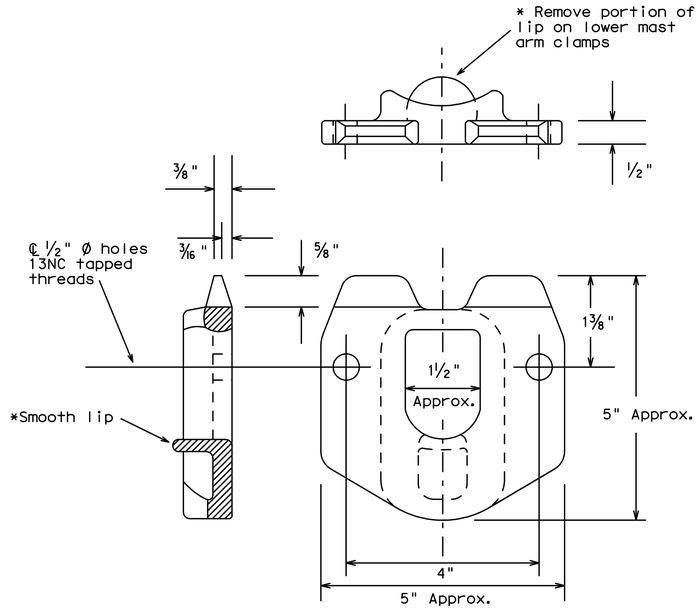
SHEET 1 OF 1

% SUBMITTAL
DRWN. BY: PD

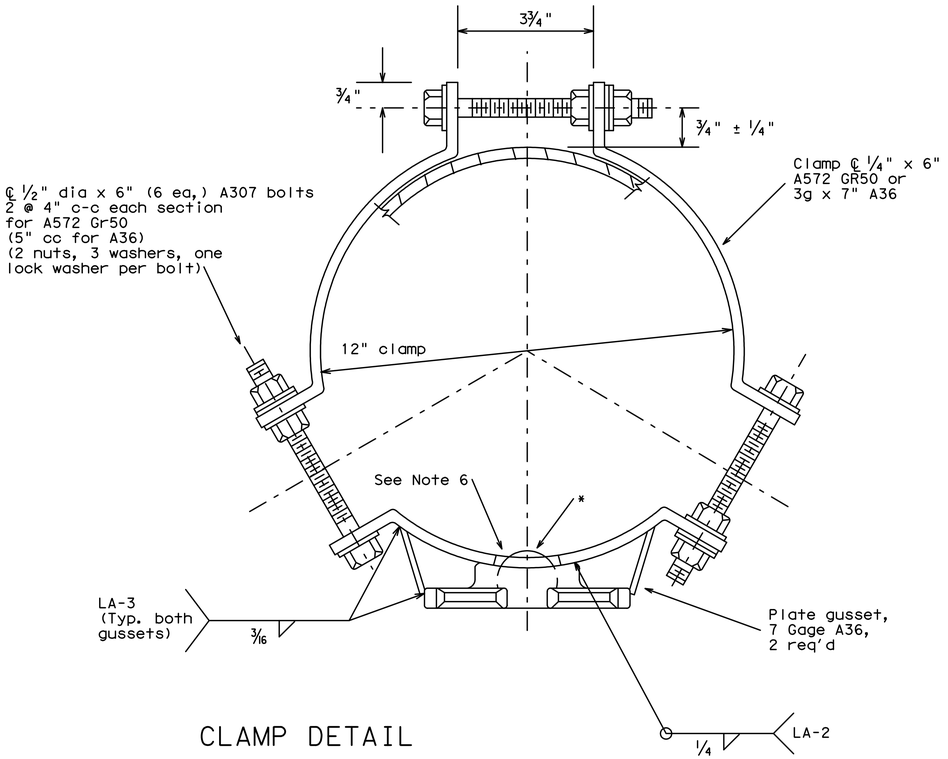
SHEET NO.: C-218

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

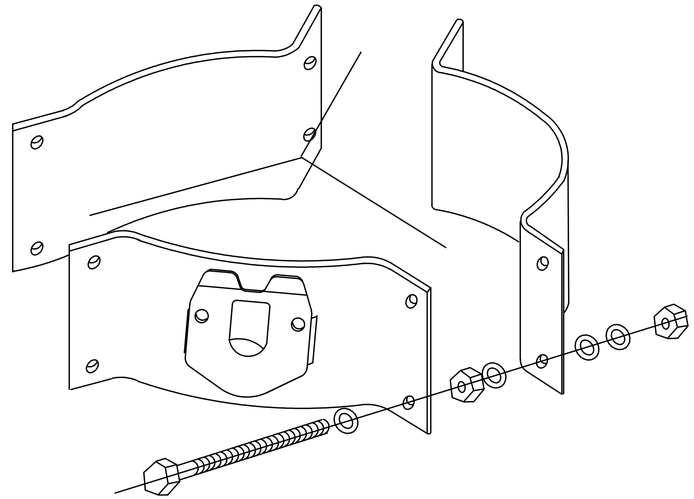
DATE:
FILE:



POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, 1/2in. X 1 1/2in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.

For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

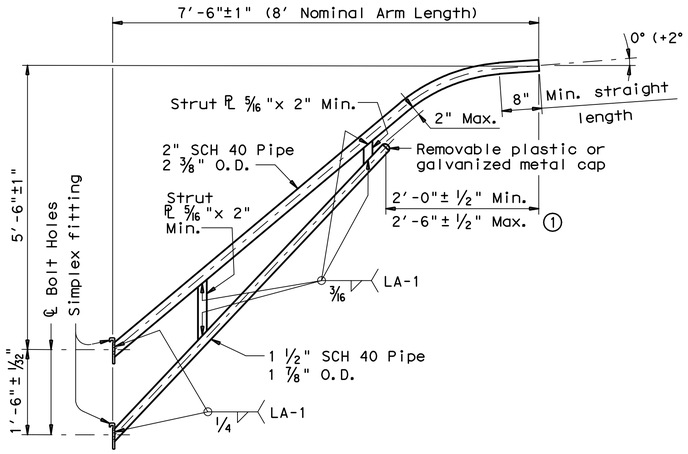
CFA-12

© TxDOT	DN: KAB	CK: RES	DW: FDN	CK: CAL
REVISIONS	CONT	SECT	JOB	HIGHWAY
11-99 1-12				

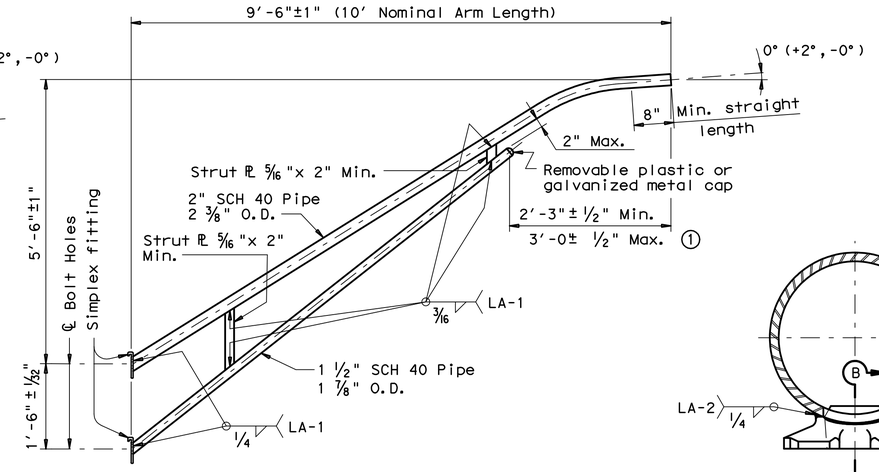
SHEET NO.: C-219

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

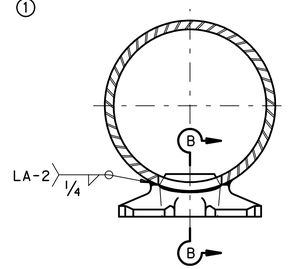
DATE:
FILE:



8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM



DIRECT ATTACHMENT DETAIL

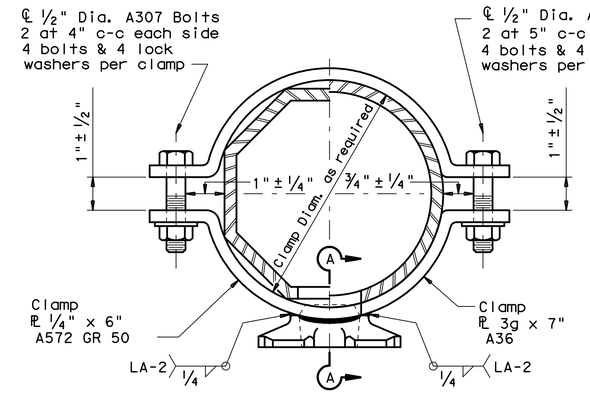
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 (3), or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 (4), or A1011 HSLAS-F Gr.50 (4)
Arm Strut Plates (2)	ASTM A36, A572 Gr.50 (4), or A588
Misc.	ASTM designations as noted

(1) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

(2) Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

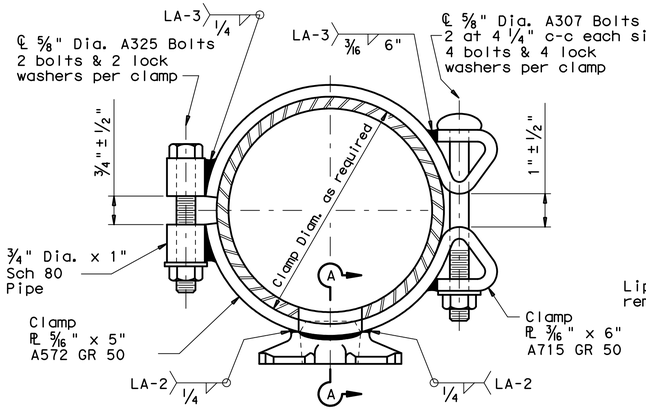
(3) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

(4) ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.



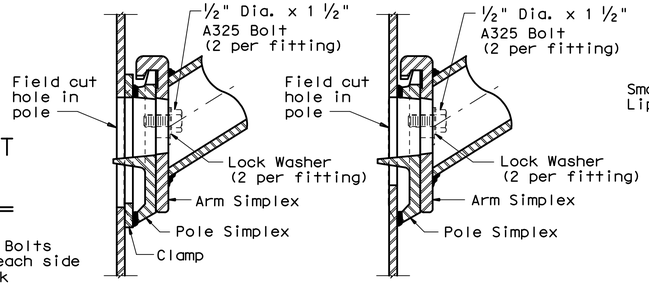
CLAMP ATTACHMENT DETAIL NO.1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO.2 (HALF SECTION)



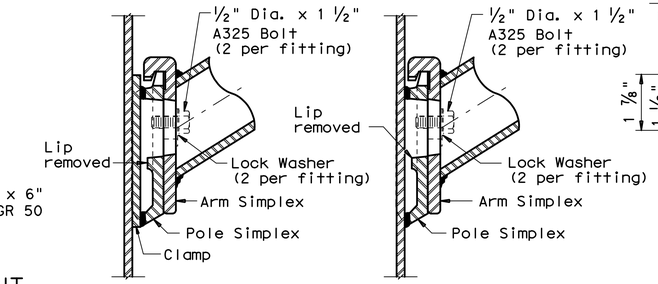
CLAMP ATTACHMENT DETAIL NO.3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO.4 (HALF SECTION)



UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

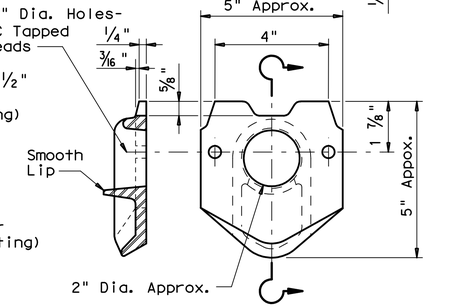


LOWER SIMPLEX FITTING

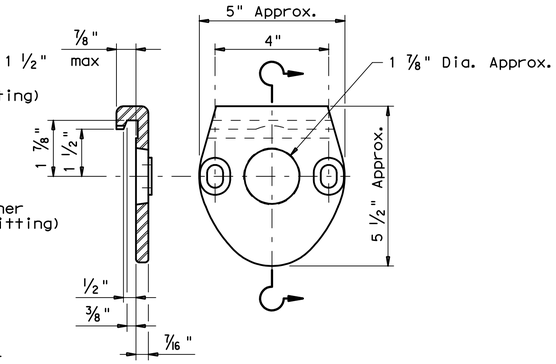
SECTON A-A

LOWER SIMPLEX FITTING

SECTON B-B



POLE SIMPLEX DETAIL



ARM SIMPLEX DETAIL

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified Fabricaton tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

© TxDOT August 1995

DN: LEH	CK: JSY	DW: LTT	CK: TEB

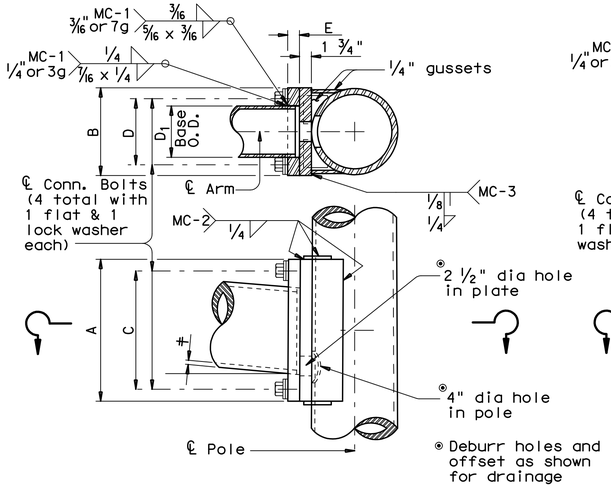
REVISIONS	CONT	SECT	JOB	HIGHWAY
5-96				
1-99				
1-12				

SHEET NO.: C-220

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for errors or omissions resulting from the use of this standard to other formats or for incorrect results or damages resulting from its use.

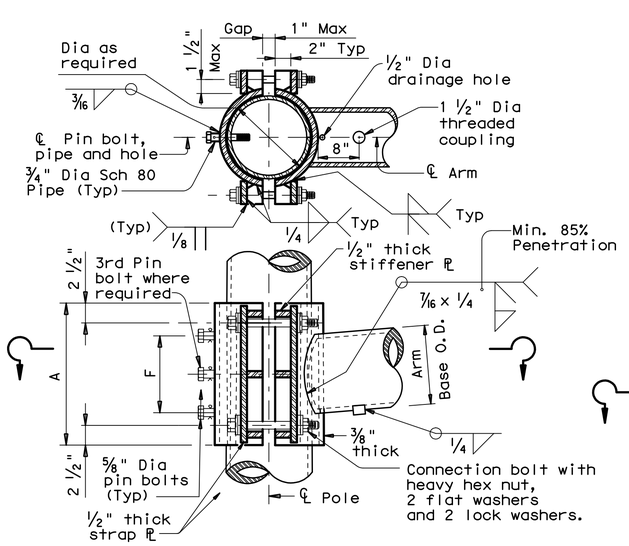
DATE:
FILE:

ARM SIZE D_1	ARM SIZE ǂ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 ¾	1
7.5	.179	13	9	10	6	1 ¾	1
8.0	.179	14	10	11	7	2	1 ¼
9.0	.179	16	11	13	8	2	1 ¼
9.5	.179	17	12	14	9	2	1 ¼
9.5	.239	18	12	15	9	2	1 ¼
10.0	.239	18	12	15	9	2	1 ¼
10.5	.239	18	13	15	10	3	1 ½
11.0	.239	18	13	15	10	3	1 ½



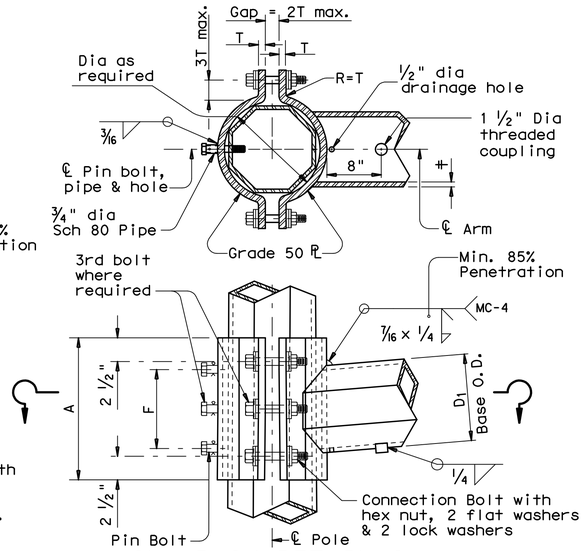
FIXED MOUNT DETAIL 1

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	4	1 ¼	3	⅝
9.5	.239	18	12	4	1 ¼	3	⅝
10.0	.239	18	12	4	1 ¼	3	⅝



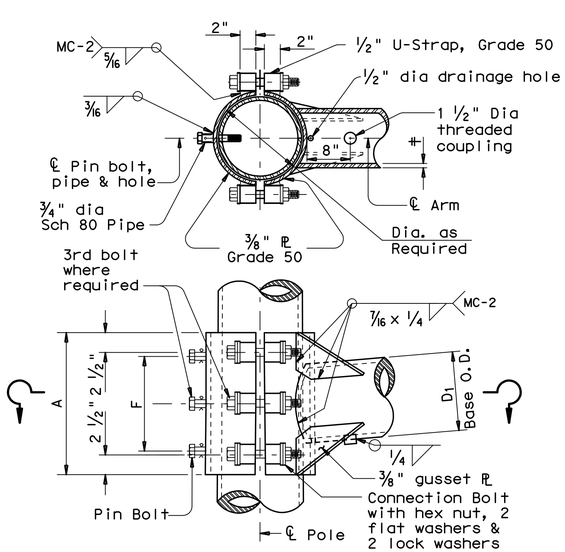
CLAMP-ON DETAIL 1

ARM SIZE D_1	ARM SIZE ǂ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
7.0	.179	12	6	¾	4	¾	2	⅝
7.5	.179	14	8	¾	4	¾	2	⅝
8.0	.179	14	8	¾	4	¾	2	⅝
9.0	.179	16	10	⅞	4	1	2	⅝
10.0	.179	18	10	⅞	4	1	2	⅝
9.5	.239	18	10	1	6	1	3	⅝
10.0	.239	18	10	1	6	1	3	⅝

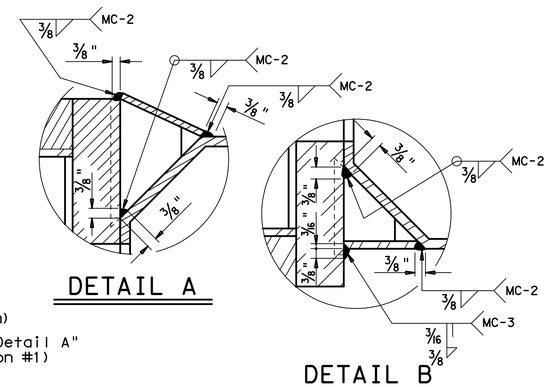


CLAMP-ON DETAIL 2

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	6	1	3	⅝
9.5	.239	18	12	6	1	3	⅝
10.0	.239	18	12	6	1	3	⅝

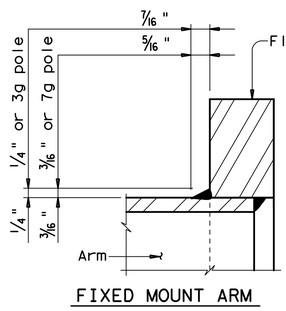


CLAMP-ON DETAIL 3

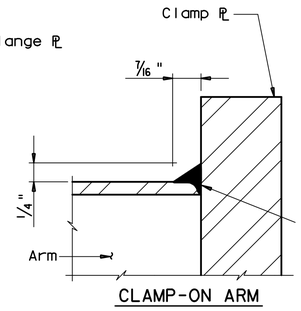


DETAIL A

DETAIL B



FIXED MOUNT ARM



CLAMP-ON ARM

ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	⅝
7.5	.179	14	8	4	1	2	⅝
8.0	.179	14	8	4	1	2	⅝
9.0	.179	16	10	4	1	2	⅝
9.5	.179	18	12	6	1	3	⅝
9.5	.239	18	12	6	1	3	⅝
10.0	.239	18	12	6	1	3	⅝

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 ½" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and ¾" dia pipe shall have 5/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a ¾" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

© TxDOT August 1995

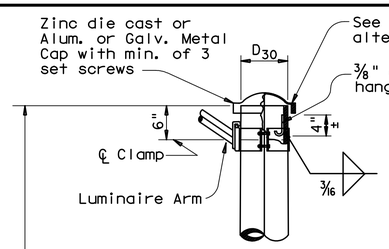
DN: MS	CK: JSY	DW: MMF	CK: JSY
CONT	SECT	JOB	HIGHWAY

REVISIONS
5-96
5-09
1-12

SHEET NO.: C-221

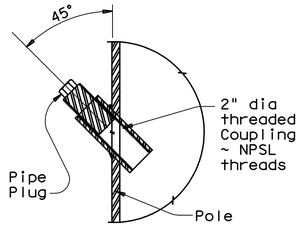
126A

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility in the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

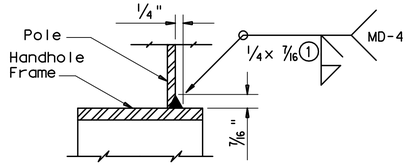


DETAIL A

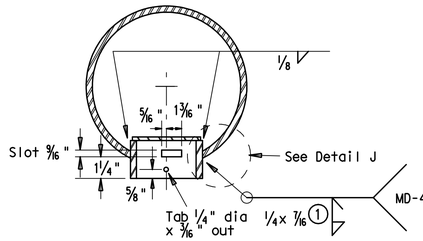
(for pole with luminaire)



POLE COUPLING DETAIL

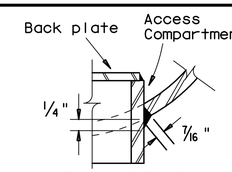


DETAIL G

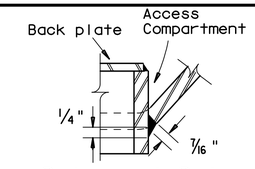


SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

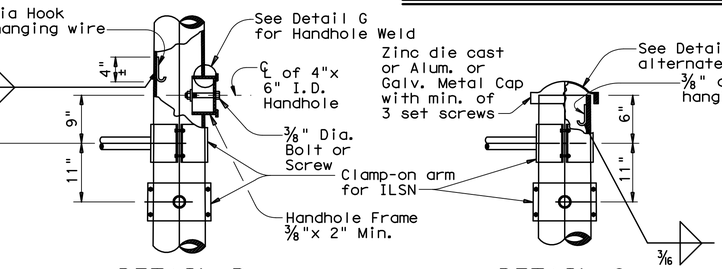


Round Pole

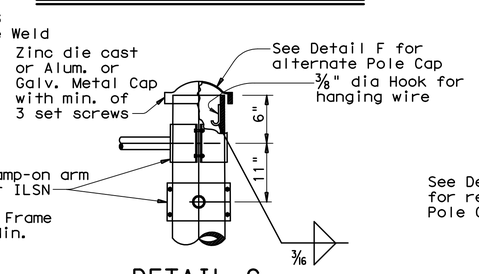


Polygonal Pole

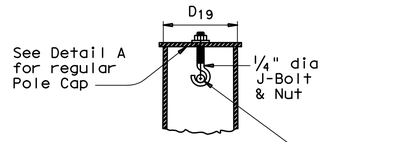
DETAIL J



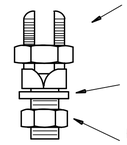
DETAIL B



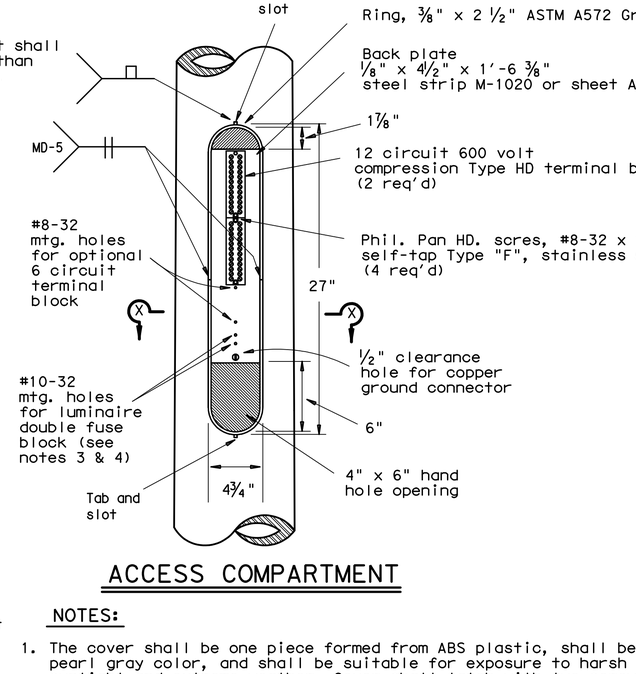
DETAIL C



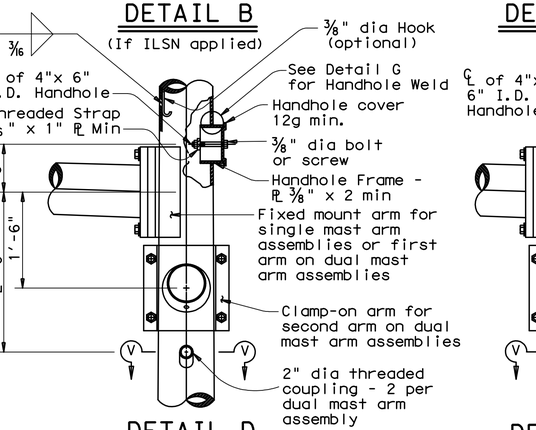
SECTION Y-Y



COPPER GROUND CONNECTOR

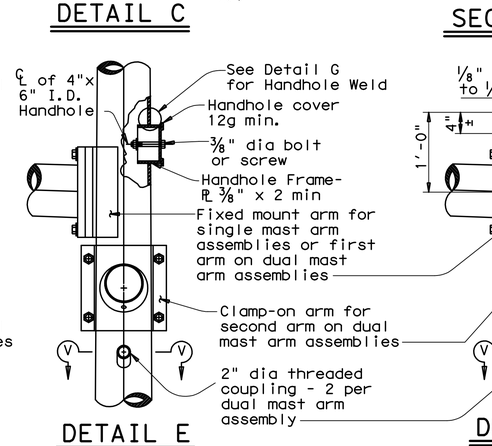


ACCESS COMPARTMENT



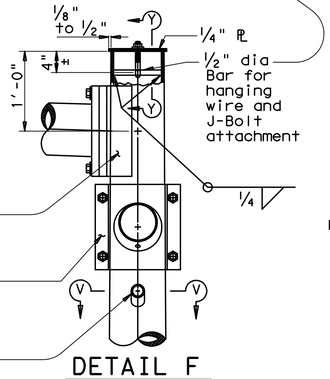
DETAIL D

(for 30' pole with luminaire and ILSN sign)



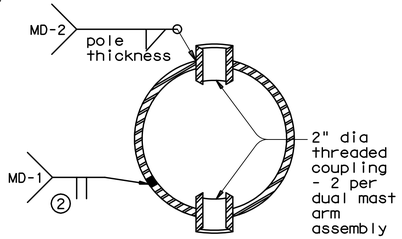
DETAIL E

(for 24' pole with ILSN sign and no luminaire)



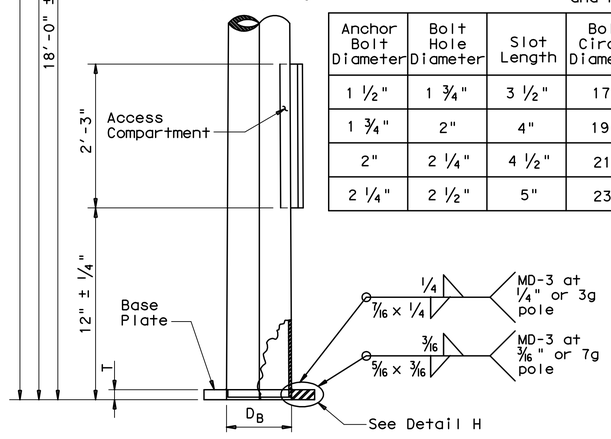
DETAIL F

(for 19' pole with no ILSN sign and no luminaire)

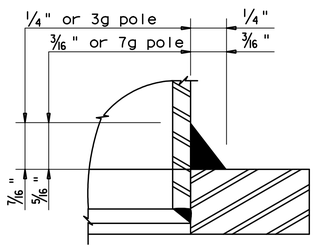


SECTION V-V

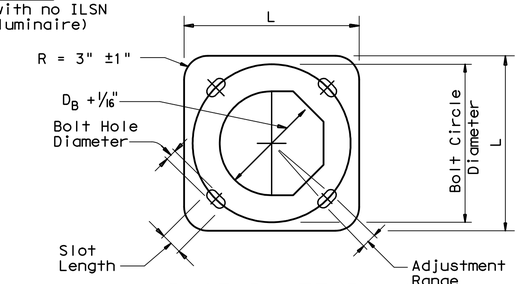
Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base ℞ Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



POLE ELEVATION



DETAIL H



BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

© TxDOT August 1995

DN: MS	CK: JSY	DW: FDN	CK: CAL

REVISIONS: 8-99, 1-12

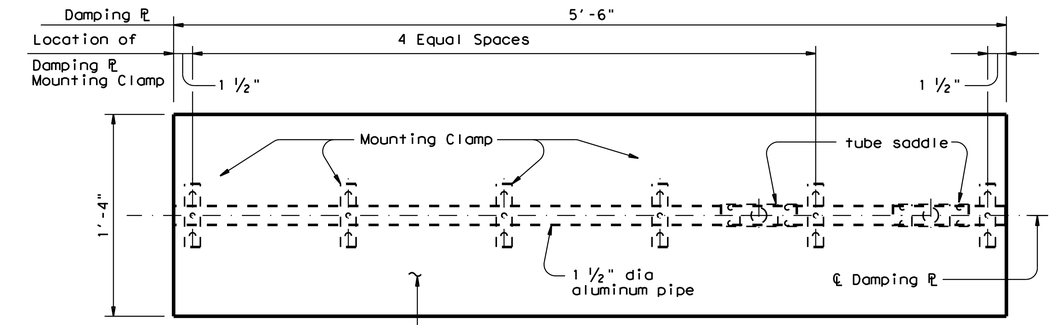
CONT	SECT	JOB	HIGHWAY

SHEET NO.: C-222

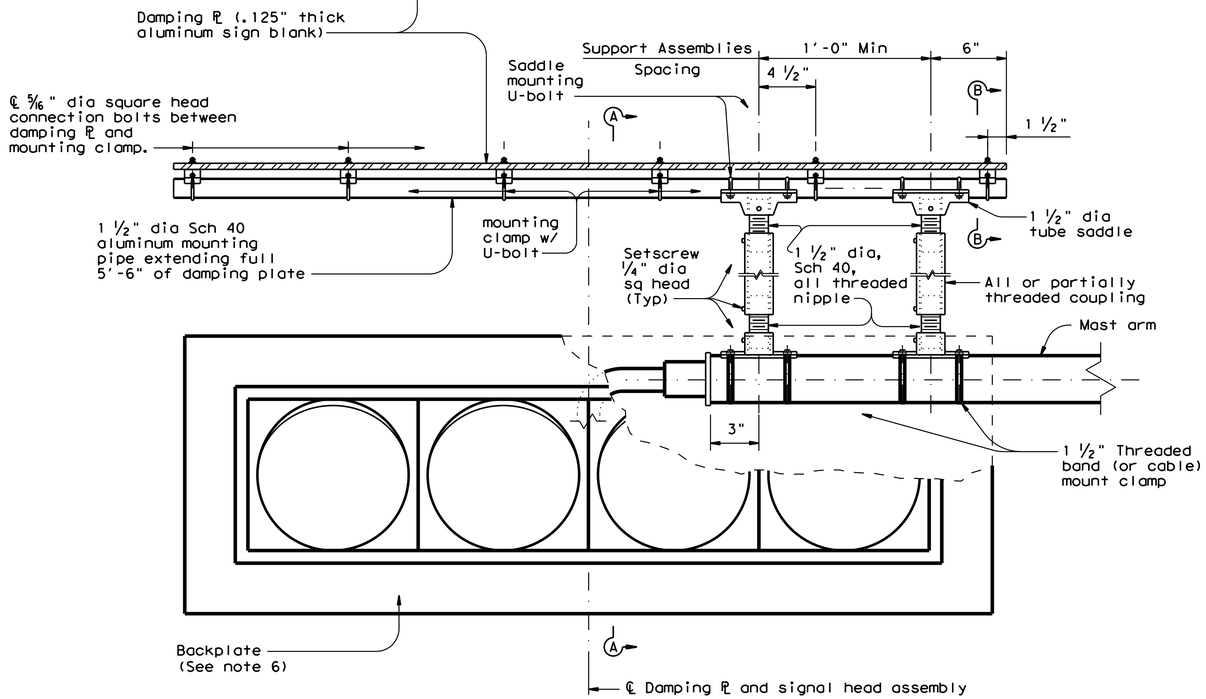
DATE:
FILE:

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



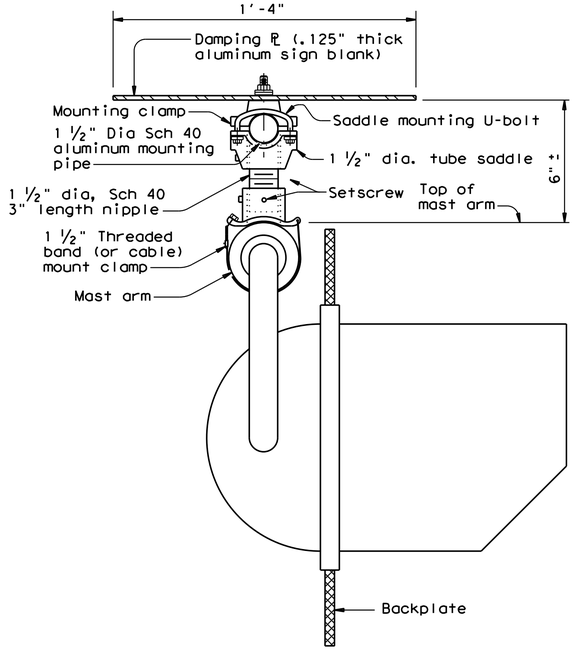
PLAN



ELEVATION

DAMPING PLATE MOUNTING DETAILS

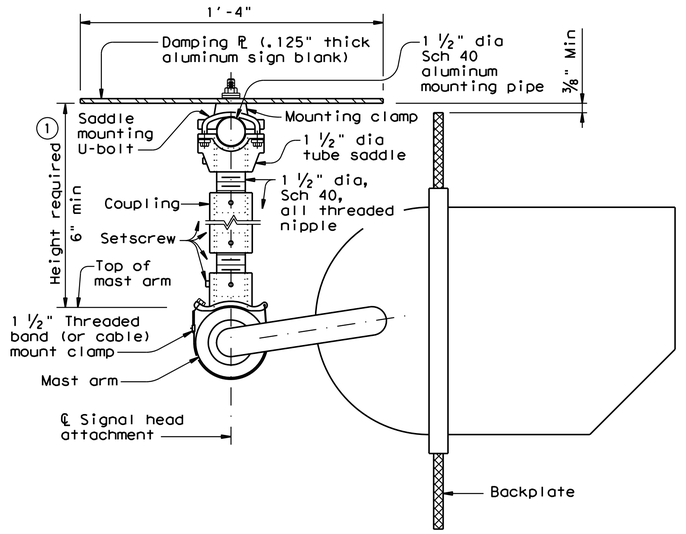
(Showing alternate placement of signal head)



SECTION A-A

(Showing standard placement of signal head)

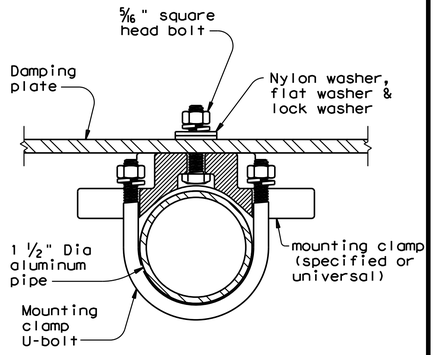
(Mounting clamp U-bolt is not shown for clarity)



SECTION A-A

(Showing alternate placement of signal head)

(Mounting clamp U-bolt is not shown for clarity)



SECTION B-B

(Showing damping plate attachment)

① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length plus	One coupling each length
6"-6 ¾"	3"	-	-
7"-8 ½"	4"	-	-
9"-10 ½"	6"	-	-
11"-15 ½"	-	4"	5"
16"-24"	-	6"	10"

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.

2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.

3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.

4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".

5. Contractor will verify applicable field dimensions before the installation.

6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

Texas Department of Transportation

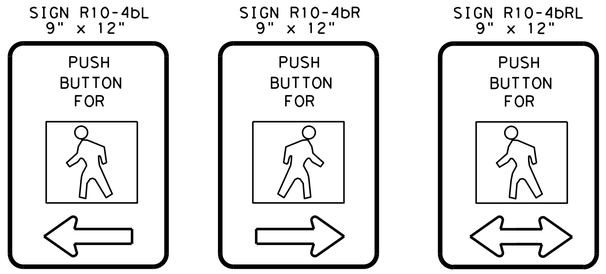
Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

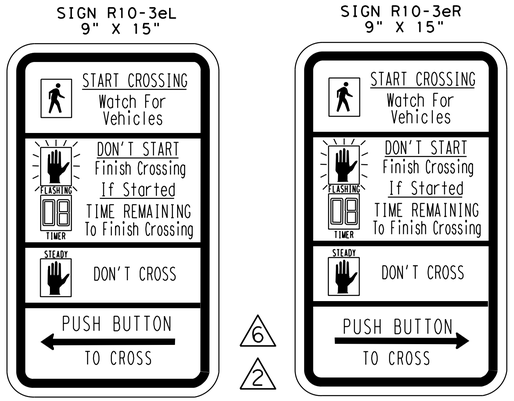
MA-DPD-20

FILE: ma-dpd-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS				
6-20				

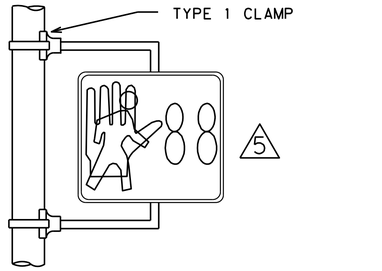
SHEET NO.: C-223



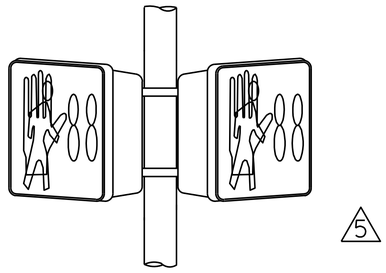
PEDESTRIAN PUSHBUTTON
SIGN DETAILS



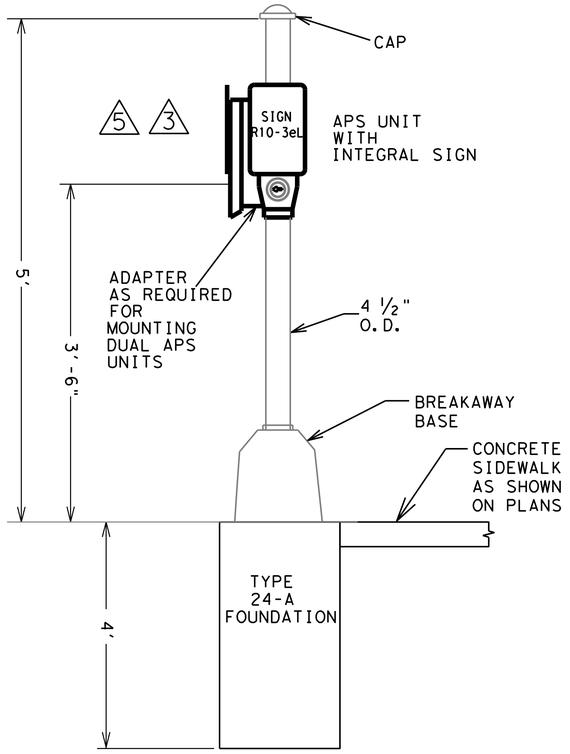
COUNTDOWN PEDESTRIAN PUSHBUTTON
SIGN DETAILS



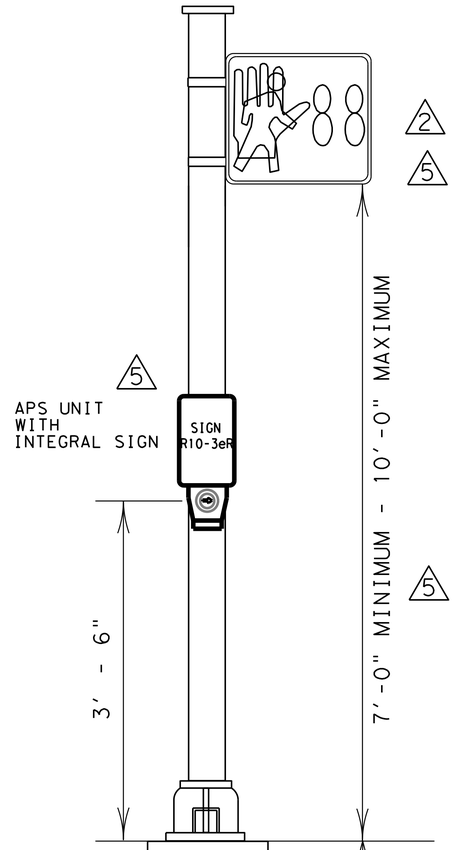
PEDESTRIAN SIGNAL HEAD MOUNTING
FOR ONE PEDESTRIAN SIGNAL HEAD
152A



PEDESTRIAN SIGNAL HEAD MOUNTING
FOR TWO PEDESTRIAN SIGNAL HEADS
143C

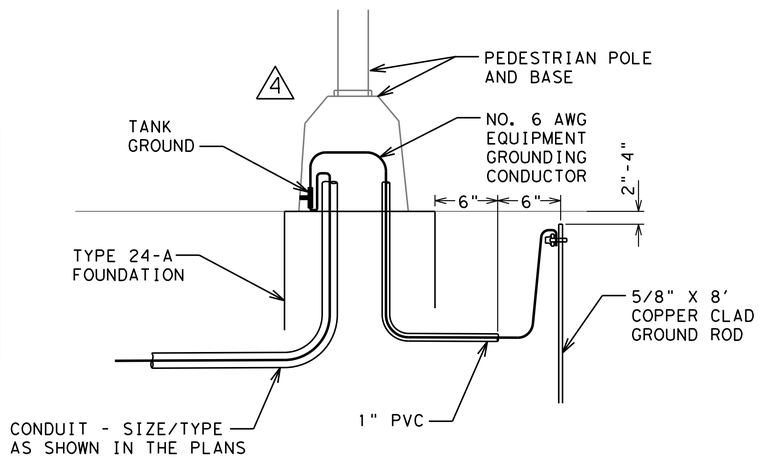


PEDESTRIAN PUSH BUTTON POLE

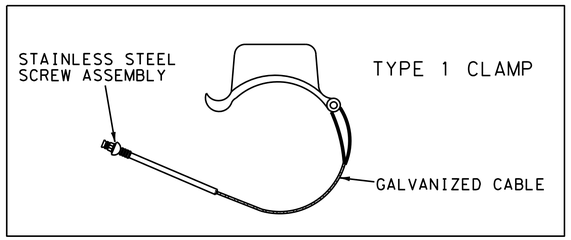


PEDESTAL POLE

NOTE:
THE POLES ON THIS DRAWING ARE SHOWN AS AN EXAMPLE ONLY. POLES OF SIMILAR DESIGN FOR ANY CROSS SECTION WHICH MEET THE SPECIFICATIONS AND REQUIREMENTS SHOWN ON THESE DRAWINGS AND ARE APPROVED BY THE ENGINEER WILL BE DEEMED ACCEPTABLE.



PEDESTRIAN PUSH BUTTON POLE
GROUNDING DETAILS



1 5 NOTE: EITHER TYPE 1 CLAMPS OR CLAM SHELL MOUNTING HARDWARE MAY BE USED AS APPROVED BY THE ENGINEER. FOR CLAM SHELLS, USE ICC P/N 4805 OR McCAIN QUICKMOUNT OR APPROVED EQUAL.

1 ALTERNATIVE MOUNTING METHOD
revised 12-92

2 ALTERNATIVE PEDESTRIAN SIGNAL HEAD AND SIGNING
revised 10-08

3 PEDESTRIAN PUSH BUTTON POLE
revised 01-11

4 PEDESTRIAN PUSH BUTTON POLE GROUNDING DETAILS
revised 09-15

5 APS UNIT ADDED
"SYMBOLS ONLY" PEDESTRIAN SIGNAL HEAD REMOVED
MOUNTING HARDWARE NOTES REVISED
MOUNTING HEIGHT REVISED
revised 06-17

6 APS SIGN REVISED
revised 11-20

NOTES:

5
1. ALL PEDESTRIAN SIGNAL HEADS SHALL BE INSTALLED ON THE AWAY-FROM-TRAFFIC SIDE OF THE PEDESTAL OR MAST ARM POLE.
2. ALL WIRING FOR PEDESTRIAN SIGNALS SHALL BE TOTALLY ENCLOSED WITHIN THE SIGNAL MOUNTING HARDWARE.
3. ALL PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON SIGNS SHALL DISPLAY THE SYMBOLIZED MESSAGES SHOWN ABOVE.

PEDESTRIAN SIGNAL HEAD DETAILS (DAL)

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
	(SEE TITLE SHEET)	
STATE	STATE DIST.	COUNTY
TEXAS		

SHEET NO.: C-224

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

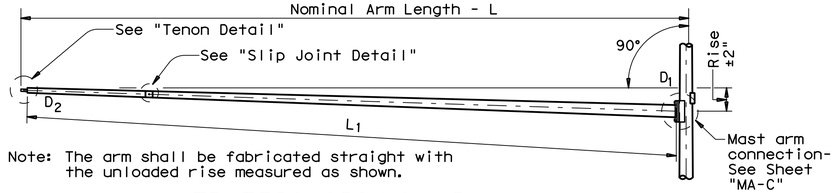
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

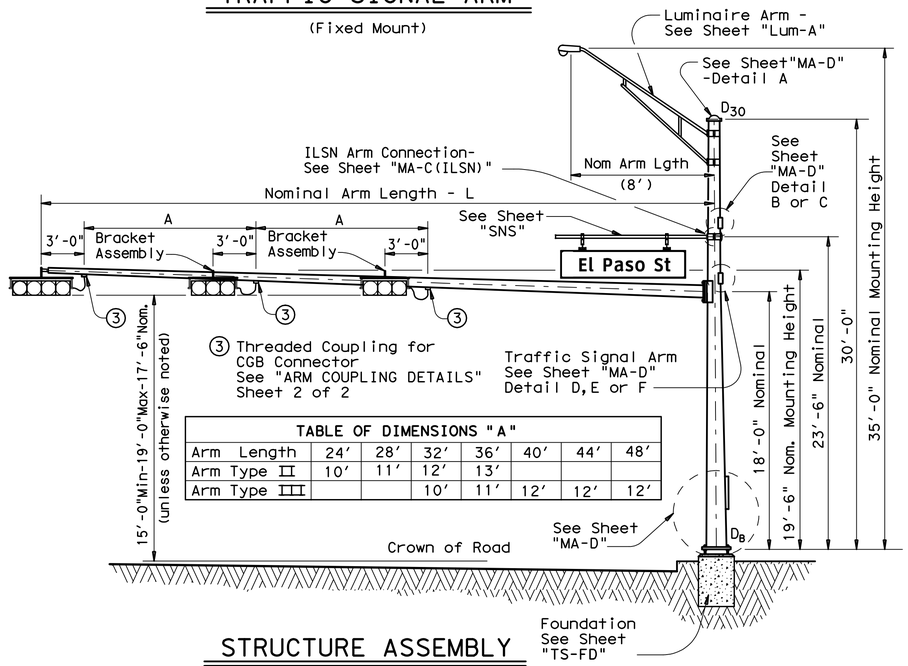


TABLE OF DIMENSIONS "A"							
Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80		28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	
48					48III-80	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	
1 ¾"	3'-10"	

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(1)-12

© TxDOT August 1995

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY

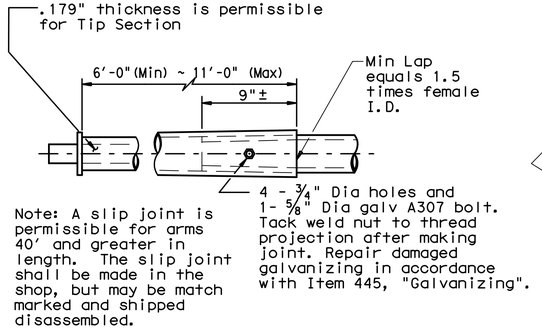
SHEET NO.: C-225

122A

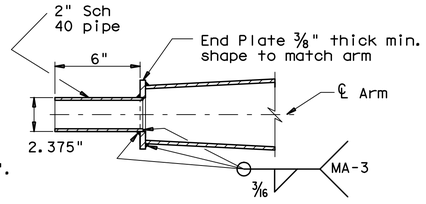
DATE:
FILE:

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



SLIP JOINT DETAIL



TENON DETAIL

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

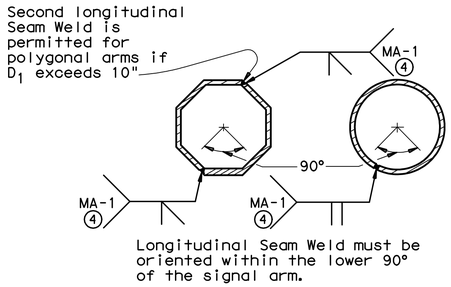
If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

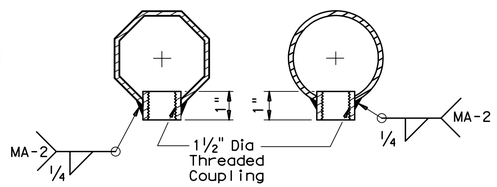
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration 100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(2)-12

© TxDOT August 1995

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

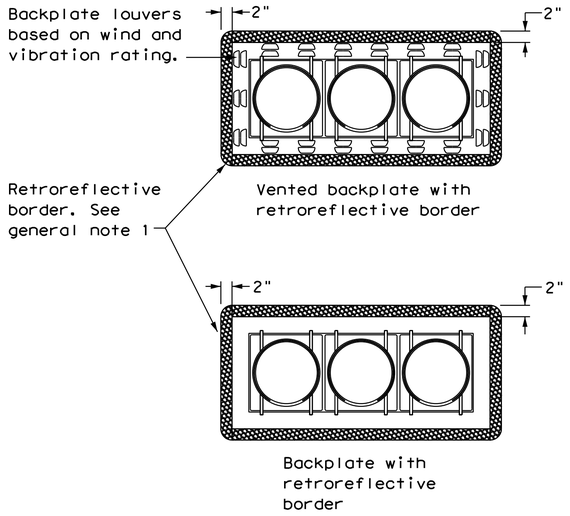
CONT	SECT	JOB	HIGHWAY

SHEET NO.: C-226

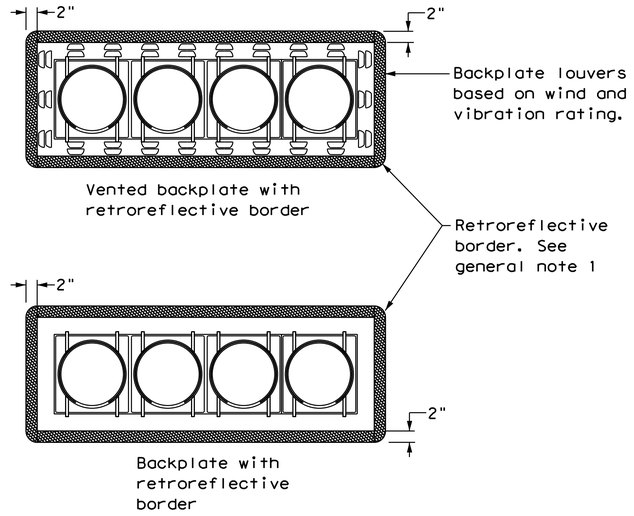
122B

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

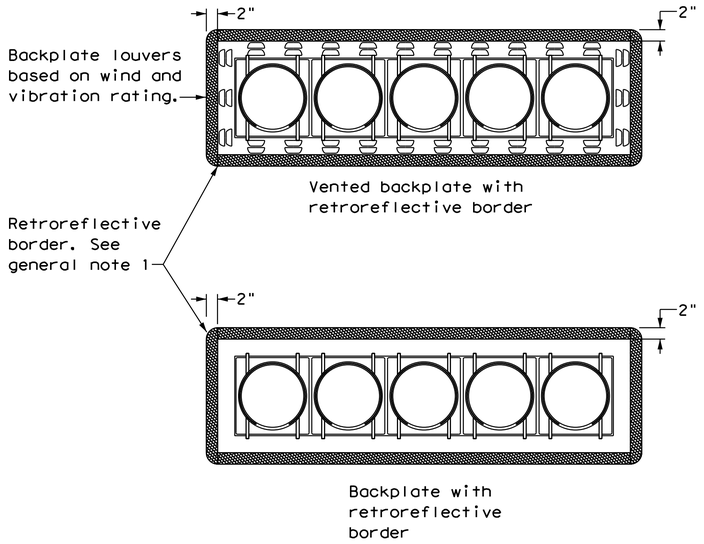
DATE:
FILE:



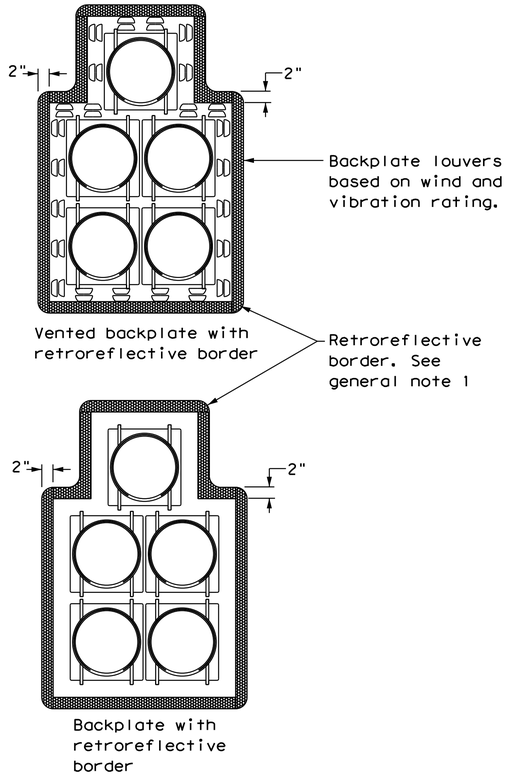
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



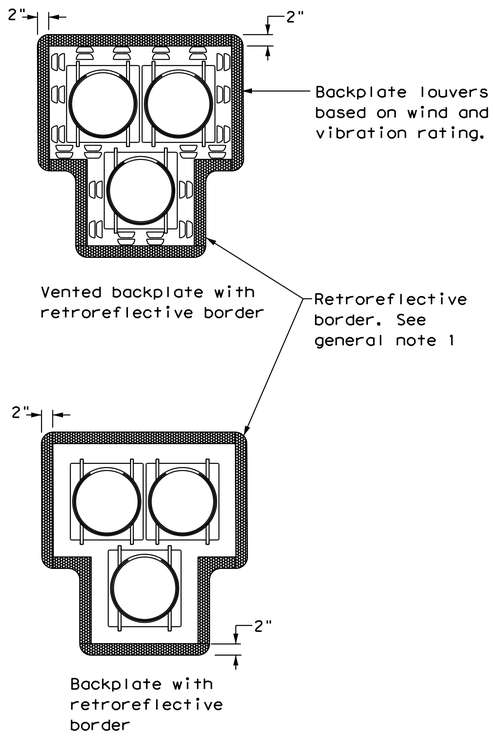
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

Texas Department of Transportation

Traffic Safety Division Standard

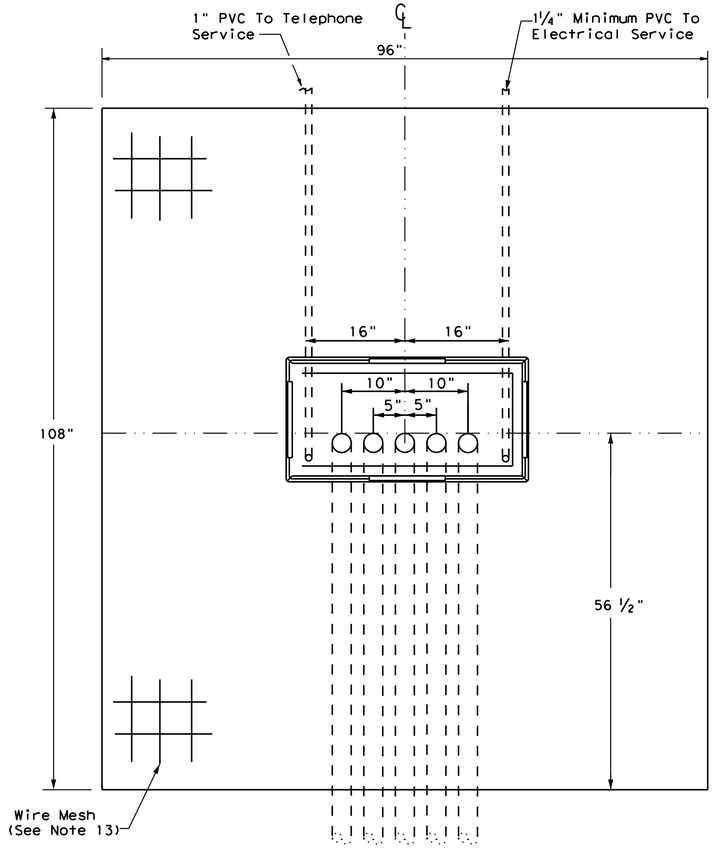
TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

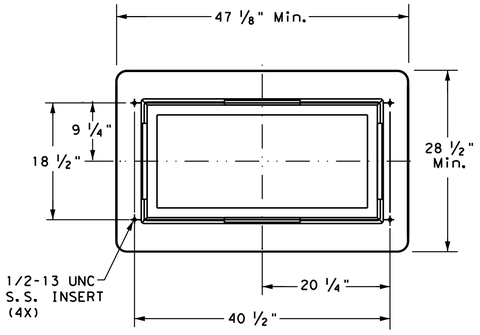
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS				

SHEET NO.: C-227

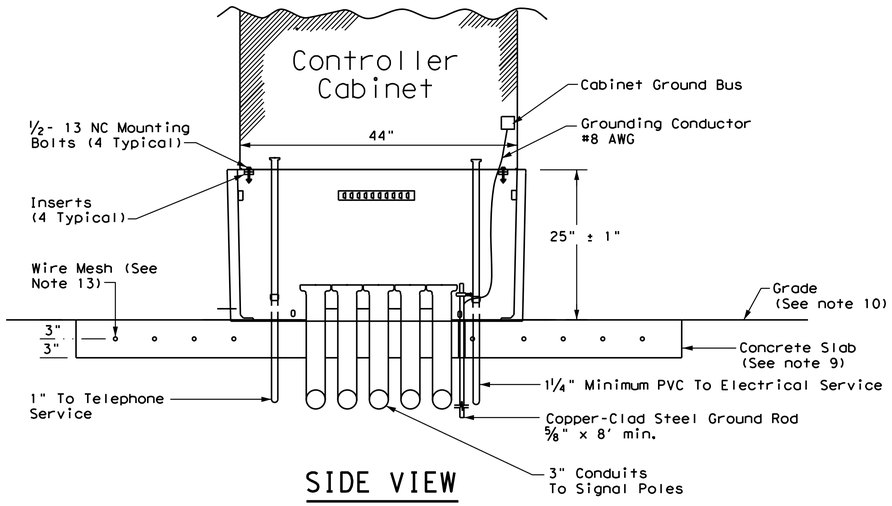
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



TOP VIEW



CABINET BASE



SIDE VIEW

TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of calcareous and siliceous stone; glass fibers and thermoset polyester resin. The polymer concrete cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Armorcast Part # A6001848X24, Quazite Model # PG3048Z709, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basemount cabinet.
4. Supply the cabinet base with four 1#2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 7 " from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x 9#16x 3#16inch steel channel with eight T-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of tie wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using 1#2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 850 lb force applied at 49" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Subsidiary to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match plans.
11. Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL Listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

15. Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4-inches above the slab.
16. Extend conduits for future use at least 18-inches from the edge of the slab, terminate underground with a coupling, and cap and seal so that the seal can be removed without damaging the coupling. This must also apply to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrical and telephone services. Run the conduit for the electrical feed directly to the electrical service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrical service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a steel one-hole strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

FILE: ts-cf-21.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS				
12-04				
2-21				

SHEET NO.: C-228

DATE:
FILE:

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥			ANCHOR BOLT DESIGN ①				FOUNDATION DESIGN LOAD ②		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

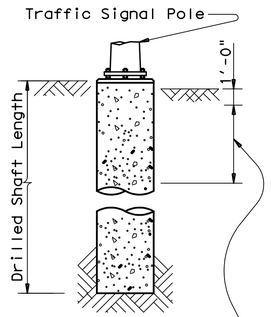
⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET)				
				24-A	30-A	36-A	36-B	42-A
TOTAL DRILLED SHAFT LENGTHS								

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

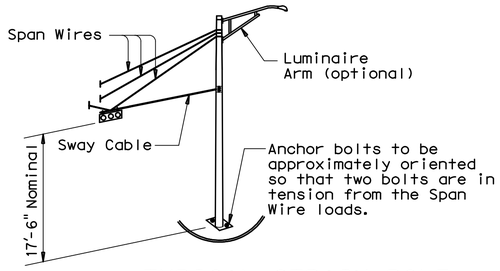
		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'



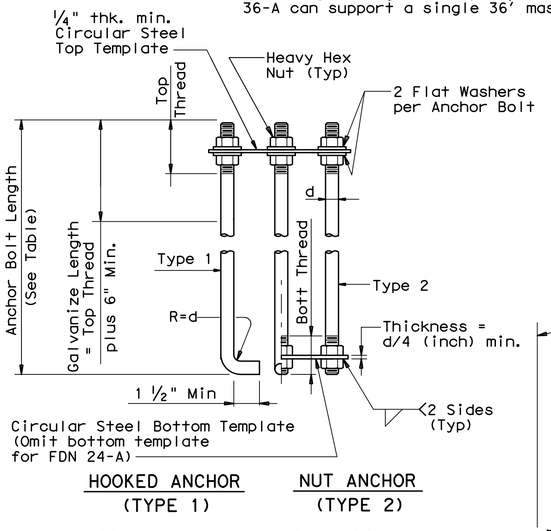
Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'

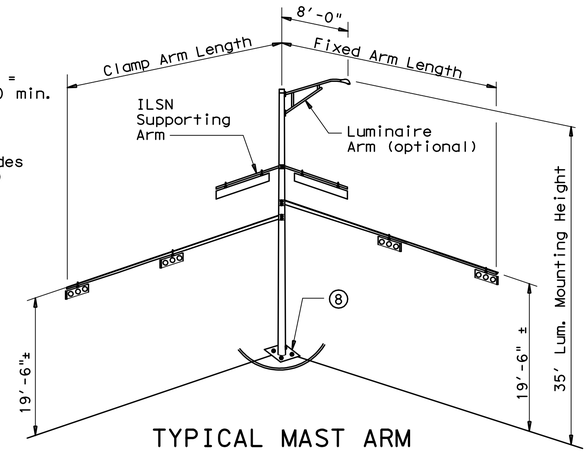
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



TYPICAL STRAIN POLE ASSEMBLY



ANCHOR BOLT ASSEMBLY



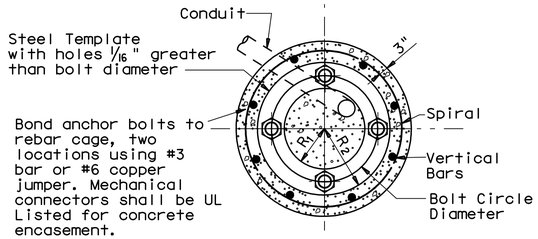
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.

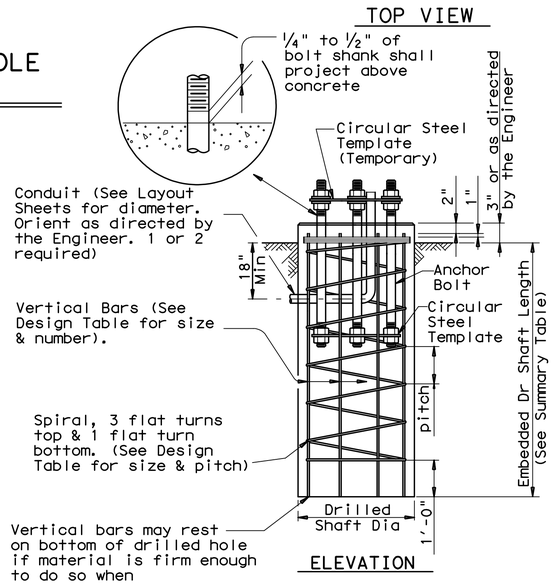
TYPICAL MAST ARM ASSEMBLY

ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.





FOUNDATION DETAILS

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

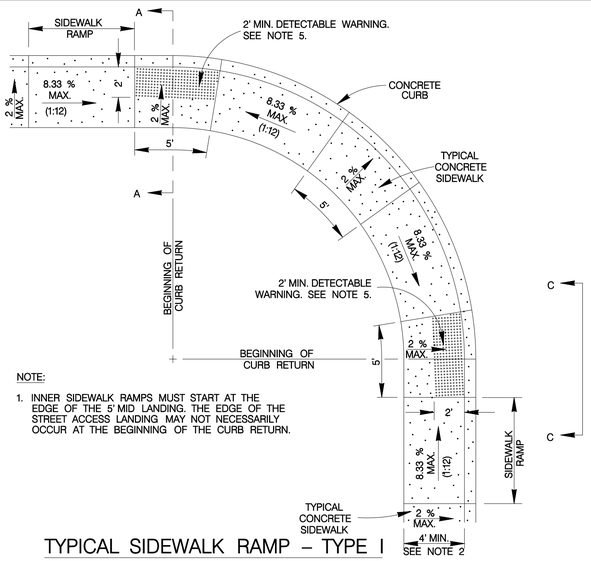
© TxDOT August 1995

DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB

REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY

SHEET NO.: C-229

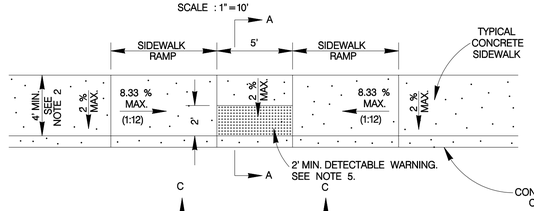


NOTE:

1. INNER SIDEWALK RAMPS MUST START AT THE EDGE OF THE 5' MID LANDING. THE EDGE OF THE STREET ACCESS LANDING MAY NOT NECESSARILY OCCUR AT THE BEGINNING OF THE CURB RETURN.

TYPICAL SIDEWALK RAMP – TYPE I

SIDEWALK ABUTS THE CURB
SCALE : 1" = 10'

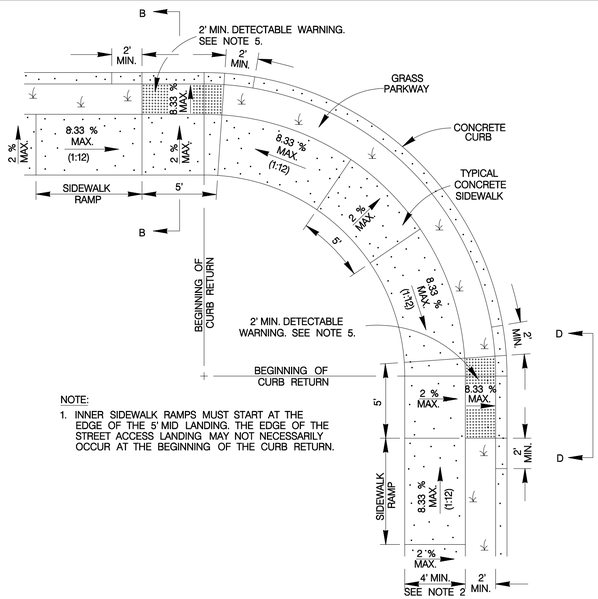


TYPICAL SIDEWALK RAMP – TYPE II

USED AT TEE INTERSECTIONS WHERE SIDEWALK ABUTS CURB
SCALE : 1" = 10'

GENERAL NOTES

1. WHEN POSSIBLE SIDEWALKS SHOULD BE PLACED NEXT TO THE PROPERTY LINE, ALLOWING A MININMUM OF 1 FOOT BUFFER. DEVIATION OF THE PATHWAY FROM A STRAIGHT LINE IS ENCOURAGED TO AVOID TREES OR OTHER OBSTRUCTIONS.
2. FOR LOCAL TYPE "A" STREETS, SIDEWALKS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF 4' AND IF SEPARATED FROM THE CURB, THE SIDEWALK SHALL BE LOCATED A MINIMUM OF 2' FROM THE BACK OF CURB.
3. FOR OTHER THAN LOCAL TYPE "A" STREETS, SIDEWALKS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF 4' AND SEPARATED A MINIMUM OF 2' FROM THE BACK OF CURB OR AS AN OPTION, THE SIDEWALK SHALL HAVE A MINIMUM WIDTH OF 6' WHEN LOCATED AT THE BACK OF CURB.
4. SIDEWALK RAMP LENGTHS PRESENTED IN TABLE 1 ARE GUIDELINES ONLY. SIDEWALK RAMP LENGTHS SHALL BE OF SUFFICIENT LENGTH TO MAINTAIN 8.33% (1:12) MAXIMUM SLOPE.
5. ALL CURB–RAMPS OR LANDINGS ABUTTING THE CROSSWALK SHALL HAVE A DETECTABLE WARNING 24 INCHES DEEP (IN THE DIRECTION OF PEDESTRIAN TRAVEL) AND EXTENDING THE FULL WIDTH OF THE CURB RAMP OR LANDING. THE DETECTABLE WARNING SHALL CONSIST OF RAISED TRUNCATED DOMES, ALIGNED IN A GRID PATTERN WITH A DIAMETER OF A NOMINAL 0.9 INCHES (23 MM), A HEIGHT OF NOMINAL 0.2 INCHES (5 MM) AND A CENTER–TO–CENTER SPACING OF NOMINAL 2.35 INCHES (60 MM). THE DETECTABLE WARNING SURFACE SHALL BE A CAST–IN–PLACE TILE CONFORMING TO THE CITY OF SAN ANTONIO STANDARD SPECIFI–CATIONS OR PAVERS CONFORMING TO TXDOT STANDARD PED–05, PEDESTRIAN FACILITIES.
6. DETECTABLE WARNINGS SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES, EITHER LIGHT–ON–DARK, OR DARK–ON–LIGHT. THE MATERIAL USED TO PROVIDE CONTRAST SHALL BE AN INTEGRAL PART OF THE WALKING SURFACE.
7. SIDEWALK RAMP TYPE V SHALL BE USED ONLY WHERE THERE IS SIGNIFICANT RESTRICTION WITHIN THE PARKWAY TO CONSTRUCT TYPE I OR TYPE III RAMPS.
8. CONSTRUCTION OF ALL WHEELCHAIR RAMPS TO BE INCLUDED UNDER ITEMS "500 – CONCRETE CURB, GUTTER, AND CONCRETE CURB AND GUTTER" AND /OR "502 – CONCRETE SIDEWALKS". RAMP SURFACE SHALL BE BRUSH FINISHED.
9. THESE DETAILS ARE FOR REFERENCE ONLY. ACTUAL LOCATIONS OF WHEELCHAIR RAMPS TO BE SHOWN ON CONSTRUCTION PLANS. CITY CONSTRUCTION INSPECTOR CAN ADJUST LOCATIONS FOR SAFETY OR UTILITY CLEARANCE.
10. SIDEWALKS LESS THAN 5 FEET IN WIDTH SHALL BE PROVIDED WITH A PASSING SPACE AT A MAXIMUM SPACING OF 200 FEET.
11. WHEELCHAIR RAMP SHALL BE CONSTRUCTED WITH 4" CLASS "A" CONCRETE AND 2" MINIMUM GRAVEL, CRUSHED ROCK OR FLEXIBLE BASE MATERIAL.
12. REINFORCING STEEL SHALL BE #3 BARS AT 18" O.C.E.W. OR 6" x 6" – W2.9 x W2.9 WIRE MESH.
13. SIDEWALK GRADES SHALL NOT EXCEED THE GRADE ESTABLISHED FOR THE ADJACENT ROADWAY, ANY SIDEWALK CONSTRUCTION THAT DEVIATES FROM THE NATURAL GRADE OF THE ROADWAY TO CREATE A GRADE STEEPER THAN THE EXISTING ROADWAY WILL REQUIRE RAMPS, HANDRAILS AND RESTING PLATFORMS TO BE CONSTRUCTED IN ACCORDANCE WITH ADA AND TAS STANDARDS.
14. SIDEWALK CROSS GRADE SHALL HAVE A MAXIMUM SLOPE OF 2%. LANDINGS SHALL HAVE A MAXIMUM SLOPE OF 2% IN ANY DIRECTION.
15. THE CHANGE OF GRADE BETWEEN ADJACENT SURFACES SHALL BE LESS THAN 11%. THE CHANGE OF GRADE SHALL BE DEFINED AS THE ALGEBRAIC DIFFERENCE OF THE ADJACENT SURFACE SLOPES. IN THE CASE OF A STREET ACCESS RAMP DESIGNED AT THE 8.33% MAXIMUM SLOPE, THE ADJACENT PAVEMENT CROSS SLOPE SHALL BE LESS THAN 2.67% (I.E. 8.33–(–2.67) = 11). IN ADDITION, THE ADJACENT PAVEMENT CROSS SLOPE SHALL BE LESS THAN OR EQUAL TO 5%.
16. IF THE CHANGE OF GRADE BETWEEN ADJACENT SURFACES IS GREATER THAN OR EQUAL TO 11%, A LEVELING STRIP, 2 FEET IN LENGTH, SHALL BE PROVIDED TO TRANSITION THE ADJACENT SURFACES.
17. ADA COMPLIANCE IN ALTERATIONS INCLUDE ONLY THAT WORK WITHIN THE LIMITS, BOUNDARIES OR SCOPE OF A PLANNED PROJECT.

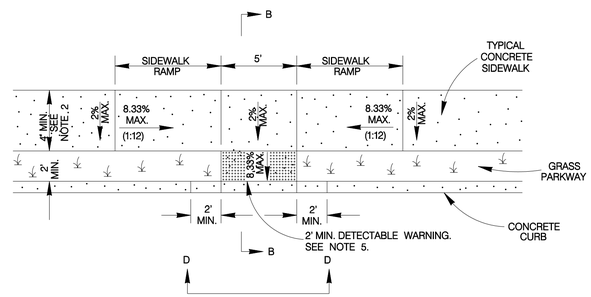


NOTE:

1. INNER SIDEWALK RAMPS MUST START AT THE EDGE OF THE 5' MID LANDING. THE EDGE OF THE STREET ACCESS LANDING MAY NOT NECESSARILY OCCUR AT THE BEGINNING OF THE CURB RETURN.

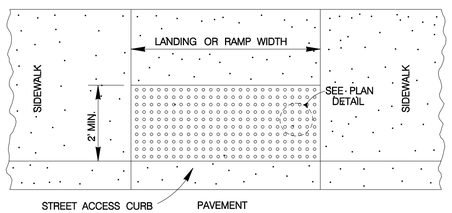
TYPICAL SIDEWALK RAMP – TYPE III

SIDEWALK SEPARATED FROM CURB
SCALE : 1" = 10'



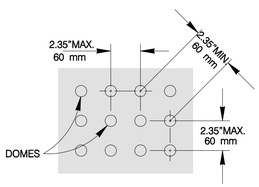
TYPICAL SIDEWALK RAMP – TYPE IV

USED AT TEE INTERSECTIONS WHERE SIDEWALK IS SEPARATED FROM CURB
SCALE : 1" = 10'



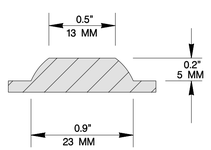
DETECTABLE WARNING SURFACE

SCALE : 1" = 4'



PLAN DETAIL

NO SCALE

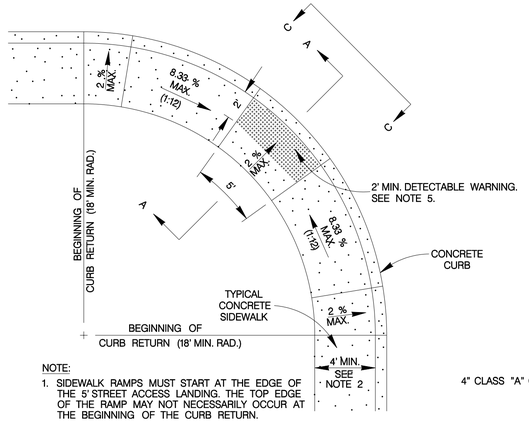


DOME SECTION

NO SCALE

NOTE:

STAMPED CONCRETE TRUNCATED DOMES WILL NOT BE ALLOWED TO BE USED FOR DETECTABLE WARNING ON WHEELCHAIR RAMPS. CONTRACTOR MUST SUBMIT TRUNCATED DOME INFORMATION THAT IS TO BE USED ON WHEELCHAIR RAMPS TO THE PROJECT MANAGER FOR APPROVAL AT LEAST 30 DAYS PRIOR TO INSTALLATION.

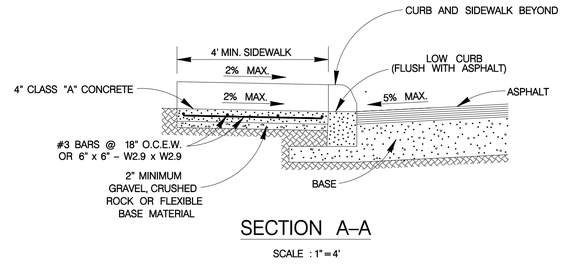


NOTE:

1. SIDEWALK RAMPS MUST START AT THE EDGE OF THE 5' STREET ACCESS LANDING. THE TOP EDGE OF THE RAMP MAY NOT NECESSARILY OCCUR AT THE BEGINNING OF THE CURB RETURN.
2. TYPE V RAMPS MUST HAVE 18' MIN. RADIUS.

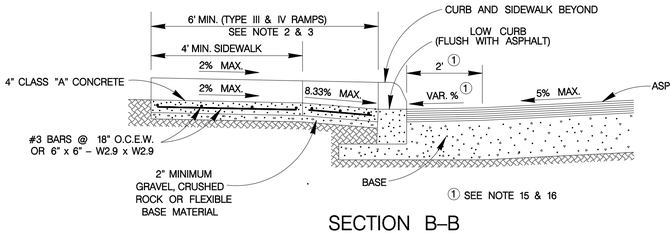
TYPICAL SIDEWALK RAMP – TYPE V

SIDEWALK ABUTS CURB
SCALE : 1" = 10'



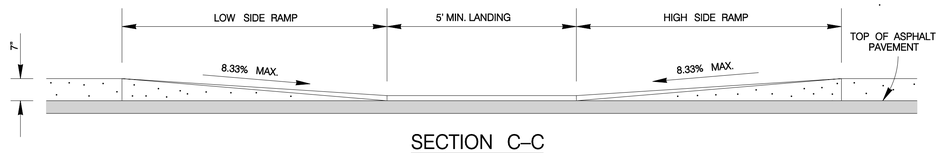
SECTION A–A

SCALE : 1" = 4'



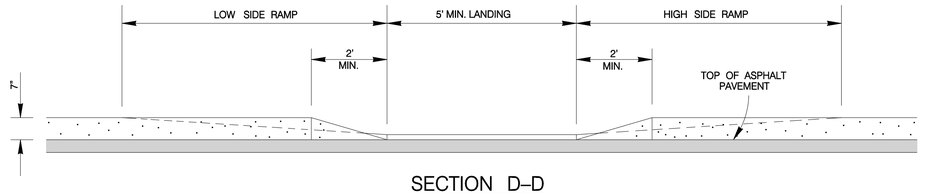
SECTION B–B

SCALE : 1" = 4'



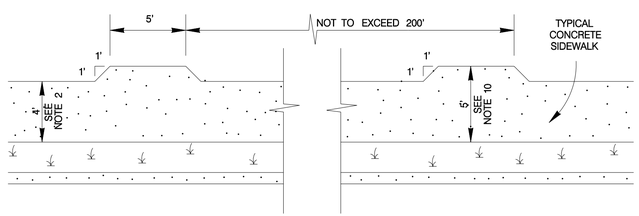
SECTION C–C

CURB PROFILE WHERE SIDEWALK ABUTS CURB
SCALE : 1" = 4'



SECTION D–D

CURB PROFILE WHERE SIDEWALK IS SEPARATED FROM CURB
SCALE : 1" = 4'



SIDEWALK PASSING SPACE

SCALE : 1" = 10'

TABLE 1 (SEE NOTE 4)		
GUTTER SLOPE	SIDEWALK RAMP LENGTH (1:12)	
	LOW SIDE	HIGH SIDE
1%	5'–6"	7'–2"
2%	5'–0"	8'–4"
3%	4'–6"	10'–0"
4%	4'–2"	12'–6"
5%	3'–10"	16'–8"

MAY 2009

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

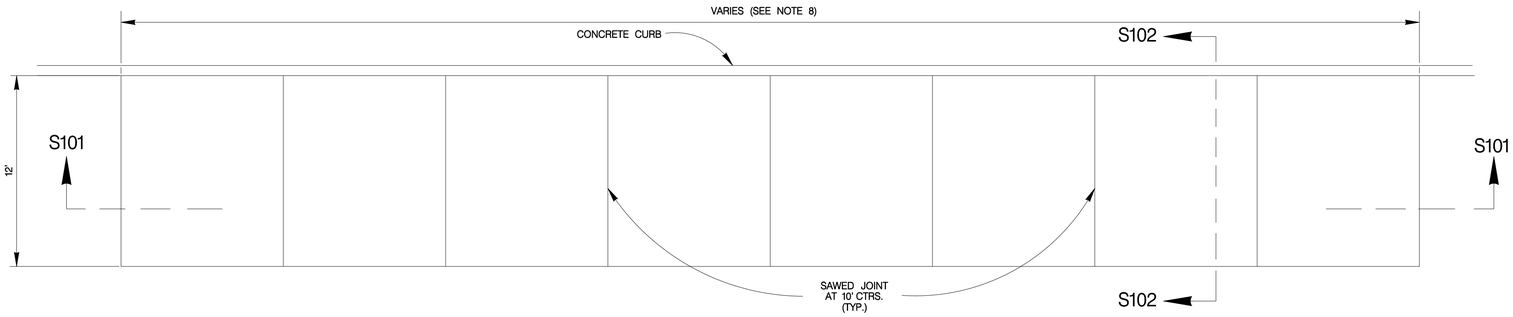
WHEELCHAIR RAMP STANDARDS

_____% SUBMITTAL
DRWN. BY: V. VASQUEZ

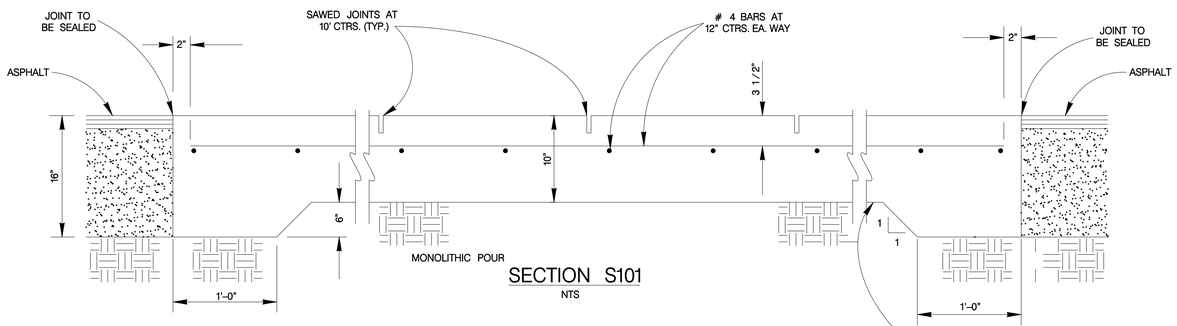
SHEET NO.: C-230

GENERAL NOTES

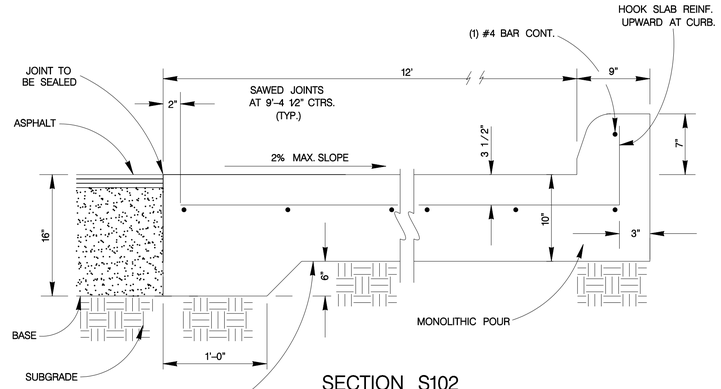
1. ALL CONCRETE SHALL TEST 4,000 P.S.I. AT 28 DAYS.
2. BUS STOP CONCRETE PAD CONSTRUCTION SHALL BE PAID UNDER ITEM 209 AT THE UNIT PRICE BID, WHICH PRICE SHALL BE FULL COMPENSATION FOR ALL DEMOLITION, REMOVAL OF EXISTING CURB, EXCAVATION, HAULING, CRUSHED LIMESTONE, REINFORCING STEEL, CONCRETE, CONCRETE CURB, JOINTS, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.
3. BUS PAD AND CURB SHALL BE MONOLITHICALLY POURED. ALL EXISTING CURBING SHALL BE REMOVED AND REPLACED AS PER STANDARD DETAILS.
4. THE CONTRACTOR SHALL CONSTRUCT AN EXPANSION JOINT MIDWAY IF THE "CONCRETE BUS STOP PAD" IS LONGER THAN 150 FEET. NO DIRECT PAYMENT SHALL BE MADE FOR CONSTRUCTION OF AN EXPANSION JOINT.
5. ACTUAL BUS PAD LENGTH AND WIDTH TO BE FIELD DETERMINED BY CITY ENGINEER OR HIS DESIGNATED REPRESENTATIVE.
6. DO NOT DRIVE ON PAD UNTIL CONCRETE HAS REACHED A STRENGTH OF 2,800 P.S.I.
7. BREAK TEST CYLINDERS AS FOLLOWS:
   2 AT 3 DAYS
   2 AT 7 DAYS
   2 AT 28 DAYS
8. CONCRETE BUS PAD LENGTH (OR AS SHOWN ON THE PLANS):
   30 M.P.H. – 100'
   35 M.P.H. – 160'
   40 M.P.H. – 160'
   45 M.P.H. – 200'



PLAN VIEW
NTS

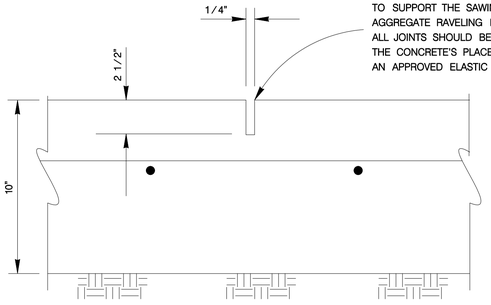


SECTION S101
NTS



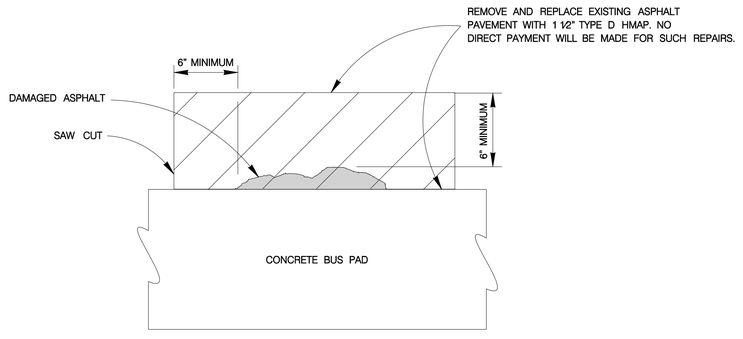
SECTION S102
NTS

PROOFROLL EXISTING SUBGRADE WITH BACKHOE OR SIMILAR EQUIPMENT TO LOCATE POTENTIAL SOFT REGIONS OF SUBGRADE . REPLACE SOFT AREAS WITH 12" OF SUITABLE MATERIAL.

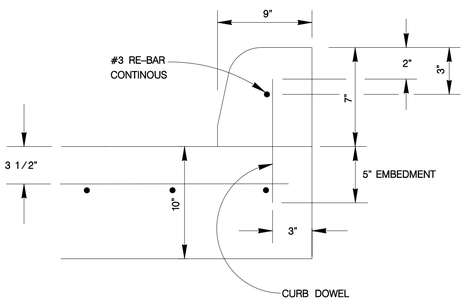


SAWCUT AS SOON AS THE CONCRETE IS STRONG ENOUGH TO SUPPORT THE SAWING EQUIPMENT AND TO PREVENT AGGREGATE RAVELING DURING THE SAWING OPERATION. ALL JOINTS SHOULD BE SAW CUT WITHIN 12 HOURS OF THE CONCRETE'S PLACEMENT. JOINTS SHALL BE FILLED WITH AN APPROVED ELASTIC TYPE MATERIAL AFTER SAW CUTTING.

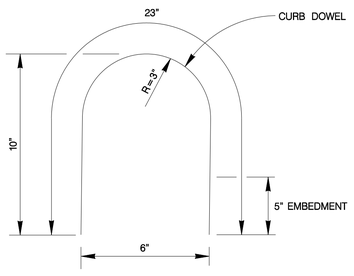
SAWED JOINT DETAIL
NTS



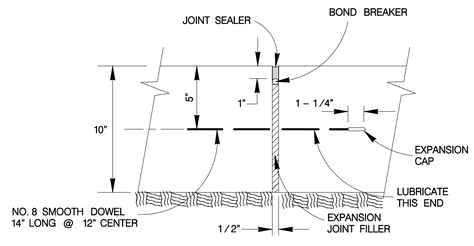
REPAIR OF DAMAGED ASPHALT
NTS



CONCRETE CURB OPTION
NEED CITY ENGINEER'S APPROVAL
NTS



CURB DOWEL
NO. 3 RE–BAR @ 30" C–C
NTS



NOTE:
THE CONTRACTOR SHALL CONSTRUCT AN EXPANSION JOINT MIDWAY IF THE "CONCRETE BUS STOP PAD" IS LONGER THAN 150 FEET. NO DIRECT PAYMENT SHALL BE MADE FOR CONSTRUCTION OF AN EXPANSION JOINT.

EXPANSION JOINT DETAIL
SCALE : 1" = 1'

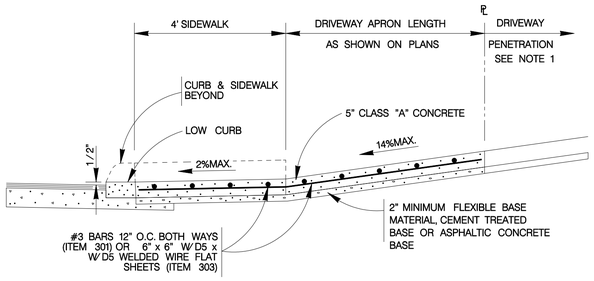
MAY 2009

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

CONCRETE BUS STOP PAD

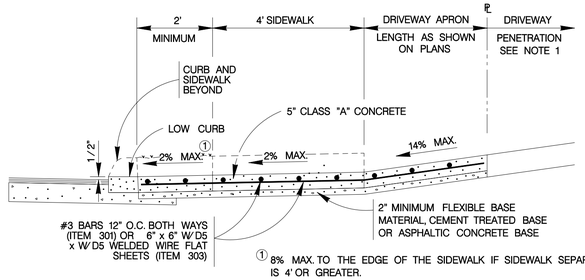
_____% SUBMITTAL
DRWN. BY: V. VASQUEZ

SHEET NO.: C-231



TYPICAL RESIDENTIAL DRIVEWAY SECTION

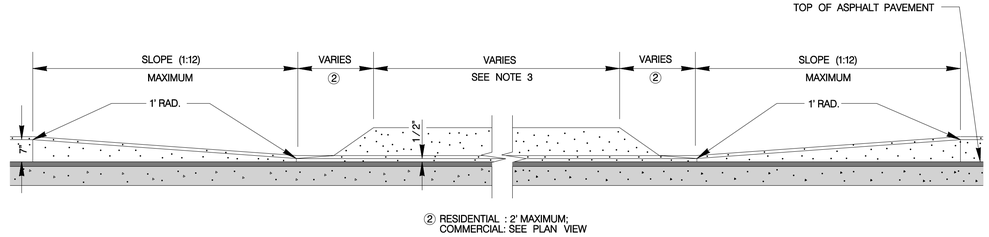
WITH SIDEWALK ABUTTING CURB
ITEM 503.1



① 8% MAX. TO THE EDGE OF THE SIDEWALK IF SIDEWALK SEPARATION IS 4' OR GREATER.

TYPICAL RESIDENTIAL DRIVEWAY SECTION

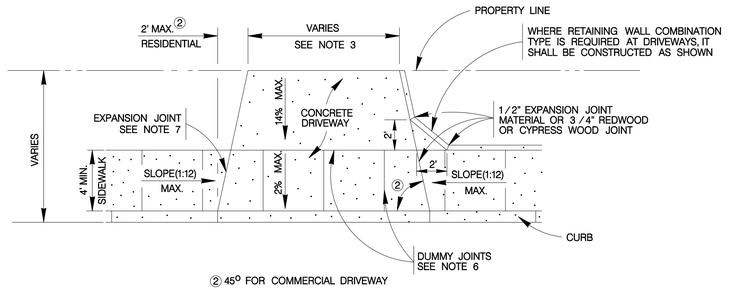
WITH SIDEWALK SEPARATED FROM CURB
ITEM 503.1



② RESIDENTIAL : 2' MAXIMUM;
COMMERCIAL: SEE PLAN VIEW

CURB PROFILE AT DRIVEWAY

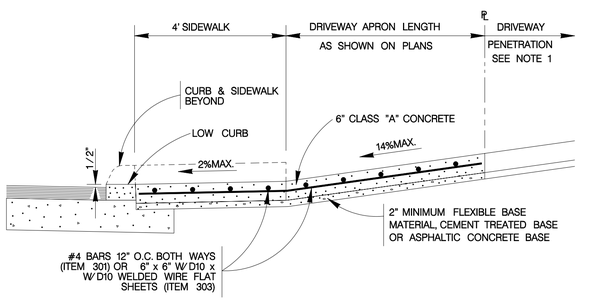
WITH SIDEWALK ABUTTING CURB



② 45° FOR COMMERCIAL DRIVEWAY

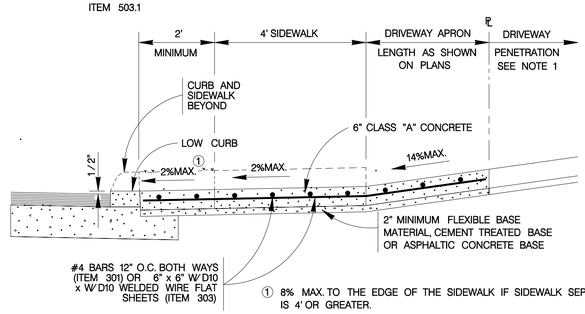
TYPICAL DRIVEWAY PLAN VIEW

WITH SIDEWALK ABUTTING CURB



TYPICAL COMMERCIAL DRIVEWAY SECTION

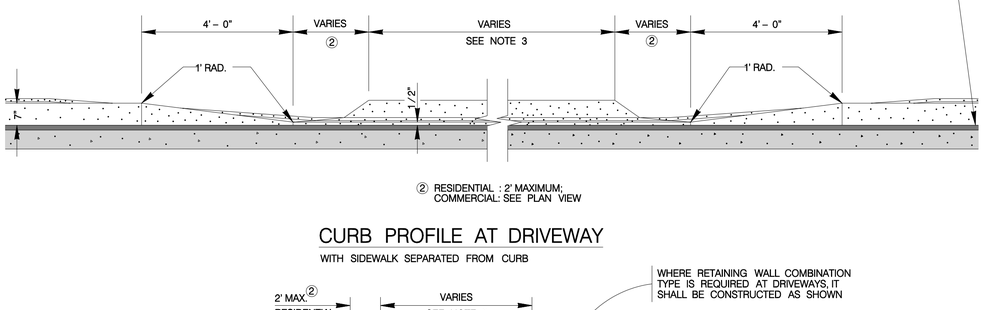
WITH SIDEWALK ABUTTING CURB
ITEM 503.2



① 8% MAX. TO THE EDGE OF THE SIDEWALK IF SIDEWALK SEPARATION IS 4' OR GREATER.

TYPICAL COMMERCIAL DRIVEWAY SECTION

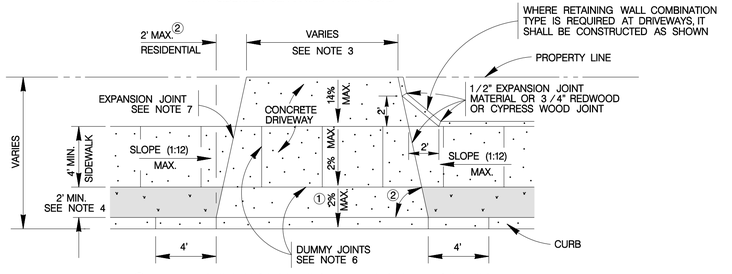
WITH SIDEWALK SEPARATED FROM CURB
ITEM 503.2



② RESIDENTIAL : 2' MAXIMUM;
COMMERCIAL: SEE PLAN VIEW

CURB PROFILE AT DRIVEWAY

WITH SIDEWALK SEPARATED FROM CURB



① 8% MAX. TO THE EDGE OF THE SIDEWALK IF SIDEWALK SEPARATION IS 4' OR GREATER.

② 45° FOR COMMERCIAL DRIVEWAY

TYPICAL DRIVEWAY PLAN VIEW

WITH SIDEWALK SEPARATED FROM CURB

CONCRETE DRIVEWAY NOTES

1. DRIVEWAY PENETRATION REFERS TO A PORTION OF THE DRIVEWAY THAT MAY BE NECESSARY TO RECONSTRUCT WITHIN PRIVATE PROPERTY TO COMPLY WITH A MAXIMUM DRIVEWAY SLOPE. THIS PORTION OF THE DRIVEWAY SHALL BE PAID FOR UNDER THE FOLLOWING ITEMS AS MAY APPLY:
   A.) CONCRETE DRIVEWAY PAID FOR UNDER ITEM NO. 503.1 OR 503.2.
   B.) ASPHALTIC CONCRETE DRIVEWAY PAID FOR UNDER ITEM NO. 503.4 AND SHALL INCLUDE A MINIMUM OF 1" ASPHALT TYPE 'D' & 6" FLEXIBLE BASE
   C.) GRAVEL DRIVEWAY PAID FOR UNDER ITEM NO. 503.5 AND SHALL INCLUDE A MINIMUM OF 6" FLEXIBLE BASE

2. 7" MINIMUM HEIGHT WILL NOT NECESSARILY OCCUR AT THE PROPERTY LINE. IT MAY OCCUR WITHIN THE RIGHT OF WAY OR WITHIN THE DRIVEWAY PENETRATION ON PRIVATE PROPERTY.

3. THE PROPOSED DRIVEWAY SHOULD MATCH THE EXISTING WIDTH AT THE PROPERTY LINE BUT UNLESS AUTHORIZED BY THE CITY TRAFFIC ENGINEER, THE WIDTH SHALL BE WITHIN THE FOLLOWING VALUES:

TYPE	MINIMUM	MAXIMUM
RESIDENTIAL	10'	20'
COMMERCIAL – ONE WAY	12'	20'
COMMERCIAL – TWO WAY	24'	30'

4. FOR LOCAL TYPE "A" STREETS, SIDEWALK SHALL HAVE A MINIMUM WIDTH OF 4' AND IF SEPARATED FROM THE CURB, THE SIDEWALK SHALL BE LOCATED A MINIMUM OF 2' FROM THE BACK OF CURB.

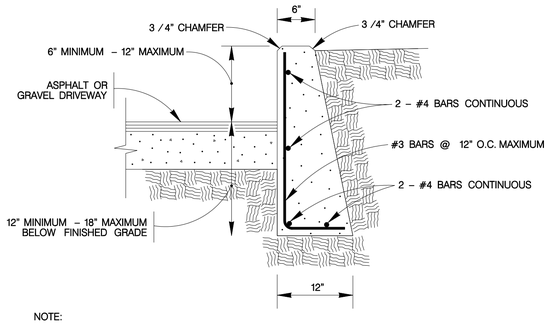
5. FOR OTHER THAN LOCAL TYPE "A" STREETS, THE SIDEWALK SHALL HAVE A MINIMUM WIDTH OF 4' AND SEPARATED A MINIMUM OF 2' FROM THE BACK OF CURB OR, AS AN OPTION, THE SIDEWALK SHALL HAVE A MINIMUM WIDTH OF 6' WHEN LOCATED AT THE BACK OF CURB.

6. DUMMY JOINTS PARALLEL TO THE CURB SHALL BE PLACED WHERE THE SIDEWALK MEETS THE DRIVEWAY. DUMMY JOINTS PERPENDICULAR TO THE CURB, AND WITHIN THE BOUNDARIES OF THE PARALLEL DUMMY JOINTS, SHALL BE PLACED AT INTERVALS EQUAL TO THE WIDTH OF THE SIDEWALK.

7. A MINIMUM OF TWO ROUND AND SMOOTH DOWEL BARS 3/8" IN DIAMETER AND 18" IN LENGTH SHALL BE SPACED 18" APART AT EACH EXPANSION JOINT.

8. SIDEWALK RAMP LENGTHS SHALL BE OF SUFFICIENT LENGTH TO MAINTAIN 8.33% (1:12) MAXIMUM SLOPE. WHERE SIDEWALKS CROSS DRIVEWAYS, SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2%.

9. SIDEWALK RAMP SURFACE SHALL BE BRUSH FINISHED.



NOTE:
1. COST OF REINFORCEMENT TO BE INCLUDED IN UNIT COST OF ITEM 307.1.
2. CONCRETE RETAINING WALL COMBINATION TYPE SHALL BE USED FOR CONCRETE DRIVEWAYS.

DRIVEWAY – CONCRETE RETAINING WALL

ON COMPACTED SUBGRADE
ITEM 307.1

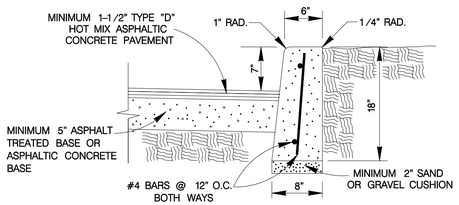
MAY 2009

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

CONCRETE DRIVEWAY STANDARDS

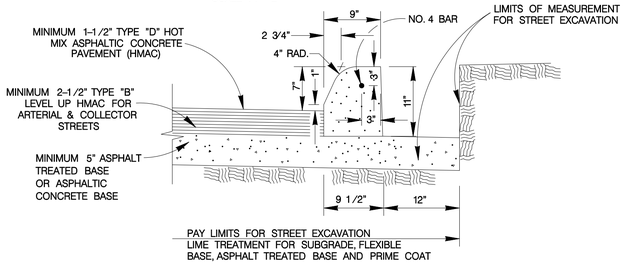
_____% SUBMITTAL
DRWN. BY: V. VASQUEZ

SHEET NO.: C-232



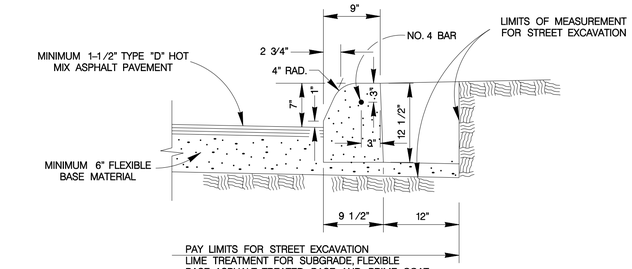
HEADER CURB

ITEM 500 ON SAND OR GRAVEL
SCALE : 1" = 2'



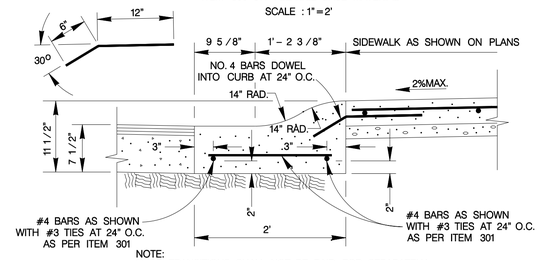
CONCRETE CURB

ITEM 500 ON ASPHALT TREATED BASE OR ASPHALTIC CONCRETE BASE
SCALE : 1" = 2'



CONCRETE CURB

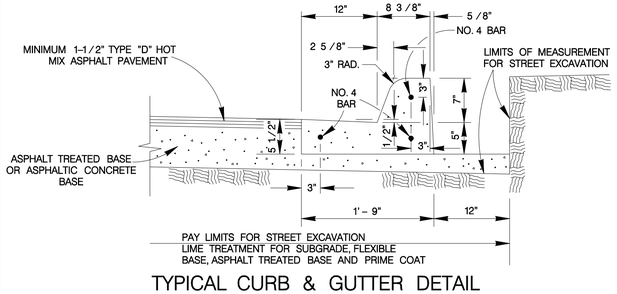
ITEM 500 ON FLEXIBLE BASE MATERIAL
SCALE : 1" = 2'



NOTE:
CURB TRANSITIONS SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN ITEM 500 CONCRETE CURBING

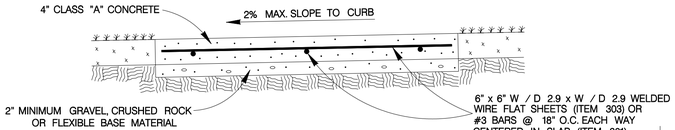
MOUNTABLE CURB

ITEM 500 ON COMPACTED SUBGRADE
SCALE : 1" = 2'



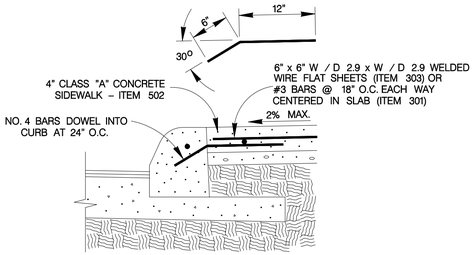
TYPICAL CURB & GUTTER DETAIL

ITEM 500 ON ASPHALT TREATED BASE OR ASPHALTIC CONCRETE BASE
SCALE : 1" = 2'



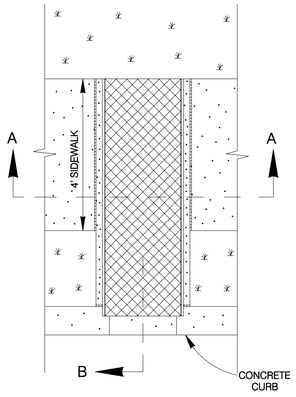
CONCRETE SIDEWALK SECTION

ITEM 502
SCALE : 1" = 2'



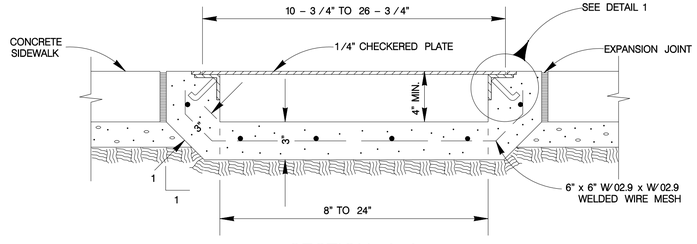
CONCRETE SIDEWALK ABUTTING CURB SECTION

ITEM 502
SCALE : 1" = 2'



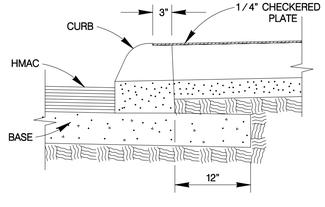
CONCRETE SIDEWALK DRAIN DETAIL

SCALE : 1" = 4'



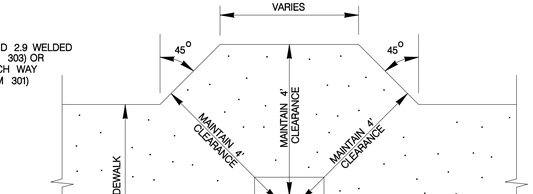
SECTION A–A

SCALE=1 : 12



SECTION B

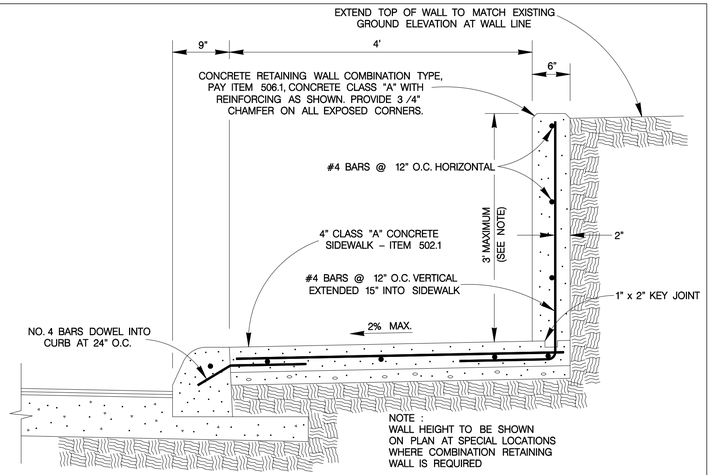
SCALE : 1" = 2'



NOTE :
THIS DETAIL TO BE USED WHENEVER A POWER POLE ENCROACHES ON SIDEWALK. A MINIMUM UNOBSTRUCTED CLEARANCE OF 4' IS TO BE MAINTAINED AROUND THE POLE AT THE LOCATIONS.

CONCRETE SIDEWALK @ UTILITY POWER POLE DETAIL

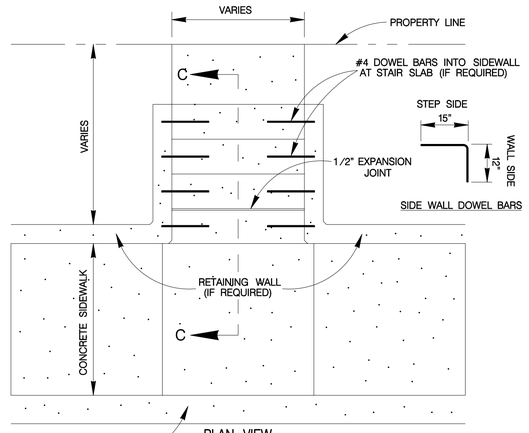
SCALE : 1" = 4'



NOTE :
WALL HEIGHT TO BE SHOWN ON PLAN AT SPECIAL LOCATIONS WHERE COMBINATION RETAINING WALL IS REQUIRED

CONCRETE RETAINING WALL – COMBINATION TYPE

ITEM 506
SCALE : 1" = 2'

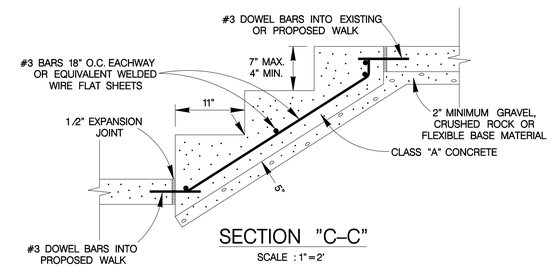


PLAN VIEW

SCALE : 1" = 4'

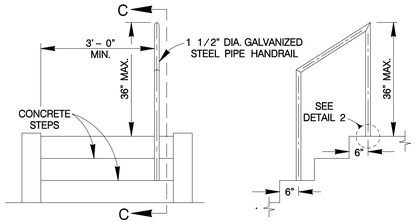
CONCRETE STEPS

ITEM 524



SECTION "C–C"

SCALE : 1" = 2'

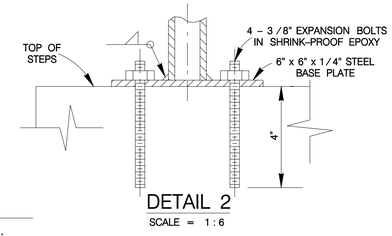


PIPE HANDRAIL DETAIL

PROFILE VIEW
SCALE : 1" = 4'

SECTION "D–D"

FRONT VIEW
SCALE : 1" = 4'



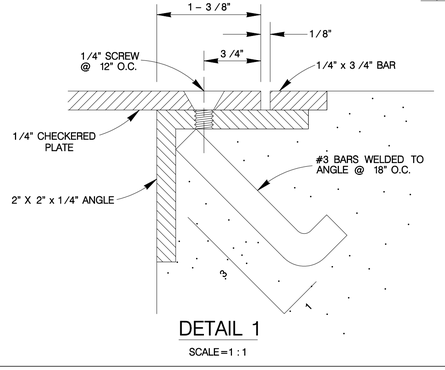
DETAIL 2

SCALE = 1 : 6

NOTES :
1. PLACE STEPS TO CONFORM WITH PROPOSED PARKWAY GRADING
2. 1–1/2" DIA. GALVANIZED STEEL PIPE HANDRAIL REQUIRED ON ONE SIDE OF THE STEPS WHEN 3 OR MORE RISERS ARE USED, OR AS DESIGNED BY ENGINEER. TO BE PAID UNDER ITEM 522

HANDRAIL FOR CONCRETE STEPS

ITEM 522



DETAIL 1

SCALE=1 : 1

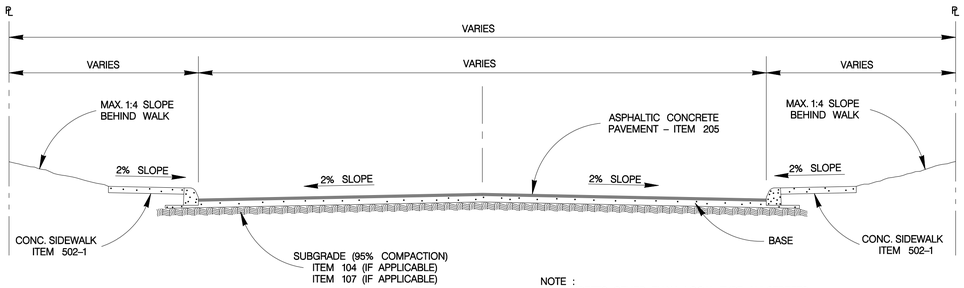
MAY 2009

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

MISCELLANEOUS CONSTRUCTION STANDARDS I

_____% SUBMITTAL
DRWN. BY: V. VASQUEZ

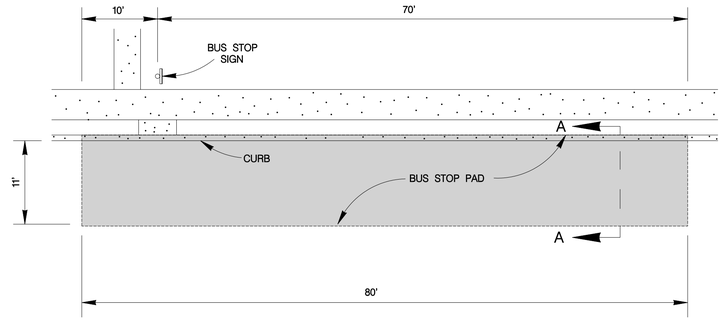
SHEET NO.: C-233



NOTE :
FOR STREETS OTHER THAN LOCAL TYPE "A" STREETS, THE EDGE OF THE SIDEWALK MUST BE LOCATED A MINIMUM OF TWO FEET AWAY FROM THE BACK OF THE CURB.

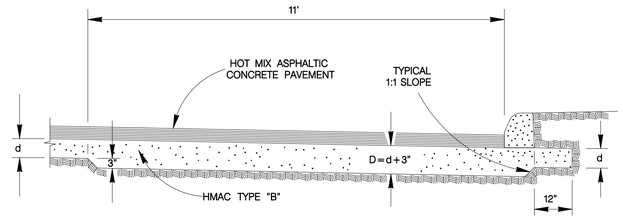
TYPICAL STREET SECTION

SCALE : 1" = 8'



PLAN VIEW

SCALE : 1" = 20'

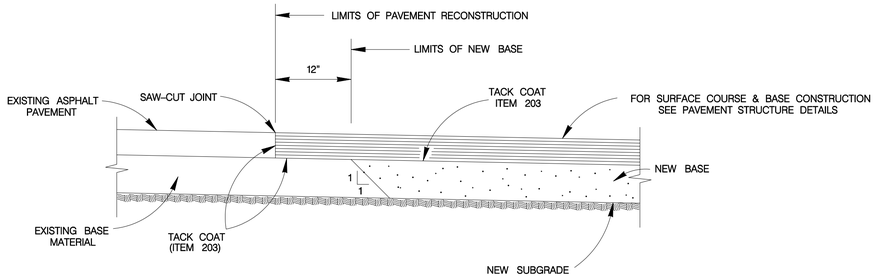


SECTION "A–A"

SCALE : 1" = 4'

NOTES :
1. EXCAVATION FOR THICKENED PAVEMENT SECTION WILL BE PAID UNDER ITEM NO. 104 "STREET EXCAVATION".

2. BASE MATERIALS :
   A.) IF THE MEASUREMENT FOR THE HMAC MATERIAL IS PER TON, THICKENED PAVEMENT SECTION WILL BE PAID FOR UNDER ITEM NO. 205, TYPE "B" – PER TON.
   B.) IF THE MEASUREMENT FOR THE HMAC MATERIAL IS PER SQUARE YARD, NO EXTRA PAYMENT WILL BE MADE FOR THE THICKENED PAVEMENT.

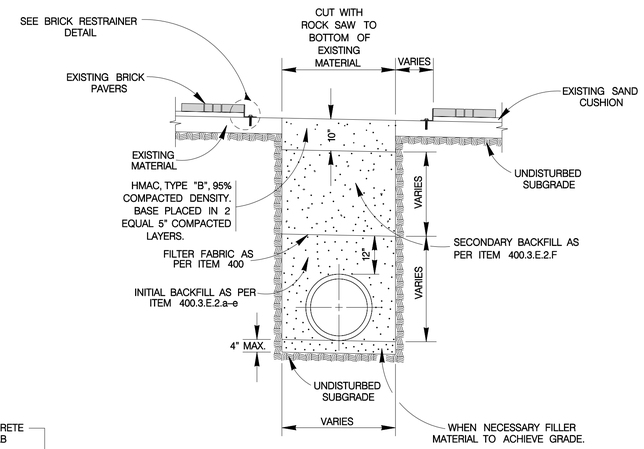


PAVEMENT JUNCTION DETAILS

SCALE : 1" = 2'

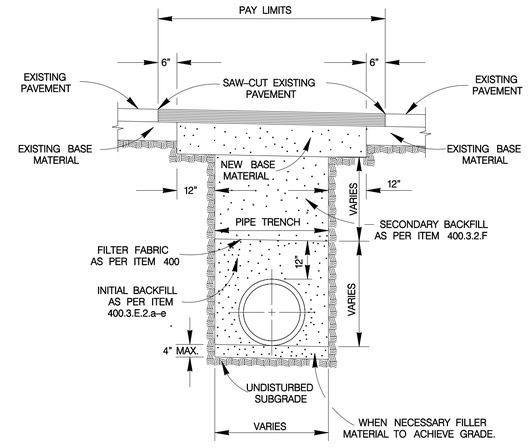
HMAC BUS STOP PAD

NEED CITY ENGINEER'S APPROVAL TO USE HMAC BUS PAD



TYPICAL BASE REPLACEMENT FOR BRICK SURFACED STREET SECTION

ITEM 511.3
SCALE : 1" = 4'

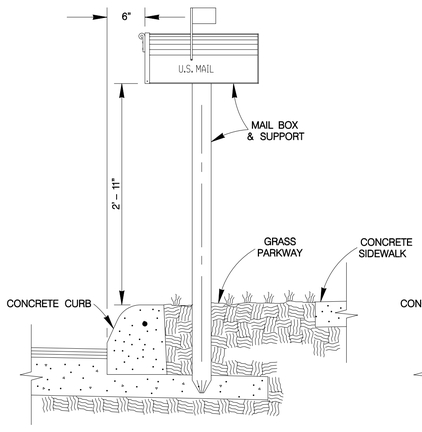


NOTES :
1. FOR LOCAL TYPE "A" & "B" STREETS (RESIDENTIAL) USE 6" ASPHALT CONCRETE BASE TYPE "B" WITH 1–1/2" TYPE "D" HOT MIX ASPHALTIC CONCRETE PAVEMENT.

2. FOR ARTERIAL & SECONDARY STREETS (COMMERCIAL) USE 12.5" TYPE "B" HOT MIX ASPHALTIC CONCRETE PAVEMENT LEVELING–UP COURSE & 1–1/2" TYPE "D" HOT MIX ASPHALTIC CONCRETE PAVEMENT SURFACE COURSE.

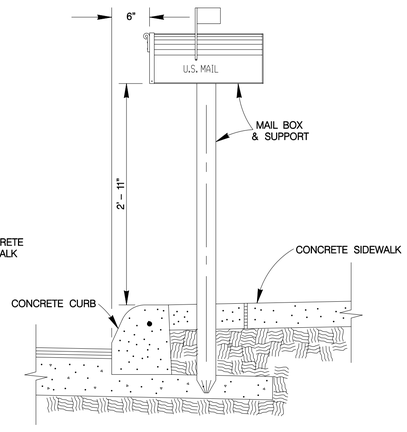
TYPICAL PAVEMENT REPLACEMENT

ITEM 511
SCALE : 1" = 4'



MAIL BOX PERPENDICULAR TO CURB

WHEN SIDEWALK IS DETACHED FROM CURB
SCALE : 1" = 2'

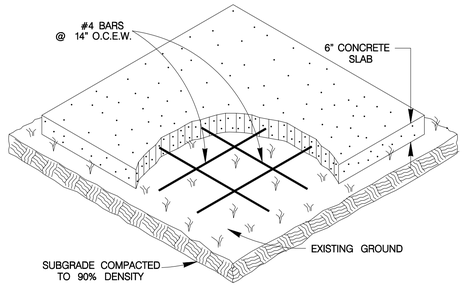


MAIL BOX PERPENDICULAR TO CURB

WHEN SIDEWALK IS ATTACHED TO CURB
SCALE : 1" = 2'

MAIL BOX LOCATION

ITEM 513.1



MAIL BOX PAD NOTES :
1. THE CONTRACTOR WILL CONSTRUCT SLABS FOR "TEMPORARY MAIL BOX COLLECTION PAD" FOR THE UNITED STATES POSTAL SERVICE WITH LOCATIONS AND SIZES SPECIFIED BY THE CITY ENGINEER DURING CONSTRUCTION.

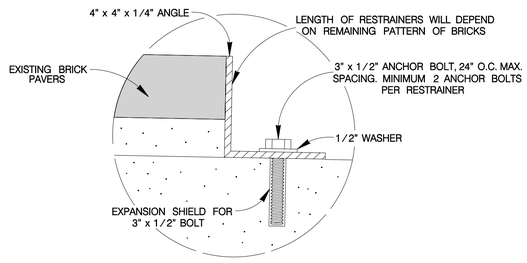
2. THE CONSTRUCTION OF SLABS SHALL CONFORM TO ITEM 513 "REMOVING AND RELOCATING MAILBOXES".

3. PAYMENT WILL BE MADE UNDER ITEM 513.2 "COMMUNITY MAILBOX SLAB – PER SQUARE YARD".

4. UNIT PRICE WILL INCLUDE REMOVAL OF "TEMPORARY MAIL BOX COLLECTION PAD" SLABS AT THE END OF THE PROJECT. NO SEPARATE PAY ITEM.

COMMUNITY MAIL BOX SLAB

ITEM 513.2
SCALE : 1" = 4'



BRICK RESTRAINER DETAIL

SCALE = 1 : 6

FEBRUARY 2010

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

MISCELLANEOUS CONSTRUCTION STANDARDS II

_____% SUBMITTAL
DRWN. BY: V. VASQUEZ

SHEET NO.: C-234

GENERAL LANDSCAPE NOTES

1. THIS DOCUMENT HAS BEEN PREPARED UNDER THE PROFESSIONAL JUDGEMENT AND RESPONSIBILITY OF TBG PARTNERS. DIGITAL AND AI-ASSISTED TOOLS MAY HAVE BEEN USED FOR PORTIONS OF ITS PREPARATION; HOWEVER, ALL CONTENT HAS BEEN REVIEWED, VERIFIED, AND APPROVED BY THE RESPONSIBLE DESIGN PROFESSIONAL. AUTHORSHIP REMAINS SOLELY WITH TBG. NO WARRANTY, EXPRESS OR IMPLIED, IS MADE BEYOND TBG'S OBLIGATION TO PERFORM IN ACCORDANCE WITH THE PROFESSIONAL STANDARD OF CARE APPLICABLE TO DESIGN PROFESSIONALS PROVIDING SIMILAR SERVICES.
2. CONTACT LOCATION SERVICE PROVIDER FOR MARKING OF UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF WORK. COSTS INCURRED DUE TO BODILY INJURY, DAMAGE OF OWNER'S PROPERTY, OR EXISTING UTILITIES AS A RESULT OF FAILURE TO SECURE LOCATION SERVICES SHALL BE THE CONTRACTOR'S RESPONSIBILITY. NOTIFY THE OWNER AND LANDSCAPE ARCHITECT AND CIVIL ENGINEER IMMEDIATELY CONCERNING ANY UTILITY DAMAGE.
3. DO NOT PROCEED WITH DEMOLITION IF OBSTRUCTIONS OR GRADE DIFFERENCES NOT IDENTIFIED IN THE DRAWINGS INTERFERE WITH COMPLETION OF WORK. NOTIFY LANDSCAPE ARCHITECT OF CONFLICTS IN WRITING.
4. IF APPLICABLE, PROTECT EXISTING TREES TO BE PRESERVED IN ACCORDANCE WITH LOCAL REGULATIONS, TREE PROTECTION PLANS, DETAILS AND SPECIFICATIONS. NOTIFY LANDSCAPE ARCHITECT OF CONFLICTS IN WRITING.
5. DEMOLITION AND CONSTRUCTION REQUIRED TO COMPLETE THE WORK SHALL CONFORM WITH FEDERAL, STATE AND LOCAL REGULATIONS AND ORDINANCES. REQUIRED PERMITS AND ASSOCIATED FEES ARE RESPONSIBILITY OF THE CONTRACTOR.
6. PROVIDE SUPERVISION, LABOR, MATERIALS, COORDINATION WITH SUBCONTRACTORS AND OTHER TRADES NECESSARY TO COMPLETE WORK IN THE CONTRACT DOCUMENTS.
7. COORDINATE STORAGE OF EXISTING ELEMENTS TO BE REMOVED AND REPLACED WITH THE OWNER'S REPRESENTATIVE. PROTECT EXISTING ELEMENTS TO BE PRESERVED IN PLACE BOTH ON SITE AND ADJACENT TO THE WORK SITE. REPAIR DAMAGE TO THE SATISFACTION OF THE OWNER.
8. CONFORM TO APPLICABLE CODES AND AUTHORITIES HAVING JURISDICTION.
9. NOTIFY OWNER AND LANDSCAPE ARCHITECT 48 HOURS PRIOR TO COMMENCEMENT OF WORK TO COORDINATE PROJECT INSPECTION SCHEDULES.
10. VERIFY EXISTING SITE CONDITIONS AND STRUCTURE LOCATIONS MATCH SURVEY INFORMATION. VERIFY PLAN DIMENSIONS PRIOR TO EXCAVATION AND INSTALLATION. NOTIFY LANDSCAPE ARCHITECT OF DISCREPANCIES IN WRITING BEFORE PROCEEDING WITH WORK.
11. DIMENSIONS ARE PERPENDICULAR TO WALL, CURB, OR CENTERLINE UNLESS OTHERWISE NOTED. DIMENSIONS AT CURB ARE FROM BACK OF CURB.
12. DO NOT SCALE DRAWINGS.
13. DRAWINGS INCLUDE REFERENCE TO CIVIL AND LIGHTING IMPROVEMENTS. COORDINATE CONSTRUCTION, DETAILS AND UTILITY CONNECTIONS WITH RELATED ARCHITECTURAL AND ENGINEERING DRAWINGS.
14. REFERENCE CIVIL DRAWINGS FOR LAYOUT, GRADES, AND DETAILS OF VEHICULAR DRIVES, ROADS, PARKING AND CURBS.
15. SITE SURVEY INFORMATION IS PROVIDED BY THE PROJECT CIVIL ENGINEER.
16. SUBMIT PROPOSED ALTERNATIVES OR SUBSTITUTIONS TO THE LANDSCAPE ARCHITECT FOR ACCEPTANCE.
17. COORDINATE STORING OF MATERIALS, PARKING OF VEHICLES AND ACCESS RESTRICTIONS WITH THE OWNER'S REPRESENTATIVE. VEHICLES AND EQUIPMENT ARE PROHIBITED WITHIN THE DRIP LINE OF EXISTING TREES.
18. UPON COMPLETION OF CONSTRUCTION AND PRIOR TO FINAL APPROVAL, THOROUGHLY CLEAN PROJECT SITE OF TRASH. REPAIR DAMAGE TO FINISH GRADE, INCLUDING TAILINGS FROM EXCAVATIONS, WHEEL RUTS AND SETTLING OR EROSION THAT HAS OCCURRED. THE PROJECT SHALL BE LEFT IN A NEAT AND PRESENTABLE CONDITION SATISFACTORY TO THE OWNER'S REPRESENTATIVE PRIOR TO SUBMITTAL OF FINAL PAYMENT.
19. EXPENSES FOR REQUIRED UTILITY SERVICE DISCONNECTION AND/OR CONNECTION TO THE PROPOSED IMPROVEMENTS TO BE INCLUDED AS PART OF THE BID.
20. EXPENSES FOR PROFESSIONALLY ENGINEERED SIGNED AND SEALED SHOP DRAWINGS REQUIRED FOR COMPLETION OF WORK TO BE INCLUDED AS PART OF THE BID.
21. EXPENSES FOR TEMPORARY UTILITIES AND SERVICES REQUIRED FOR COMPLETION OF WORK TO BE INCLUDED AS PART OF THE BID.
22. EXPENSES FOR LEGAL OFF-SITE DISPOSAL OF SURPLUS MATERIAL AND DEBRIS TO BE INCLUDED AS PART OF THE BID.

ABBREVIATIONS

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
∠	ANGLE	MAX.	MAXIMUM
°	DEGREE	MFG.	MANUFACTURER
ϕ	DIAMETER	MIN.	MINIMUM
±	PLUS / MINUS	N.G.	NATURAL GRADE
ALT.	ALTERNATE	N.I.C.	NOT IN CONTRACT
APPROX.	APPROXIMATE	O.C.	ON CENTER
ASSY.	ASSEMBLY	O.C.E.W.	ON CENTER EACH WAY
B.L.	BUILDING LINE	O.D.	OUTSIDE DIAMETER
BLDG.	BUILDING	P.A.	PLANTING AREA
B.O.C.	BACK OF CURB	P.L.	PROPERTY LINE
B.R.	BOTTOM OF RAMP	P.O.B.	POINT OF BEGINNING
B.S.	BOTTOM OF STEP	P.O.T.	POINT OF TANGENCY
B.W.	BOTTOM OF WALL	PROP.	PROPOSED
C.J.	CONTROL JOINT	PVC	POLYVINYL CHLORIDE
CL	CENTERLINE	R.	RADIUS
CMU	CONCRETE MASONRY UNIT	REF.	REFERENCE
d	DEGREE	REINF.	REINFORCING / REINFORCED
DIA.	DIAMETER	RIM	RIM ELEVATION
DEMO.	DEMOLISH / DEMOLITION	R.O.W.	RIGHT OF WAY
DWG	DRAWING	S.S.	STAINLESS STEEL
DWGS	DRAWINGS	S.S.E.J.	SUBSURFACE EXPANSION JOINT
E.G.	EXISTING GRADE	SIM.	SIMLIAR
E.J.	EXPANSION JOINT	SSWR	SANITARY SEWER
ELEV.	ELEVATION	STRM	STORM SEWER
EQ.	EQUAL	SYN.	SYNTHETIC
ESMT	EASEMENT	TAN.	TANGENT
EXT.	EXTERIOR	T.B.D.	TO BE DETERMINED
EXIST.	EXISTING	T.C.	TOP OF CURB
F.F.E.	FINISHED FLOOR ELEVATION	T.F.	TOP OF FOOTING
F.G.	FINISHED GRADE	T.R.	TOP OF RAMP
F.L.	FLOW LINE	T.S.	TOP OF STEP
F.O.C.	FACE OF CURB	T.W.	TOP OF WALL
F.S.	FINISHED SURFACE	TY.	TYPE
FIN.	FINISH	TYP.	TYPICAL
GA.	GAUGE	U.N.O.	UNLESS NOTED OTHERWISE
GALV.	GALVANIZED	VAR.	VARIATION / VARIES
H.P.	HIGH POINT	W..M.	WELDED WIRE MESH
I.D.	INTERIOR DIAMETER	W.	WITH
I.E.	INVERT ELEVATION	W.L.	WATER LEVEL
INT.	INTERIOR	W.N.	WITHIN
L.P.	LOW POINT	W.S.E.	WATER SURFACE ELEVATION
LAND. ARCH.	LANDSCAPE ARCHITECT	W.T.	WITHOUT

LAYOUT NOTES

1. LAYOUT AND VERIFY DIMENSIONS PRIOR TO CONSTRUCTION. BRING DISCREPANCIES TO THE ATTENTION OF THE LANDSCAPE ARCHITECT.H
2. WHERE DIMENSIONS ARE CALLED "EQUAL", SPACE REFERENCED ITEMS EQUALLY, MEASURED TO A CONSISTENT EDGE.
3. MEASUREMENTS ARE TO FACE OF BUILDING, WALL OR THE FIXED SITE IMPROVEMENT. DIMENSIONS TO CENTER LINES IS AS INDICATED.
4. INSTALL INTERSECTING ELEMENTS AT 90 DEGREE ANGLES TO EACH OTHER UNLESS OTHERWISE NOTED.
5. PROVIDE EXPANSION JOINTS WHERE CONCRETE FLATWORK MEETS VERTICAL STRUCTURES SUCH AS WALLS, CURBS, STEPS AND BUILDING ELEMENTS.
6. ALL WALKWAYS SHALL BE LOCATED FROM FINISHED FACE OF BUILDINGS.

ANNOTATION SYMBOLS

SYMBOL	DESCRIPTION
TEXT NOTE	TEXT LEADER
A00	MATERIAL, FURNISHING, FIXTURE, EQUIPMENT, KEYNOTE INDICATOR
GS	TREE TYPE CALLOUT LABEL
GS	SHRUB / GROUNDCOVER TYPE CALLOUT LABEL
RE: L0000	VIEW REFERENCE AREA WITH SHEET CALLOUT LABEL
00 / L0000	VIEW REFERENCE AREA WITH VIEW CALLOUT LABEL
00 / L0000	ELEVATION VIEW CALLOUT LABEL
00 / L0000	SECTION VIEW CALLOUT
MATCHLINE, RE: L0000	MATCH LINE ℄ LABEL
L.O.C.	LIMIT OF CONSTRUCTION LINE ℄ LABEL
00.00	PROPOSED SPOT GRADE
00.00	EXISTING SPOT GRADE
0.0%	SLOPE / FLOW LABEL
000	EXISTING CONTOUR ℄ LABEL
000	PROPOSED CONTOUR ℄ LABEL

	SWALE FLOW LINE
	CENTER LINE ℄ LABEL
0'-0"	LINEAR DIMENSION
00.00°	ANGULAR DIMENSION
R0'-0" ϕ0'-0"	RADIUS ℄ DIAMETER DIMENSIONS WITH CENTER MARK
	BREAK LINE
W.S.E. 000.00	WATER SURFACE ELEVATION
P.O.B. N/S = 00000.00 E/W = 00000.00	DATUM POINT LABEL
GROUND FLOOR FFE = 000.00 / FINISHED GRADE 000.00	DATUM PLANE LABEL
FFE	FINISHED FLOOR ELEVATION
FG	FINISHED GRADE ELEVATION
TP	TOP OF PAVEMENT ELEVATION
TW	TOP OF WALL ELEVATION
TB	TOP OF BENCH ELEVATION
GB	GRADE BREAK

GRADING AND DRAINAGE NOTES

1. EXISTING UNDERGROUND UTILITIES ARE SHOWN PER AVAILABLE RECORDS. CONTRACTOR TO VERIFY THE ACTUAL LOCATION AND ELEVATION IN THE FIELD PRIOR TO COMMENCEMENT OF CONSTRUCTION THE NEW FACILITIES. CONTRACTOR TO PROTECT EXISTING UTILITIES. THE CONTRACTOR BEARS FULL RESPONSIBILITY FOR THIS WORK AND DISRUPTION OF DAMAGE TO UTILITIES SHALL BE REPAIRED IMMEDIATELY AT NO EXPENSE TO THE OWNER.
2. REQUEST INSPECTION AS REQUIRED 48 HOURS IN ADVANCE OF PERFORMING ANY WORK UNLESS OTHERWISE NOTED ON THIS SHEET.
3. DEBRIS CREATED BY REMOVAL OPERATIONS BECOME THE PROPERTY OF THE CONTRACTOR AND IS TO BE LEGALLY DISPOSED OF AWAY FROM THE SITE.
4. NOTIFY LOCAL UNDERGROUND SERVICE COMPANIES FOR UTILITY FINDS AND MARKINGS 48 HOURS PRIOR TO ANY EXCAVATION.
5. REFER TO CIVIL ENGINEER'S DRAWINGS FOR ALL PIPING AND TIE-INS.
6. ENSURE POSITIVE DRAINAGE IN ALL PLANTING AREAS AND PAVING. REVISE ANY AREAS WHERE STANDING WATER OCCURS.

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15985

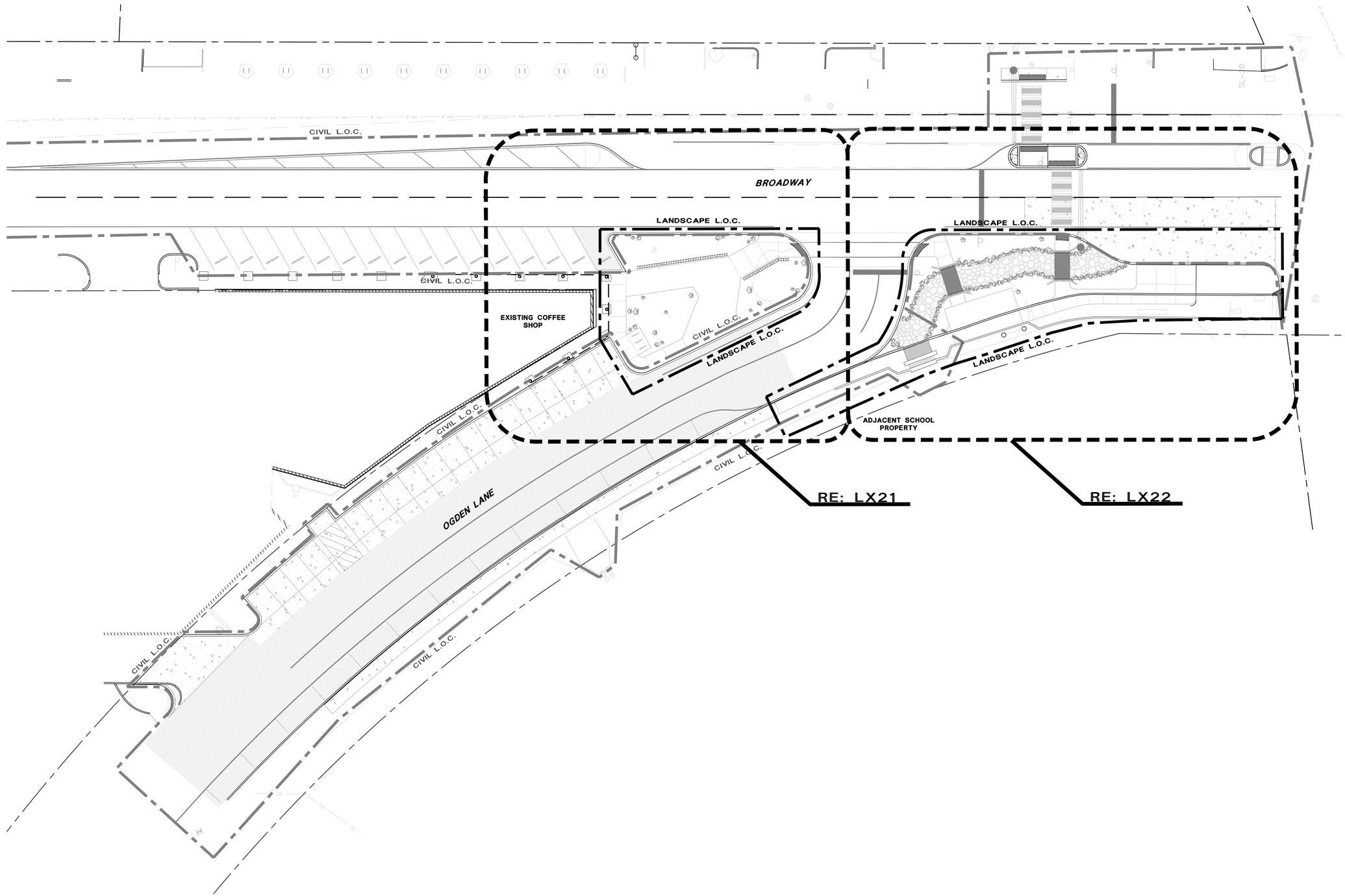
REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KERSHNER
3109
01/30/2026

GENERAL NOTES AND LEGEND

BROADWAY & OGDEN LN. INTERSECTION PLANS

L002

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L0 General\S23362-L0001.dwg | ANSI A (8.50 X 11.00 Inches)



1 OVERALL REFERENCE PLAN

Plan

SCALE: 1"=20' NORTH

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15065

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KENNEDY
5108
01/30/2026

OVERALL REFERENCE PLAN

BROADWAY & OGDEN LN. INTERSECTION PLANS

L011

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L0 General\S23362-L0001.dwg | ANSI A (8.50 X 11.00 Inches)

TREE INVENTORY

#	Species	Tree Protection Treatment (TPT)	Understory Species* 5.0" - 11.5"		Significant Tree 6" - 23.5"		Significant Tree** 10.0" - 23.5"		Heritage 3:1		Heritage 1:1		Additional Inches Preserved for Mitigation ***	Not Protected Trees	Notes
			Removed	Preserved	Removed	Preserved	Removed	Preserved	Removed	Preserved	Removed	Preserved	Preserved	Removed	
11140	OAK	**Protect**						19							
001	OAK	**Protect**						11							Field Verified; Trees are not tagged in the field
002	OAK	**Protect**						33		33					Field Verified; Trees are not tagged in the field
003	OAK	**Protect**								34					Field Verified; Trees are not tagged in the field
004	OAK	**Protect**						16							Field Verified; Trees are not tagged in the field
005	MESQUITE	**Protect**										38			Field Verified; Trees are not tagged in the field
Sub. Tot. Inches:			0	0	0	0	0	79	0	67	0	38	0	0	
Total inches by category:				0		0		79		67		38		0	
Preservation percentage:		**Understory Preservation (%)**	#DIV/0!		**Significant Preservation (%)**		100%		**Heritage Preservation (%)**		100%		0		
	Mitigation required (Commercial) :		0		**Commercial (inches)**		-47.4		**Heritage Mitigation (inches)**		0				
									TOTAL MITIGATION REQUIRED (inches)				**-44.4**		
									TOTAL PRESERVATION (%)				**100%**		

No category to fall below 20% preservation;

Preserved- Tree to remain that meets root protection zone requirements described in section 35-523 of the UDC.

100% preservation of heritage trees are required. If not met, must mitigate at 3:1 ratio, unless listed below as small species.

40% preservation required of significant trees are required. If not met, must mitigate at 1:1 ratio.

** Small species: Condalia, Redbud, Tx. Mountain Laurel, Tx. Persimmon, Hawthorn, Possumhaw, Palms - these are mitigated at 1:1 for Heritage Trees*

*** Ashe Juniper, Huisache, Mesquite, Arizona Ash, Hackberry protected at 10" dbh and mitigated at 1:1 for heritage trees*

**** Additionaly Preserved Inches for Mitigation Trees: Unprotected-sized trees to be used for mitigation calculations; subtract inches from mitigation owed*

TREE MITIGATION

TOTAL MITIGATION REQUIRED	**-44.4**
PROPOSED TREE MITIGATION (1.5"/TREE REMOVED FOR LANDSCAPE ORDINANCE REQUIREMENTS)	

COUNT	SIZE (INCHES)	SPECIES	INCHES PER SPECIES
1	6.0	LIVE OAK	4.5
2	5	MEXICAN WHITE OAK	7.0
3	5.0	CHINQUAPIN OAK	10.5
3	2.0	TEXAS REDBUD	1.5
5	2.0	TEXAS MOUNTAIN LAUREL	2.5
TOTAL MITIGATION INCHES PLANTED			**26.0**

FINAL TREE CANOPY COVER

Developments of all sites must provide a minimum final tree canopy cover as listed below for the entire gross project area outside the regulatory floodplain.

A. Single Family Residential: 38%
B. Multi-Family and Non-Residential: 25%
C. CRAG Area: 15%

TOTAL SITE AREA (SF)	**49,693.0**
TOTAL TREE CANOPY REQUIRED IS 25%	**12,423.3**
TOTAL TREE CANOPY PROVIDED (EXISTING AND PROPOSED)	**12,700.0**

EXISTING TREE CANOPY (WITHIN PROPERTY BOUNDARY)

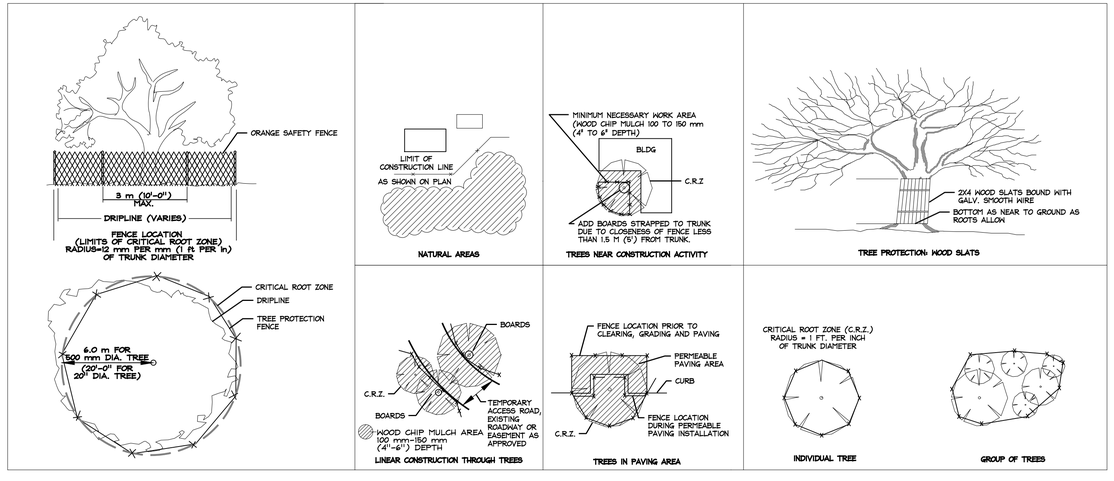
QUANTITY	TREE TYPE	TREE CANOPY (SF)	TOTAL
6	LIVE OAK	875.0	**5,250.0**
TOTAL EXISTING TREE CANOPY (WITHIN PROPERTY BOUNDARY)			**5,250.0**

PROPOSED TREE CANOPY (WITHIN PROPERTY BOUNDARY)

QUANTITY	TREE TYPE	TREE CANOPY (SF)	TOTAL
1	LIVE OAK	875.0	**875.0**
2	MEXICAN WHITE OAK	875.0	**1,750.0**
3	CHINQUAPIN OAK	875.0	**2,625.0**
3	TEXAS REDBUD	275.0	**825.0**
5	TEXAS MOUNTAIN LAUREL	275.0	**1,375.0**
TOTAL PROPOSED TREE CANOPY (WITHIN PROPERTY BOUNDARY)			**7,450.0**
TOTAL PROPOSED TREE CANOPY			**7,450.0**

TREE PROTECTION NOTES

1. ALL TREES SHOWN AS PROTECTED ARE TO BE RETAINED AND SHALL BE PROTECTED DURING CONSTRUCTION WITH TEMPORARY FENCING.
2. TREE PROTECTION FENCES SHALL BE ERECTED AS SHOWN IN THE DOCUMENT DETAILS.
3. TREE PROTECTION FENCES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITE PREPARATION WORK (DEMOLITION, CLEARING, GRUBBING OR GRADING), AND SHALL BE MAINTAINED THROUGHOUT ALL PHASES OF THE CONSTRUCTION PROJECT.
4. FENCES SHALL COMPLETELY SURROUND THE TREE OR CLUSTERS OF TREES UNLESS NOTED OTHERWISE AND SHALL BE LOCATED AT THE OUTERMOST LIMITS OF THE TREE BRANCHES (DRIPLINE) UNLESS NOTED OTHERWISE. FENCES SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROJECT IN ORDER TO PREVENT THE FOLLOWING:
   - 4.1. SOIL COMPACTION IN THE ROOT ZONE AREA RESULTING FROM VEHICULAR TRAFFIC OR STORAGE OF EQUIPMENT OR MATERIALS.
   - 4.2. ROOT ZONE DISTURBANCES DUE TO GRADE CHANGES (GREATER THAN 2 INCHES CUT OR FILL) OR TRENCHING NOT REVIEWED AND AUTHORIZED BY THE CITY ARBORIST.
   - 4.3. WOUNDS TO EXPOSED ROOTS, TRUNK OR LIMBS BY MECHANICAL EQUIPMENT.
   - 4.4. OTHER ACTIVITIES DETRIMENTAL TO TREES SUCH AS CHEMICAL STORAGE, CONCRETE TRUCK CLEANING, AND FIRES.
5. EXCEPTIONS TO INSTALLING FENCES AT TREE DRIPLINES MAY BE PERMITTED IN THE FOLLOWING CASES:
   - 5.1. WHERE TREES ARE CLOSE TO PROPOSED BUILDINGS, ERECT THE FENCE NO CLOSER THAN 6 FEET TO THE BUILDING.
   - 5.2. WHERE THERE ARE SEVERE SPACE CONSTRAINTS DUE TO TRACT SIZE, OR OTHER SPECIAL REQUIREMENTS, CONTACT A CERTIFIED ARBORIST TO DISCUSS ALTERNATIVES.
6. WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN A FENCE THAT IS CLOSER THAN 4 FEET TO A TREE TRUNK, PROTECT THE TRUNK WITH STRAPPED-ON PLANKING TO A HEIGHT OF 8 FEET IN ADDITION TO THE REDUCED FENCING PROVIDED.
7. WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN AREAS OF UNPROTECTED ROOT ZONES (UNDER DRIPLINES) THOSE AREAS SHOULD BE COVERED WITH 4 INCHES OF ORGANIC MULCH OR GRAVEL TO MINIMIZE SOIL COMPACTION.
8. ALL GRADING WITHIN PROTECTED ROOT ZONE AREAS SHALL BE DONE BY HAND OR WITH SMALL EQUIPMENT TO MINIMIZE ROOT DAMAGE. PRIOR TO GRADING, RELOCATE PROTECTIVE FENCING TO 2 FEET BEHIND THE GRADE CHANGE AREA.
9. ANY ROOTS EXPOSED BY CONSTRUCTION ACTIVITY SHALL BE PRUNED FLUSH WITH THE SOIL. BACKFILL ROOT AREAS WITH SPECIFIED PLANTING SOIL AS SOON AS POSSIBLE. IF EXPOSED ROOT AREAS ARE NOT BACKFILLED WITHIN 4 HOURS, COVER THEM WITH ORGANIC MATERIAL IN A MANNER WHICH REDUCES SOIL TEMPERATURE AND MINIMIZES WATER LOSS DUE TO EVAPORATION.
10. PRIOR TO EXCAVATION OR GRADE CUTTING WITHIN TREE DRIPLINES, A CLEAN CUT SHALL BE MADE BETWEEN THE DISTURBED AND UNDISTURBED ROOT ZONES WITH A ROCK SAW OR SIMILAR EQUIPMENT TO MINIMIZE DAMAGE TO REMAINING ROOTS.
11. TREES IMPACTED BY CONSTRUCTION ACTIVITIES WILL BE WATERED DEEPLY ONCE A WEEK DURING PERIODS OF HOT, DRY WEATHER. TREE CROWNS ARE TO BE SPRAYED WITH WATER MONTHLY TO REDUCE DUST ACCUMULATION ON THE LEAVES.
12. NO FILL MATERIAL GREATER THAN 2 INCHES SHALL BE PERMITTED WITHIN THE DRIPLINE OF TREES. NO SOIL IS PERMITTED ON THE ROOT FLARE OF ANY TREE.
13. PRUNING TO PROVIDE CLEARANCE FOR STRUCTURES, VEHICULAR TRAFFIC AND CONSTRUCTION EQUIPMENT SHALL TAKE PLACE BEFORE CONSTRUCTION BEGINS (BEFORE DAMAGE OCCURS). ALL FINISHED PRUNING MUST BE DONE ACCORDING TO RECOGNIZED, APPROVED STANDARDS OF THE INDUSTRY. REFERENCE THE NATIONAL ARBORIST ASSOCIATION PRUNING STANDARDS FOR SHADE TREES, CLASS IV OF PRUNING. CONTRACTOR MUST NOTIFY LANDSCAPE ARCHITECT AND OWNER PRIOR TO PROCEEDING.
14. ALL WOUNDS WHICH OCCUR TO OAK TREE TRUNKS AND LIMBS MUST BE REPAIRED WITHIN 24 HOURS OF OCCURRENCE BY BARK TRACING TO REMOVE DAMAGED WOOD AND BARK AND THOROUGHLY SEALED WITH AN ACCEPTABLE TREE WOUND DRESSING. THIS SPECIFICALLY APPLIES TO WOUNDS CREATED BY CONSTRUCTION VEHICLES AND EQUIPMENT. DO NOT PAINT SEALANTS TO WOUNDS, EXCEPT FOR OAK WILT PREVENTION, OR AS DIRECTED BY AN ARBORIST.
15. REFERENCE CIVIL DRAWINGS FOR ALL SITE PREPARATION INCLUDING CLEARING, GRUBBING, AND FULL TREE REMOVAL SCHEDULE.



1 TREE PROTECTION DETAILS

NOT TO SCALE

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE., SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15985

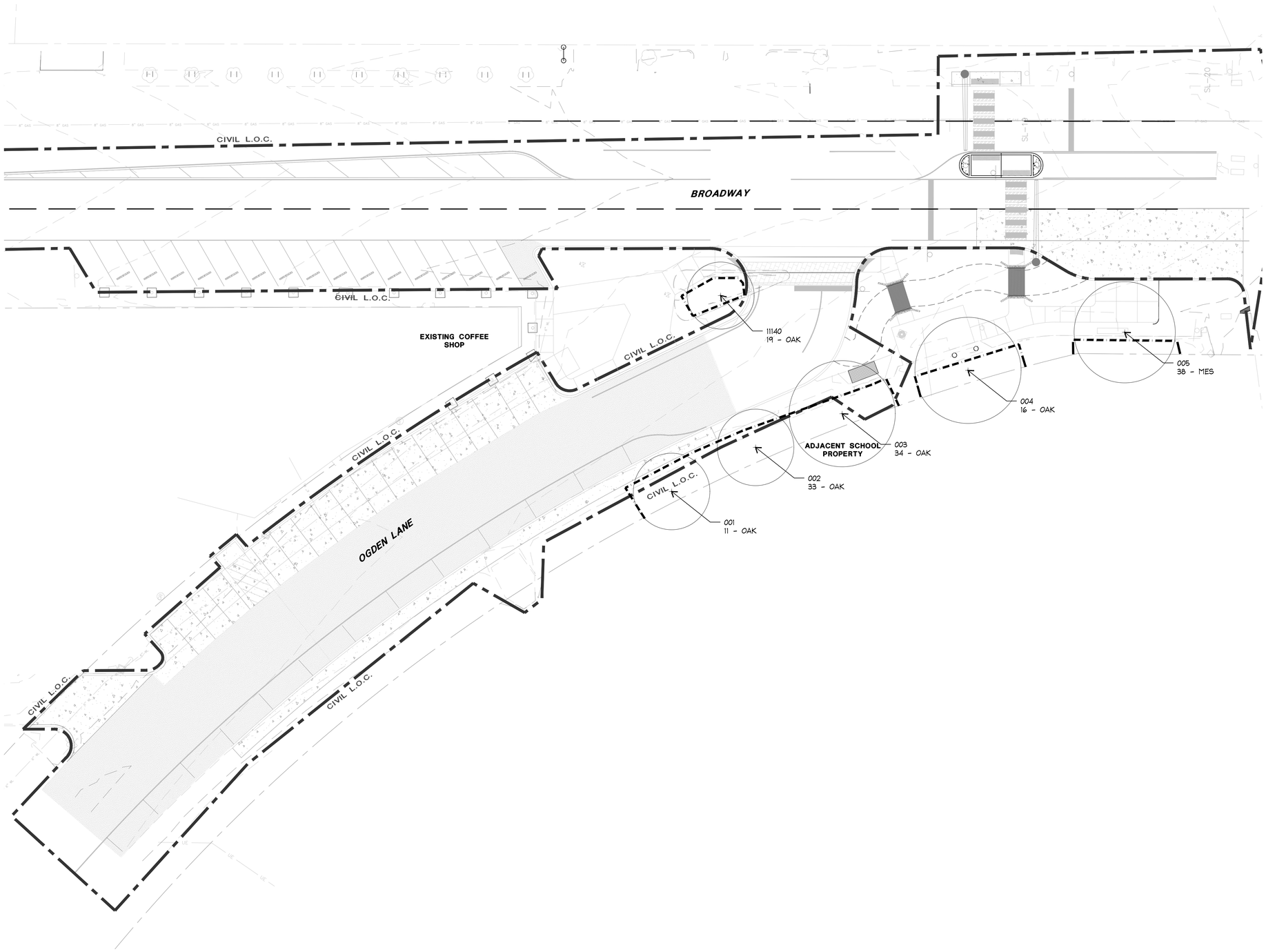
REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE HENDRIX
STATE OF TEXAS
3109
01/30/2026

TREE PROTECTION NOTES AND DETAILS

BROADWAY & OGDEN LN. INTERSECTION PLANS

L101

P:\is23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L1 Tree Protection\L111 Tree Protection Plan.dwg | ANSI A (8.50 X 11.00 Inches)



TREE PROTECTION LEGEND

SYMBOL	DESCRIPTION
TREE PROTECTION	
TAG NO. SIZE - TYPE	EXISTING TREE TO REMAIN, PRESERVE AND PROTECT, TYP.
TAG NO. SIZE - TYPE	EXISTING TREE TO BE REMOVED, TYP.
	6' TREE PROTECTION CHAIN LINK FENCE

TREES 001-005 ARE FIELD VERIFIED; TREES ARE NOT TAGGED IN THE FIELD

1 TREE PROTECTION PLAN

Plan

0' 10' 20' 40'
SCALE: 1"=20' NORTH

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE., SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15865

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KENNEDY
3109
STATE OF TEXAS
01/30/2026

TREE PROTECTION PLAN

BROADWAY & OGDEN LN. INTERSECTION PLANS

L111

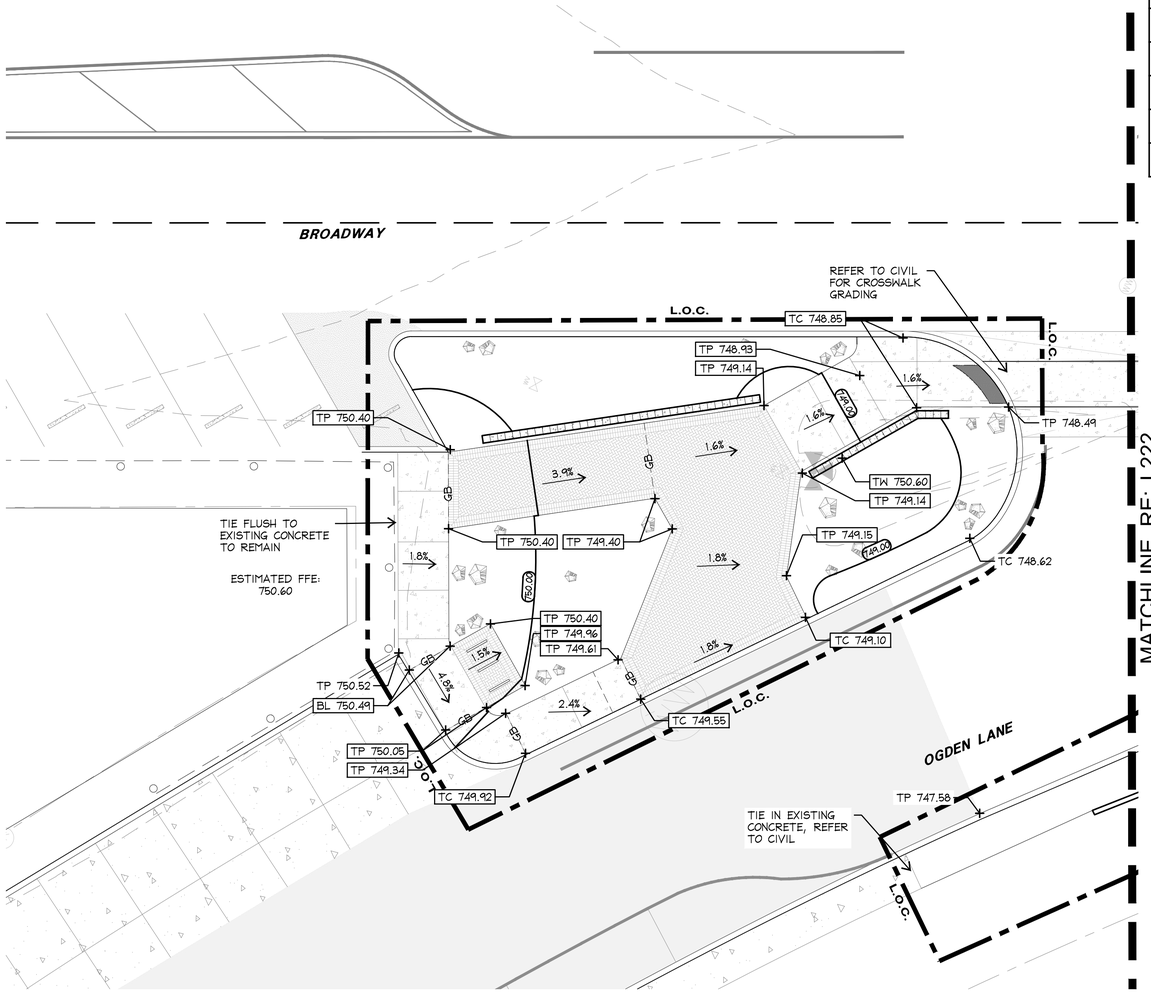
P:\s223362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L1 Tree Protection\L111 Tree Protection Plan.dwg | ANSI A (8.50 X 11.00 Inches)

GRADING & DRAINAGE SYMBOLS

SYMBOL	DESCRIPTION
%	SLOPE ARROW
	SWALE FLOW LINE
000	EXISTING CONTOUR
000	PROPOSED CONTOUR
00.00	EXISTING SPOT GRADE
00.00	PROPOSED SPOT GRADE
FFE	FINISHED FLOOR ELEVATION
FG	FINISHED GRADE ELEVATION
TP	TOP OF PAVEMENT ELEVATION
TW	TOP OF WALL ELEVATION
TB	TOP OF BENCH ELEVATION
GB	GRADE BREAK

REFER TO CIVIL FOR ALL STREET, CURB, AND RAMP ELEVATIONS

CONTRACTOR TO STAKE GRADES OF ALL FLATWORK, WALKING SURFACES, AND ASSOCIATED APPURTENANCES IN FIELD FOR LANDSCAPE ARCHITECT TO REVIEW AND APPROVAL PRIOR TO INSTALLATION.



1 GRADING PLAN ENLARGEMENT

Plan

SCALE: 1"=10' NORTH

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
FIRM NO: F-15865
210.860.9334

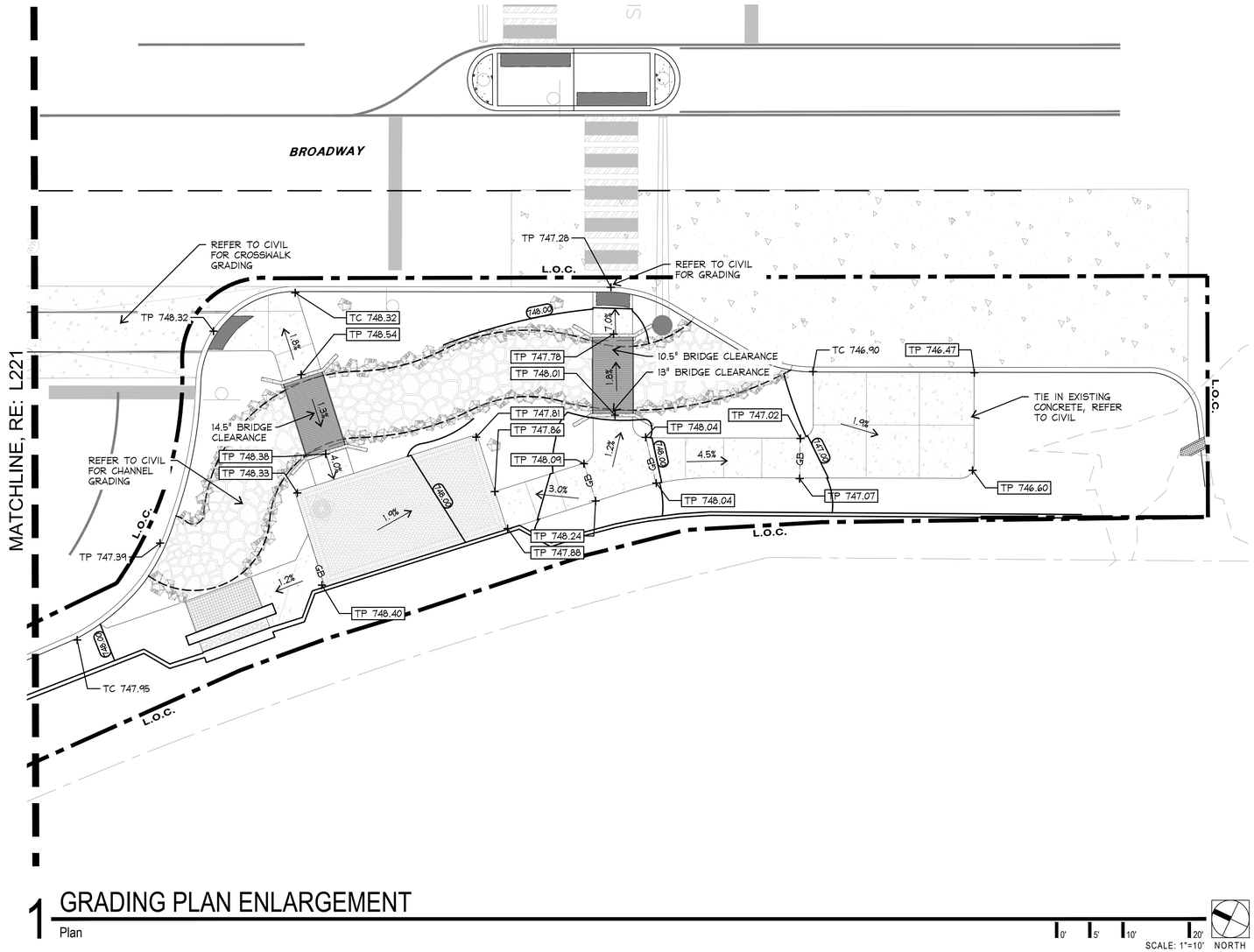
REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KERNER
STATE OF TEXAS
3109
01/30/2026

GRADING PLAN

BROADWAY & OGDEN LN. INTERSECTION PLANS

L221

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\S23362-title.dwg | ANSI A (8.50 X 11.00 Inches)



1 GRADING PLAN ENLARGEMENT

Plan

0' 5' 10' 20'

SCALE: 1"=10'

NORTH

GRADING & DRAINAGE SYMBOLS

SYMBOL	DESCRIPTION
%	SLOPE ARROW
	SWALE FLOW LINE
000	EXISTING CONTOUR
000	PROPOSED CONTOUR
00.00	EXISTING SPOT GRADE
00.00	PROPOSED SPOT GRADE
FFE	FINISHED FLOOR ELEVATION
FG	FINISHED GRADE ELEVATION
TP	TOP OF PAVEMENT ELEVATION
TW	TOP OF WALL ELEVATION
TB	TOP OF BENCH ELEVATION
GB	GRADE BREAK

REFER TO CIVIL FOR ALL STREET, CURB, AND RAMP ELEVATIONS

CONTRACTOR TO STAKE GRADES OF ALL FLATWORK, WALKING SURFACES, AND ASSOCIATED APPURTENANCES IN FIELD FOR LANDSCAPE ARCHITECT TO REVIEW AND APPROVAL PRIOR TO INSTALLATION.

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE., SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15865

REGISTERED LANDSCAPE ARCHITECT
SARAH LAINE KORNEGAY
3109
01/30/2026

GRADING PLAN

BROADWAY & OGDEN LN. INTERSECTION PLANS

L222

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L2 Grading\L211 Grading Plan.dwg | ANSI A (8.50 X 11.00 Inches)

HARDSCAPE SCHEDULE

MARK	DETAIL	DESCRIPTION	SIZE	COLOR	FINISH	CONTACT	REMARKS
PAVING (P)							
P01	1 / L331	CONCRETE PAVING	N/A	STANDARD GRAY	MEDIUM ROCK SALT	LOCAL SOURCE	PROVIDE A MOCK UP FOR LANDSCAPE ARCHITECT REVIEW AND APPROVAL. REFERENCE SPECIFICATIONS FOR ADDITIONAL SUBMITTAL REQUIREMENTS
P02	3 / L331	UNIT PAVING OPTION 1 PRODUCT: INVISI-LUG PAVER	4" X 8" X 2-1/4"	COPPERTONE	STANDARD	COMPANY: ENDICOTT WEBSITE: WWW.EDICOTT.COM CONTACT: ERIN LYNCH EMAIL: ERIN@UPCHURCHKIMBROUGH.COM PHONE: (512) 560-7988	PROVIDE PRICE FOR BOTH PAVING OPTIONS. FINAL PAVER CHOICE PENDING OWNERS DIRECTION. REFERENCE SPECIFICATIONS FOR SUBMITTAL REQUIREMENTS. INSTALL USING LATEX MODIFIED MORTAR, REFERENCE DETAIL
P02	3 / L331	UNIT PAVING OPTION 2 PRODUCT: HOLLAND 60MM	3.94" X 7.87" X 2.36"	CUSTOM COLOR MATCH TO EDICOTT'S COPPERTONE	STANDARD	COMPANY: KEYSTONE HARDSCAPES CONTACT: DAVE HASNESS EMAIL: DHASNESS@KEYSTONEHARDSCAPE.COM PHONE: (512) 787-1247	PROVIDE PRICE FOR BOTH PAVING OPTIONS. FINAL PAVER CHOICE PENDING OWNERS DIRECTION. REFERENCE SPECIFICATIONS FOR SUBMITTAL REQUIREMENTS. INSTALL USING LATEX MODIFIED MORTAR, REFERENCE DETAIL
P03	1 / L332	LIMESTONE BOULDER BANK PAVING SKU: 271424 TYPE II MEDIUM DENSITY	ROCK SIZE VARIES, REF. PLANS AND DETAILS	STANDARD	STANDARD	COMPANY: WHITTLESEY LANDSCAPE SUPPLIES WEBSITE: 989ROCK.COM (OR APPROVED ALTERNATE)	PROVIDE A MOCK UP FOR LANDSCAPE ARCHITECT REVIEW AND APPROVAL. REFERENCE SPECIFICATIONS FOR ADDITIONAL SUBMITTAL REQUIREMENTS. INSTALL USING LATEX MODIFIED MORTAR, REFERENCE DETAIL
P04	1 / L332	FLAGSTONE PAVERS PRODUCT: OKLAHOMA HICKORY FAMILY PATIO SKU: 272917	2" THICK	HICKORY	STANDARD		
P05	2 / L331	GRAVEL MULCH SKU: 211554	1-2"	SANTA FE	STANDARD		REFERENCE SPECIFICATIONS FOR SUBMITTAL REQUIREMENTS.
WALLS (W)							
W01	4 / L331	RETAINING SEAT WALL; CONCRETE MASONRY UNIT PLASTER: SIKAWALL -421 ALTO CAP: CHAPEL STONE	PLASTER: N/A CAP: 12" X 12" X 3"	PLASTER: LUNA CAP : TAN BLEND	PLASTER: CLASSIC CAP: STANDARD	PLASTER SUPPLIER: SIKA WEBSITE: USA.SIKA.COM CAP SUPPLIER: HANOVER ARCHITECTURAL SUPPLIES WEBSITE: WWW.HANOVERPAVERS.COM	REFERENCE SPECIFICATIONS FOR SUBMITTAL REQUIREMENTS.
W02	5 / L331	FREESTANDING SEAT WALL; CONCRETE MASONRY UNIT PLASTER: SIKAWALL -421 ALTO CAP: CHAPEL STONE					
SITE FEATURES (S)							
S01	2 / L332	RAW STEEL BRIDGE, CUSTOM FABRICATION RAW STEEL STEEL STRINGER AND FRAME CARBON STEEL BAR GRATING WALKING SURFACE BAR GRATING PRODUCT #: GCM-1-150	REF. DETAILS	N/A	N/A	STRINGER + FRAME: LOCAL SOURCE GRATE: MCNICHOLS WEBSITE: WWW.MCNICHOLS.COM FINISH: SHERWIN WILLIAMS WEBSITE: WWW.SHERWIN-WILLIAMS.COM	REFERENCE SPECIFICATIONS FOR SUBMITTAL REQUIREMENTS.
S02	1 / L333	BIKE RACK PRODUCT: BØY	N/A	RAL 8001 - OCHRE BROWN	POWDERCOAT	COMPANY: VESTRE WEBSITE: WWW.VESTRE.COM	REFERENCE SPECIFICATION FOR SUBMITTAL REQUIREMENTS
S03	2 / L333	LIMESTONE BOULDER SKU: 271424	MIN. 24", MAX. 48" IN ANY DIRECTION	N/A	N/A	COMPANY: WHITTLESEY LANDSCAPE SUPPLIES WEBSITE: 989ROCK.COM (OR APPROVED ALTERNATE)	REFERENCE SPECIFICATION FOR SUBMITTAL REQUIREMENTS

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

FIRM NO: F-15065
WGI.
WGInc.com
755 E. MULBERRY AVE., SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KOONCE
3109
01/30/2026

HARDSCAPE SCHEDULE AND NOTES

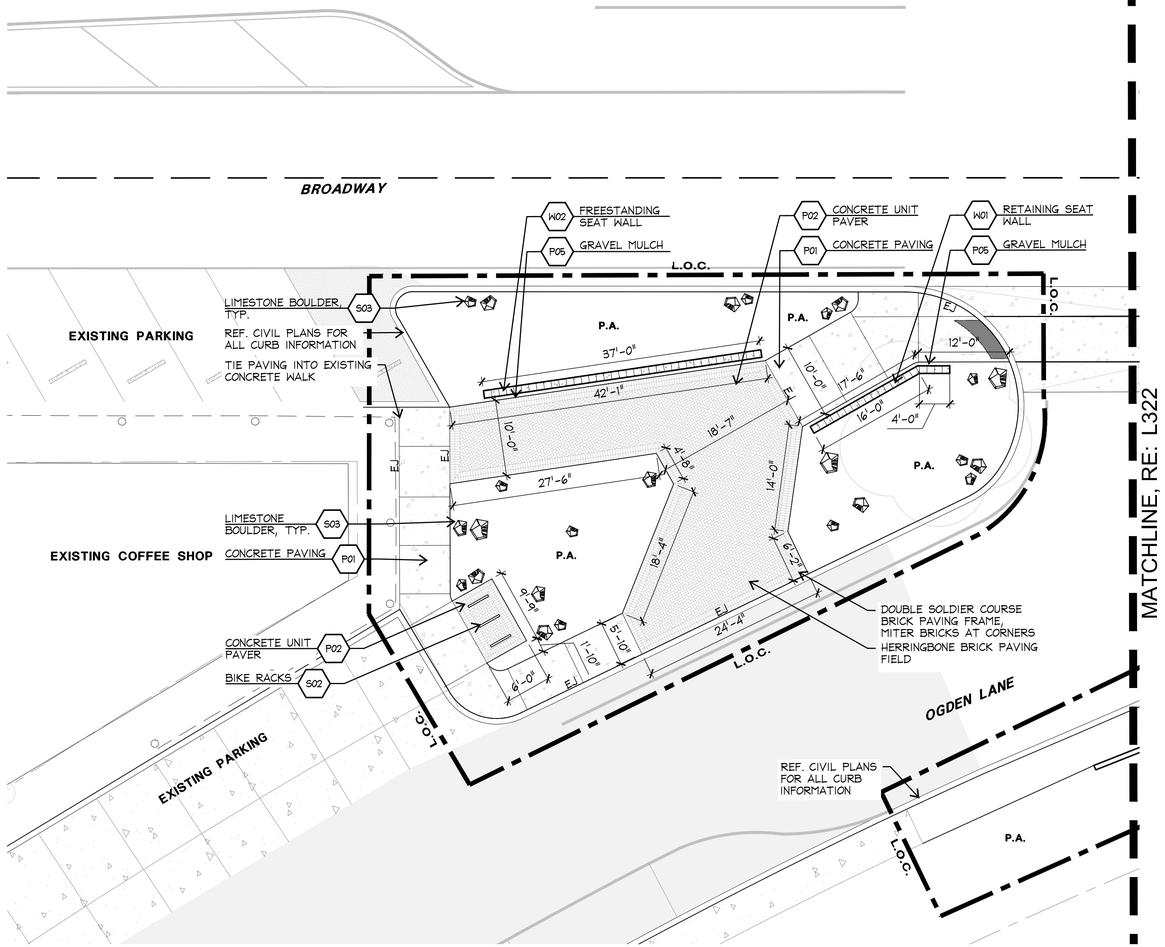
BROADWAY & OGDEN LN. INTERSECTION PLANS

L301

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\S23362-title.dwg | ANSI A (8.50 X 11.00 Inches)

HARDSCAPE LEGEND

MARK	DETAIL	DESCRIPTION
PAVING (P)		
P01	1 / L331	CONCRETE PAVING
P02	3 / L331	UNIT PAVING
P03	1 / L332	LIMESTONE BOULDER BANK PAVING
P04	1 / L332	FLAGSTONE PAVERS
P05	2 / L331	GRAVEL MULCH
WALLS (W)		
W01	4 / L331	RETAINING SEAT WALL
W02	5 / L331	FREESTANDING SEAT WALL
SITE FEATURES (S)		
S01	2 / L332	RAW STEEL BRIDGE
S02	1 / L333	BIKE RACK
S03	2 / L333	LIMESTONE BOULDER



1 HARDSCAPE PLAN ENLARGEMENT

Plan

0' 5' 10' 20'

SCALE: 1"=10' NORTH

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE., SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15865

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KARNES
3109
STATE OF TEXAS
01/30/2026

HARDSCAPE PLAN

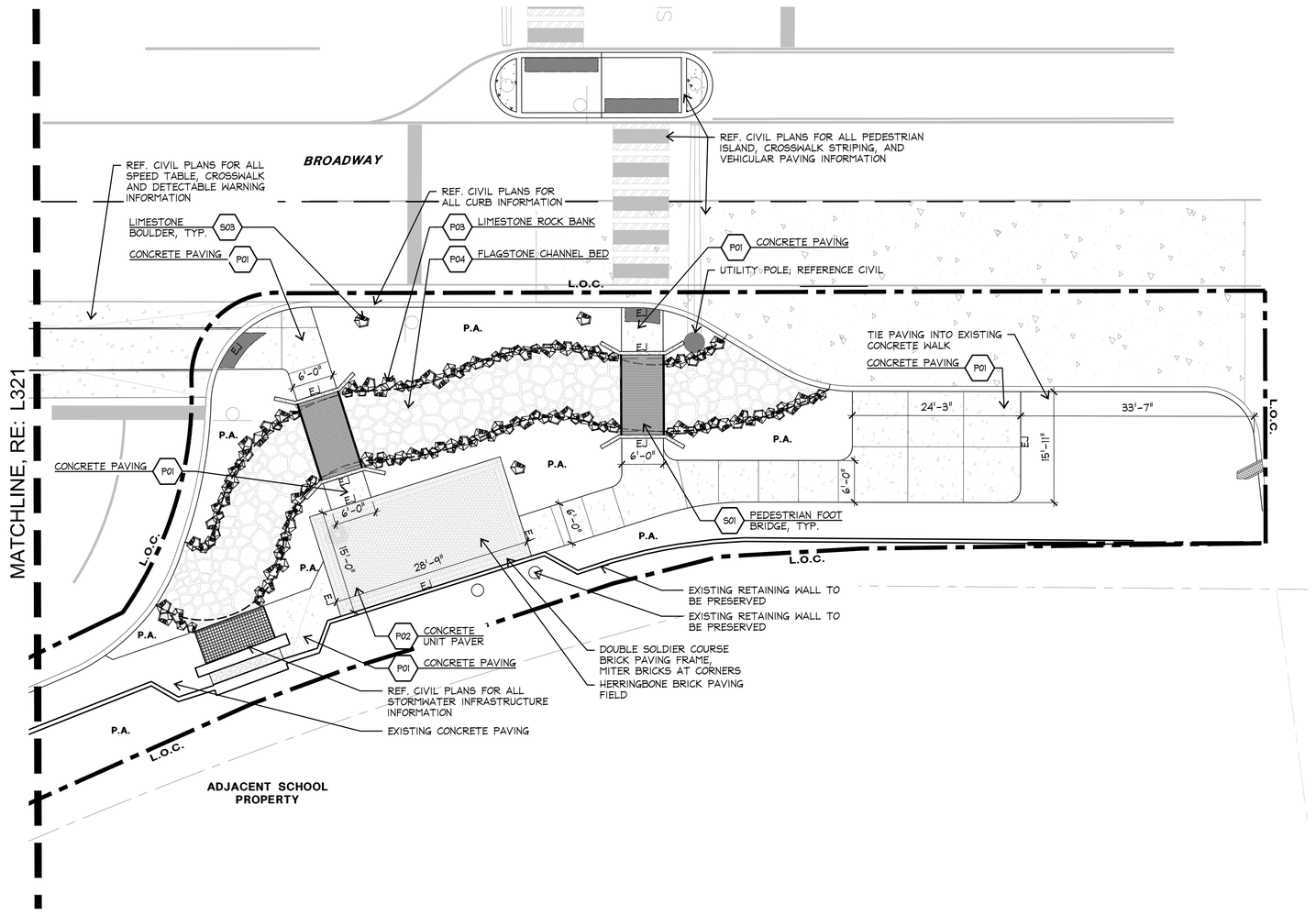
BROADWAY & OGDEN LN. INTERSECTION PLANS

L321

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L3 Site\L311 Hardscape Plan.dwg | ANSI A (8.50 X 11.00 inches)

HARDSCAPE LEGEND

MARK	DETAIL	DESCRIPTION
PAVING (P)		
P01	1 / L331	CONCRETE PAVING
P02	3 / L331	UNIT PAVING
P03	1 / L332	LIMESTONE BOULDER BANK PAVING
P04	1 / L332	FLAGSTONE PAVERS
P05	2 / L331	GRAVEL MULCH
WALLS (W)		
W01	4 / L331	RETAINING SEAT WALL
W02	5 / L331	FREESTANDING SEAT WALL
SITE FEATURES (S)		
S01	2 / L332	RAW STEEL BRIDGE
S02	1 / L333	BIKE RACK
S03	2 / L333	LIMESTONE BOULDER



1 HARDSCAPE PLAN ENLARGEMENT

Plan

SCALE: 1"=10' NORTH

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15865

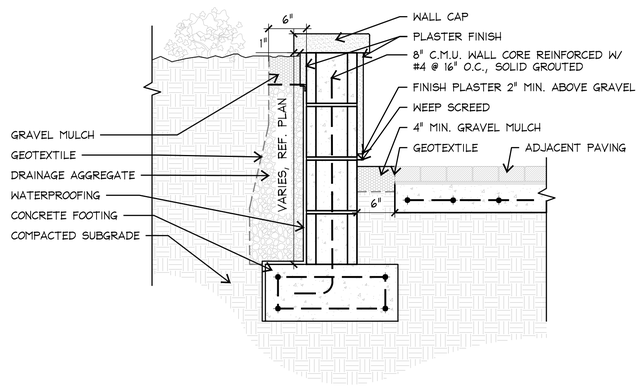
REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KENNEY
3109
01/30/2026

HARDSCAPE PLAN

BROADWAY & OGDEN LN. INTERSECTION PLANS

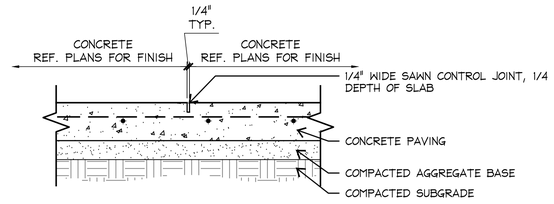
L322

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L3 Site\L311 Hardscape Plan.dwg | ANSI A (8.50 X 11.00 Inches)

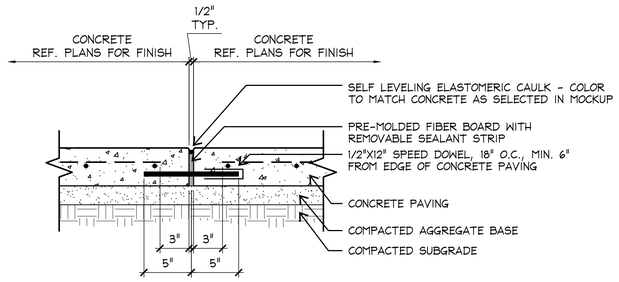


4 RETAINING SEAT WALL, TYPICAL

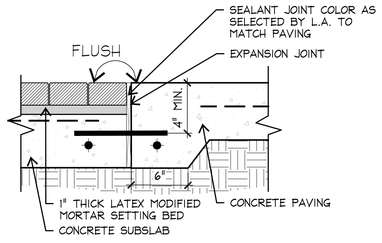
SCALE: 1"=1'-0"



D. CONTROL JOINT
SCALE: 1-1/2" = 1'

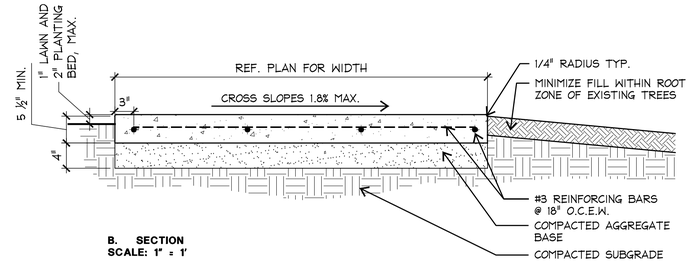


C. EXPANSION JOINT
SCALE: 1-1/2" = 1'

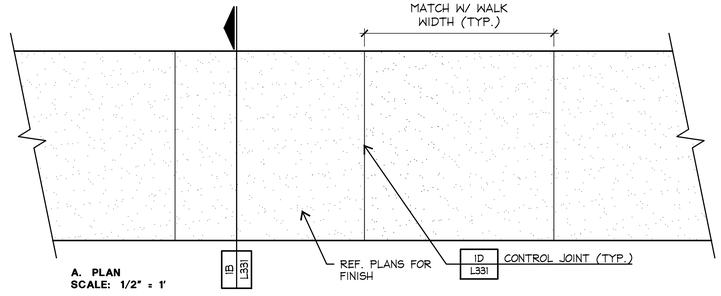


3 UNIT PAVING, TYPICAL

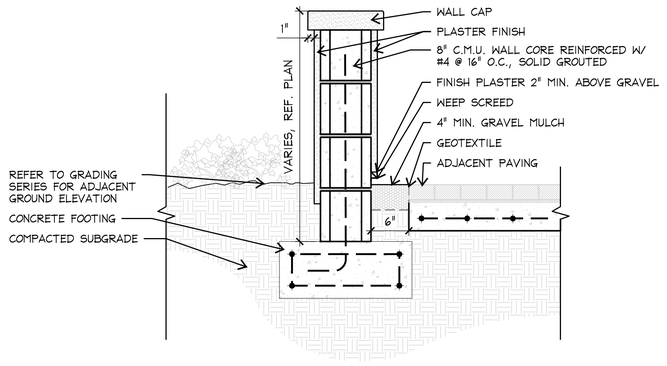
SCALE: 1-1/2"=1'-0"



B. SECTION
SCALE: 1" = 1'

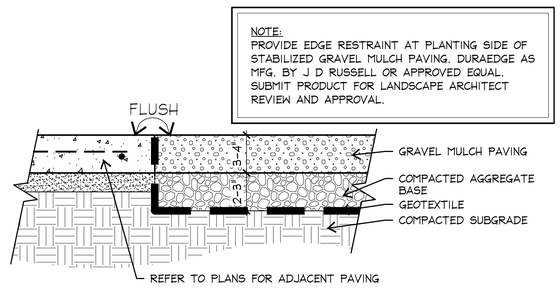


A. PLAN
SCALE: 1/2" = 1'



5 FREESTANDING SEAT WALL, TYPICAL

SCALE: 1"=1'-0"



2 GRAVEL MULCH PAVING, TYPICAL

SCALE: 1-1/2"=1'-0"

1 CONCRETE PAVING, TYPICAL

SCALE: AS SHOWN

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15985

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KARNEY
3109
STATE OF TEXAS
01/30/2026

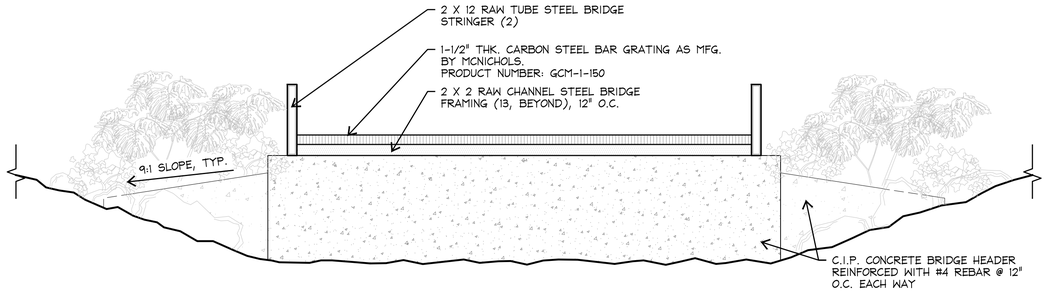
HARDSCAPE DETAILS - PAVING, WALLS, & BENCHES

BROADWAY & OGDEN LN. INTERSECTION PLANS

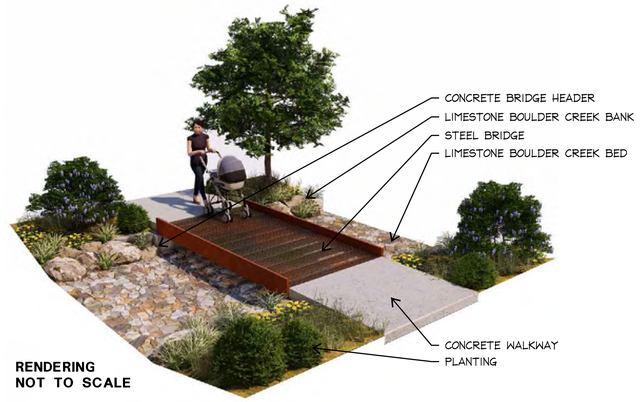
L331

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L3 Site\L332 Hardscape Details - Site Features.dwg | ANSI A (8.50 X 11.00 Inches)

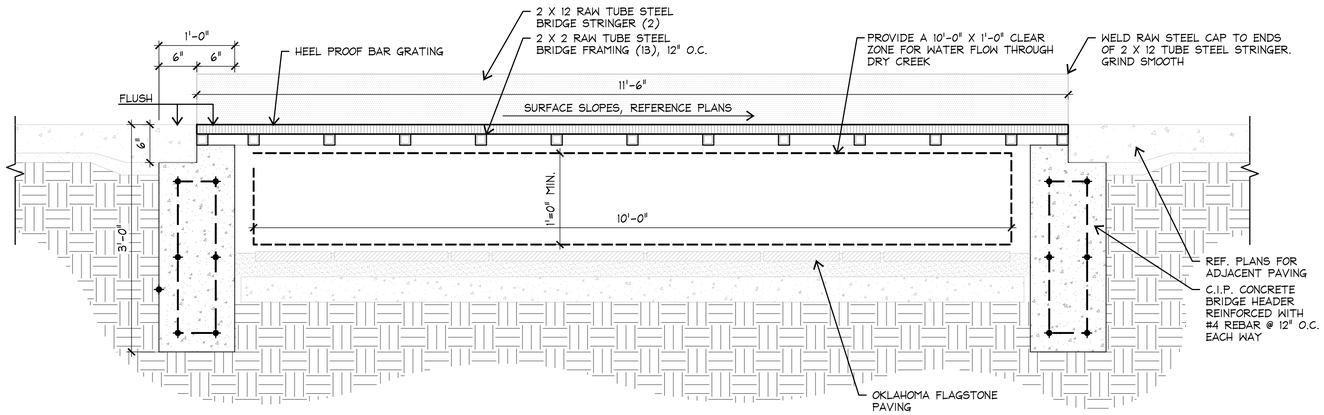
NOTES:
- **ALL STEEL SUPPORT STRUCTURE TO BE GALVANIZED. ALL STEEL CONNECTIONS TO BE WELDED SMOOTH, PRIMED, AND PAINTED.**
- **BRIDGE TO BE MECHANICALLY FASTENED TO BRIDGE HEADER BELOW.**
- **CONTRACTOR SHALL PROVIDE SHOP DRAWINGS SIGNED AND SEALED BY AND ENGINEER LICENSED WITHIN THE APPLICABLE JURISDICTION SHOWING ALL SITE CONDITIONS, FIELD MEASUREMENTS AS APPLICABLE, FABRICATION, ATTACHMENTS, REINFORCEMENTS, FOOTINGS AND MATERIALS FOR THE DESIGN ELEMENT DESCRIBED HEREIN FOR REVIEW AND APPROVAL PRIOR TO PROCUREMENT, FABRICATION, OR INSTALLATION.**



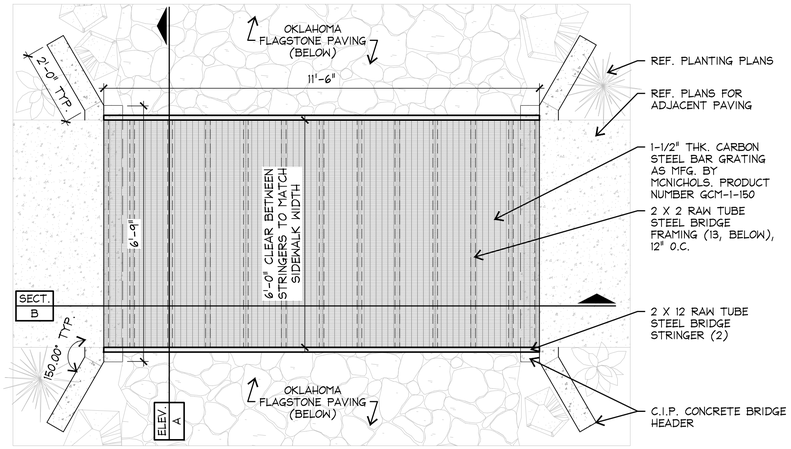
ELEVATION A
SCALE: 1" = 1'-0"



RENDERING
NOT TO SCALE



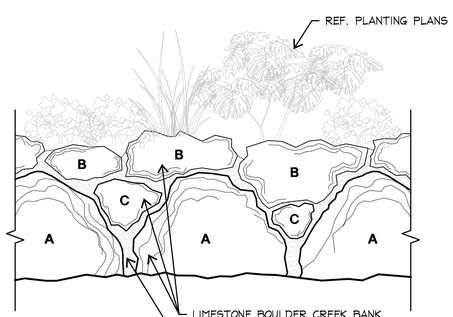
SECTION B
SCALE: 1" = 1'-0"



A. PLAN
SCALE: 1/2" = 1'-0"

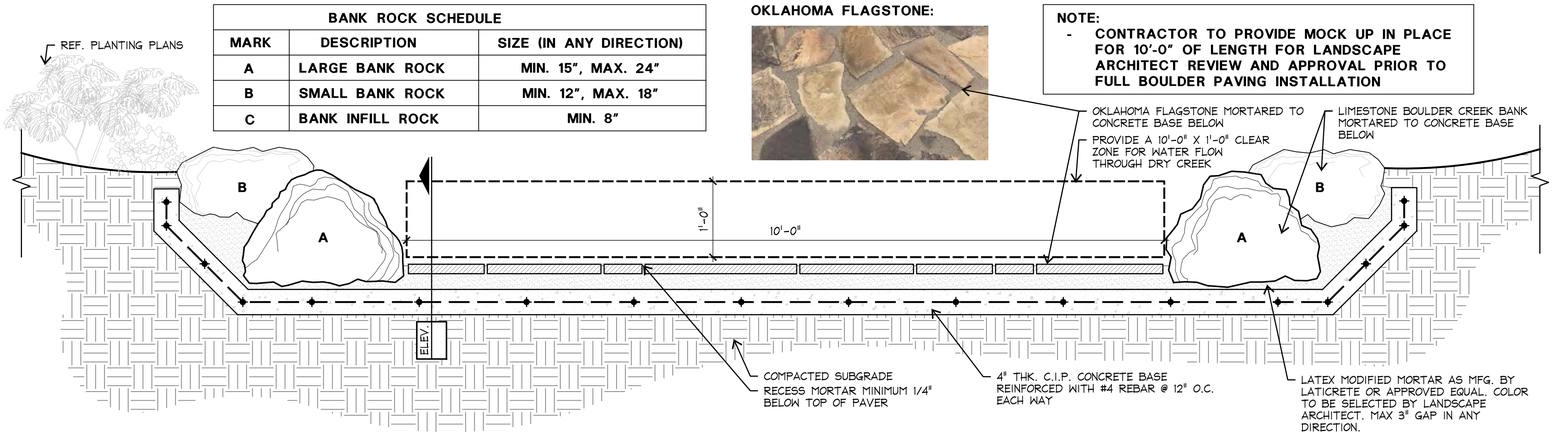
2 STEEL BRIDGE, TYPICAL

SCALE: AS SHOWN



B. ELEVATION

BANK ROCK SCHEDULE		
MARK	**DESCRIPTION**	**SIZE (IN ANY DIRECTION)**
A	LARGE BANK ROCK	MIN. 15", MAX. 24"
B	SMALL BANK ROCK	MIN. 12", MAX. 18"
C	BANK INFILL ROCK	MIN. 8"



A. SECTION

OKLAHOMA FLAGSTONE:

NOTE:
- **CONTRACTOR TO PROVIDE MOCK UP IN PLACE FOR 10'-0" OF LENGTH FOR LANDSCAPE ARCHITECT REVIEW AND APPROVAL PRIOR TO FULL BOULDER PAVING INSTALLATION**

OKLAHOMA FLAGSTONE MORTARED TO CONCRETE BASE BELOW
PROVIDE A 10'-0" X 1'-0" CLEAR ZONE FOR WATER FLOW THROUGH DRY CREEK
LIMESTONE BOULDER CREEK BANK MORTARED TO CONCRETE BASE BELOW
LATEX MODIFIED MORTAR AS MFG. BY LATICRETE OR APPROVED EQUAL. COLOR TO BE SELECTED BY LANDSCAPE ARCHITECT. MAX 3/8" GAP IN ANY DIRECTION.

1 LIMESTONE BOULDER PAVING, TYPICAL

SCALE: 1-1/2"=1'-0"

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15865

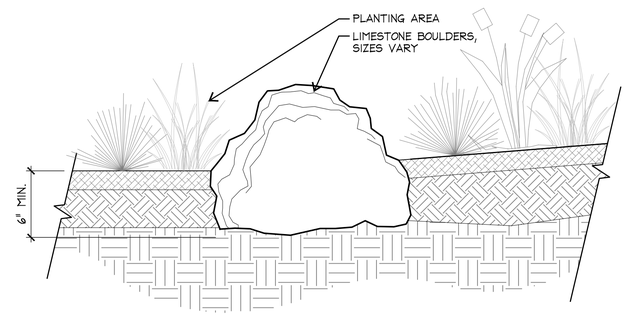
REGISTERED LANDSCAPE ARCHITECT
SARAH LAINE KASNER
3109
STATE OF TEXAS
01/30/2026

HARDSCAPE DETAILS - SITE FEATURES

BROADWAY & OGDEN LN. INTERSECTION PLANS

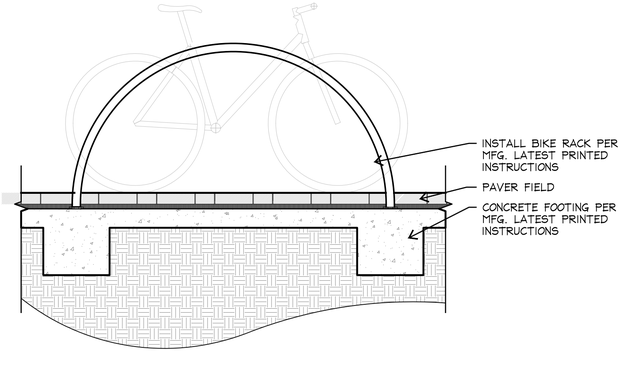
L332

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L3 Site\L332 Hardscape Details - Site Features.dwg | ANSI A (8.50 X 11.00 Inches)



2 BOULDER, TYPICAL

SCALE: 1"=1'-0"



1 BIKE RACK, TYPICAL

SCALE: 3/4"=1'-0"

CITY OF ALAMO HEIGHTS
6116 BROADWAY;
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15085

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KEARNEY
3109
STATE OF TEXAS
01/30/2026

HARDSCAPE DETAILS - SITE FEATURES

BROADWAY & OGDEN LN. INTERSECTION PLANS

L333

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\S23362-title.dwg | ANSI A (8.50 X 11.00 Inches)

PRESSURE REQUIREMENT CALCULATIONS @ ZONE No. 05	
DESIGN STATISTICS FOR CALCULATIONS	
Total Zone Flow:	9.0 g.p.m.
Electric Valve Size:	1"
Static Pressure Less 10% (static @ 65 psi):	58.5 p.s.i.
ACCUMULATIVE LOSSES FROM CITY MAIN TO FURTHEST HEAD	
Sprinkler head requirement:	30 p.s.i.
Zone Pipe/Fitting Loss:	1.22 p.s.i.
1" Electric Valve Loss:	3.0 p.s.i.
Elevation Net Loss (+- FT.):	n/a
System Mainline Loss (1" Sch-40 Mainline):	2.86 p.s.i.
Backflow Preventer Loss (1"):	3.5 p.s.i.
Water Meter Loss (5/8"):	3.0 p.s.i.
Master Electric Valve Loss (1"):	3.0 p.s.i.
Type K Copper Service Loss:	
Total Net Loss:	16.57 p.s.i.
Design Pressure:	46.57 p.s.i.

Notes: System requires a minimum of 47 psi static pressure for system to operate properly. Irrigation Contractor shall conduct on site pressure test to verify site pressure prior to starting work. Contractor shall notify Owner's Representative of pressure deficiencies or any other on site problems that may alter the effectiveness of the system. Pipe has been size to insure that velocity does not exceed 5 FPS. do not change pipe size in the field without consulting system designer.

4 CRITICAL LOSS CHART

TYPICAL WEEKLY SCHEDULE BASED ON PRECIPITATION RATE

Precipitation Rate (in/hr)		Water Desired (in/wk)	Time/Cycle (min)	No. of Zones	Total Time * Min.	Hrs.
Turf Rotor Zone	.64	.80				
MP Rotator Spray	.44	.80				
Turf Drip Zones	.85	.80				
Drip Zones	.57	.80	110.0	3	330	5.5
Tree Bubblers	3.87	.80	12.0	2	24	0.4
Total System Hours of Operation Per Week						5.9

* IT WILL BE NECESSARY TO WATER MULTIPLE ZONES AT ONE TIME TO MEET WATERING WINDOW . A TYPICAL SCHEDULE WOULD ALLOW WATERING TO OCCUR TWO TIMES PER WEEK. TOTAL WATERING TIME WOULD BE DIVIDED BY THE NUMBER OF WATERING DAYS. THIS SCHEDULE IS DESIGNED FOR SUMMER WATER USAGE AND ESTABLISHMENT OF NEW PLANTING.

3 VALVE SCHEDULE

1. IRRIGATION CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING HIMSELF FAMILIAR WITH THE SPECIFICATIONS AND ALL SUBMITTAL REQUIREMENTS. IT IS THE RESPONSIBILITY OF THE IRRIGATION CONTRACTOR TO NOTIFY THE OWNER'S REPRESENTATIVE FOR SITE INSPECTIONS AS SPECIFIED IN THE SPECIFICATIONS. FAILURE TO NOTIFY THE OWNER'S REPRESENTATIVE DOES NOT RELIEVE THE CONTRACTOR FROM INSPECTION APPROVAL AND WILL REQUIRE THE CONTRACTOR TO UNCOVER WORK AS REQUIRED FOR APPROVAL AT THE COST OF THE CONTRACTOR. IRRIGATION CONTRACTOR IS TO INFORM OWNER'S REPRESENTATIVE OF THE START DATE OF WORK.
2. THE IRRIGATION CONTRACTOR IS REQUIRED BY LAW TO NOTIFY TEXAS ONE CALL (800-245-4545) 72 HOURS PRIOR TO ANY EXCAVATION. IRRIGATION CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING HIMSELF FAMILIAR WITH ALL UNDERGROUND UTILITIES, PIPES AND STRUCTURES. IRRIGATION CONTRACTOR SHALL TAKE SOLE RESPONSIBILITY FOR ANY COST INCURRED DUE TO DAMAGE OF SAID UTILITIES WHETHER OR NOT TEXAS ONE CALL IS NOTIFIED.
3. DO NOT WILLFULLY PROCEED WITH CONSTRUCTION AS DESIGNED WITHOUT VERIFYING ACTUAL ON-SITE WATER PRESSURE FROM THE SOURCE. DO NOT WILLFULLY PROCEED WITH CONSTRUCTION AS DESIGNED WHEN IT IS OBVIOUS THAT UNKNOWN OBSTRUCTIONS AND/OR GRADE DIFFERENCES EXIST THAT MAY NOT HAVE BEEN KNOWN DURING DESIGN. SUCH CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE. THE IRRIGATION CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO FAILURE TO GIVE SUCH NOTIFICATION.
4. IRRIGATION CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COORDINATION WITH OTHER CONTRACTORS AS REQUIRED TO ACCOMPLISH IRRIGATION INSTALLATION.
5. DUE TO SCALE OF DRAWINGS, IT IS NOT POSSIBLE TO INDICATE ALL OFFSETS, FITTINGS SLEEVES, ETC., WHICH MAY BE REQUIRED. IRRIGATION CONTRACTOR SHALL CAREFULLY INVESTIGATE THE STRUCTURAL AND FINISHED CONDITIONS AFFECTING ALL OF HIS WORK AND PLAN HIS WORK ACCORDINGLY, FURNISHING SUCH FITTINGS, ETC., AS MAY BE REQUIRED TO MEET SUCH CONDITIONS. DRAWINGS ARE GENERALLY DIAGRAMMATIC AND INDICATIVE OF THE WORK TO BE INSTALLED. THE WORK SHALL BE INSTALLED IN SUCH A MANNER AS TO AVOID CONFLICTS BETWEEN IRRIGATION SYSTEM, PLANTING AND ARCHITECTURAL FEATURES. THIS DESIGN IS DIAGRAMMATIC. ALL PIPING, VALVES, ETC., SHOWN WITHIN PAVED AREAS IS FOR DESIGN CLARIFICATION ONLY AND SHALL BE INSTALLED IN PLANTING AREAS AND WITHIN PROPERTY LINES.
6. DURING INSTALLATION IT IS THE IRRIGATION CONTRACTOR'S RESPONSIBILITY TO COORDINATE PIPING WITH THE LANDSCAPE SUBCONTRACTOR TO AVOID CONFLICT WITH PROPOSED PLANTING. IT WILL BE THE RESPONSIBILITY OF THE IRRIGATION SUBCONTRACTOR TO MOVE PIPING TO ALLOW PROPER PLACEMENT OF PLANT MATERIAL. THE IRRIGATION CONTRACTOR SHALL MAKE MINOR ADJUSTMENTS TO ENSURE PROPER COVERAGE AT NO ADDITIONAL COST TO THE OWNER.
7. NO MACHINE TRENCHING IS TO BE DONE WITHIN THE DRIPLINE OF EXISTING TREES. TRENCHING IS TO BE DONE BY HAND, AIR-SPADE OR BY TUNNELING UNDER ROOT SYSTEM BY METHOD APPROVED BY LANDSCAPE ARCHITECT. PIPING LAYOUT IS DIAGRAMMATIC AND PIPING SHALL BE ROUTED AROUND EXISTING TREES AS POSSIBLE TO AVOID DAMAGE TO THE ROOT SYSTEMS. DO NOT CUT ANY ROOT OVER 3/4" DIAMETER UNLESS APPROVAL FROM THE LANDSCAPE ARCHITECT IS FIRST OBTAINED. ANY CUTS MADE SHALL BE CLEAN AND WITHOUT FRAYED ENDS.
8. IRRIGATION CONTRACTOR SHALL BE RESPONSIBLE FOR SLEEVES AND CHASES WHEREVER PIPING OR CONDUIT PASSES, UNDER ALL PAVING, THROUGH WALLS, ETC. ALL SLEEVE LOCATIONS MAY NOT BE SHOWN ON PLAN, COORDINATE WITH ARCHITECTURAL AND CIVIL DRAWINGS, GENERAL CONTRACTOR AND OTHER SUBCONTRACTORS AS REQUIRED. ALL SLEEVE AND CHASE LOCATIONS ARE NOT NOTED ON PLAN. ALL SLEEVES 4" OR LESS SHALL BE SCH-40 PVC, ALL SLEEVES 6" OR GREATER SHALL BE CLASS-200 PVC. ALL SLEEVES TO BE SIZED TWICE THE DIAMETER OF PIPE OR COMBINATION OF PIPES ENCLOSED WITHIN THE SLEEVE.
9. CONFIRM STATIC WATER PRESSURE AT LEAST 7 DAYS BEFORE BEGINNING WORK. IF STATIC WATER PRESSURE IS LESS THAN STATED IN PRESSURE CALCULATIONS DO NOT PROCEED UNTIL DIRECTED SO BY THE LANDSCAPE ARCHITECT. IF ACTUAL SITE STATIC PRESSURE EXCEEDS DESIGN PRESSURE BY 15 P.S.I. IN ANY ZONE, A PRESSURE REDUCING VALVE SHALL BE INSTALLED. REFER TO DETAILS FOR MODEL.
10. ADJUSTABLE FLOW CONTROLS SHALL BE REQUIRED ON CIRCUIT REMOTE CONTROL VALVE. PRESSURE AT ANY POINT WITHIN A ZONE SHALL NOT VARY BY MORE THAN 10% FROM THE DESIGN SPRINKLER OPERATING PRESSURE. SEE SPECIFICATIONS FOR TESTING.
11. THE CONTRACTOR SHALL BE A REGISTERED LICENSED IRRIGATOR IN THE STATE OF TEXAS. CONTRACTOR MUST CONFORM TO ALL CODES AS STATED IN SECTION 344 OF THE TEXAS WATER CODE AS OUTLINED BY TCEQ.
12. OBTAIN COVERAGE TEST APPROVAL FROM OWNER'S REPRESENTATIVE PRIOR TO PLANTING, SODDING OR SEEDING.
13. ALL UNDESIGNATED END LATERAL PIPING SHALL BE ½" IN SPRAY ZONES AND ¾" IN ROTOR ZONES.
14. SPRINKLER HEAD SPACING SHALL NOT EXCEED 50% OF SPRAY DIAMETER BASED ON MANUFACTURERS OPERATING SPECIFICATIONS. SPRINKLER HEAD SPACING SHALL BE DESIGNED FOR HEAD-TO-HEAD COVERAGE OR HEADS SHALL BE SPACED AS PER MANUFACTURER'S RECOMMENDATIONS AND ADJUSTED FOR PREVAILING WINDS. THE SYSTEM SHALL BE DESIGNED SO THAT IRRIGATION IS NOT APPLIED TO VEHICULAR TRAFFIC LANES, OTHER PAVEMENT OR STRUCTURES.
15. ALL ROTORS SHALL BE LOCATED 12" FROM PAVEMENT, CURBS OR EDGE OF STRUCTURE, ALL SPRAY HEADS SHALL BE LOCATED 6" FROM PAVEMENT, CURBS OR EDGE OF STRUCTURE.
16. VALVE AND CIRCUITS SHALL BE SEPARATED BASED ON WATER USE, SO THAT TURF AREAS ARE WATERED SEPARATELY FROM SHRUB AND GROUND COVER AREAS. IRRIGATION HEADS IN THE TURF AREAS WILL BE VALVED SEPARATELY FROM SHRUB AND/OR GROUND COVER AREAS. IT IS RECOMMENDED THAT SEASONAL COLOR AREAS BE WATERED SEPARATELY. UNDER NO CIRCUMSTANCES ARE ZONE TYPES TO BE COMBINED I.E. ROTARY HEADS WITH SPRAYS, TURF AREAS WITH PLANTING BEDS.
17. IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM STATIC PRESSURE ON SITE PRIOR TO STARTING WORK. REFER TO NOTES #9 AND #10.
18. IT IS THE IRRIGATION CONTRACTOR'S RESPONSIBILITY TO SECURE ALL REQUIRED PERMITS AND PAY ALL ASSOCIATED FEES UNLESS OTHERWISE NOTED. ALL LOCAL CODES SHALL PREVAIL OVER ANY DISCREPANCIES CONTAINED IN THESE DOCUMENTS.
19. UNSLEEVED PIPES MAY BE SHOWN UNDER PAVEMENT FOR GRAPHIC CLARITY. INSTALL PIPES IN ADJACENT SLEEVES WITHIN LANDSCAPE AREAS.
20. 120 VAC ELECTRICAL POWER SOURCE AT CONTROLLER LOCATION SHALL BE PROVIDED BY OTHERS. THE IRRIGATION CONTRACTOR SHALL MAKE THE FINAL CONNECTION FROM THE ELECTRICAL SOURCE TO THE CONTROLLER WITH A HARDWIRE CONNECTION APPROVED AND INSTALLED BY A LICENSED ELECTRICIAN.
21. SPRINKLER HEADS SHALL HAVE MATCHED PRECIPITATION RATES WITHIN EACH CONTROL VALVE CIRCUIT.
22. SERVICEABLE CHECK VALVES SHALL BE REQUIRED ADJACENT TO PAVED AREAS WHERE ELEVATION DIFFERENCES MAY CAUSE LOW HEAD DRAINAGE.
23. ALL AUTOMATIC IRRIGATION SYSTEMS SHALL BE EQUIPPED WITH A CONTROLLER CAPABLE OF DUAL OR MULTIPLE PROGRAMMING. CONTROLLERS SHALL HAVE MULTIPLE CYCLE START CAPACITY AND A FLEXIBLE CALENDAR PROGRAM, INCLUDING THE CAPABILITY OF BEING SET TO WATER EVERY FIVE DAYS. ALL AUTOMATIC IRRIGATION SYSTEMS SHALL BE EQUIPPED WITH A RAIN SENSOR SHUT-OFF DEVICE.
24. ALL IRRIGATION WIRES SHALL BE UL LISTED FOR DIRECT UNDERGROUND BURIAL AND SHALL BE SIZED PER THE MANUFACTURER'S RECOMMENDATIONS. 3M-DBY WATERPROOF CONNECTORS TO BE USED ON ALL WIRE CONNECTIONS. SUBMIT SAMPLE TO LANDSCAPE ARCHITECT.
25. ALL IRRIGATION HEADS SHALL BE ADJUSTED TO MINIMIZE OVER-SPRAY ONTO ALL IMPERVIOUS SURFACES.
26. ALL PIPE CONNECTIONS SHALL BE PRIMED WITH AN APPROVED COLOR PRIMER BEFORE BEING CHEMICAL WELDED.
27. AFTER AWARD OF CONTRACT AND BEFORE ANY IRRIGATION SYSTEM MATERIALS ARE ORDERED FROM SUPPLIERS OR DELIVERED TO THE JOB SITE, SUBMIT TO THE OWNER A COMPLETE LIST OF ALL IRRIGATION SYSTEM MATERIALS, OR PROCESSES PROPOSED TO BE FURNISHED AND INSTALLED AS PART OF THIS CONTRACT. THE LANDSCAPE ARCHITECT OR OWNER'S AUTHORIZED REPRESENTATIVE WILL ALLOW NO SUBSTITUTIONS WITHOUT PRIOR WRITTEN ACCEPTANCE. MANUFACTURER'S WARRANTIES SHALL NOT RELIEVE THE CONTRACTOR OF HIS LIABILITY UNDER THE GUARANTEE. SUCH WARRANTIES SHALL ONLY SUPPLEMENT THE GUARANTEE.
29. ALL TEMPORARY IRRIGATION SHALL BE DESIGNED PRIOR TO INSTALLATION BY A STATE OF TEXAS LICENSED IRRIGATOR. THE DESIGN IS TO BE SUBMITTED FOR APPROVAL PRIOR TO COMMENCING INSTALLATION OF THE TEMPORARY SYSTEM.
30. IRRIGATION CLOSEOUT DOCUMENTS SHALL INCLUDE A WATER BUDGET. A LAMINATED COPY OF THE WATER BUDGET SHALL BE PERMANENTLY INSTALLED INSIDE THE IRRIGATION CONTROLLER DOOR.

A. CHART CONTAINING ZONE NUMBER, PRECIPITATION RATE AND GPM.
B. LOCATION OF EMERGENCY IRRIGATION SYSTEM SHUT-OFF VALVE.

2 CONSTRUCTION NOTES

- W — DEDICATED IRRIGATION WATER METER - 5/8", BY CIVIL ENGINEER
- DC — DOUBLE CHECK BACKFLOW DEVICE - 1" WATTS, MODEL 007 PER LOCAL CODES
- MV — MASTER VALVE - 1" HUNTER NORMALLY CLOSED VALVE, MODEL ICV-101G
- C — CONTROLLER - HUNTER ICC2 WITH STAINLESS STEEL PEDESTAL, FINAL LOCATION IS TO BE DETERMINED AFTER CONSULTING WITH OWNERS REPRESENTATIVE
- W — WEATHER SENSOR - HUNTER SOLAR-SYNC RAIN/FREEZE SENSOR, FINAL LOCATION IS TO BE DETERMINED AFTER CONSULTING WITH OWNERS REPRESENTATIVE
- SHUT OFF VALVE - SCH 80 BALL VALVE, SIZE PER LINE
- REMOTE CONTROL VALVE - HUNTER ICV, SIZE AS INDICATED
- DRIP CONTROL ZONE KIT - RAIN BIRD, REFERENCE DETAILS
- BBL — TREE BUBBLER ASSEMBLY - SINGLE BUBBLER ON 6" POP-UP
- 2-BBL — TREE BUBBLER ASSEMBLY - TWO BUBBLERS ON 6" POP-UPS
- # / #"-## — ZONE IDENTIFICATION; ZONE SIZE IN GALLONS PER MINUTE; ZONE VALVE SIZE
- # / #"-## — ZONE IDENTIFICATION; ZONE SIZE IN GALLONS PER MINUTE; HATCH PATTERN INDICATES BED/TURF AREAS TO BE INCLUDED THIS ZONE; ZONE VALVE SIZE, REFERENCE DETAILS
- DRIPLINE; NETAFIM TLHCVXR5-12 FOR SURFACE PLANTING BEDS, ROWS SPACED AT 18 INCHES; NETAFIM TLHCVXR5-12 FOR SUBSURFACE TURF, ROWS SPACED AT 12 INCHES (SHRT. ZONE I.D.)
- DRIP SUPPLY LINE, SCH 40 PVC, SIZE PER PLAN.
- 1 — INDIVIDUAL DRIP EMITTERS FOR PLANTS, REF. DETAIL 8/L422
- MAIN LINE - PVC PIPE, SCH-40, SIZE AS INDICATED ON PLANS
- 1-1/2" — LATERAL LINE - PVC PIPE, CLASS 200 SDR 21, SIZE AS INDICATED ON PLANS . DO NOT DEVIATE ON SIZING WITHOUT CONSULTING WITH PROJECT DESIGNER.
- 1-1/2" — LATERAL LINE TO DRIP HEADER - CLASS 200 PVC DRIP LATERAL LINE TO SCH-40 PVC SUPPLY HEADER WITH INSERT FITTINGS, REF. DETAILS XX/IR109
- SLEEVE - PVC PIPE, SCH-40, USE TWO (2) SIZES LARGER THAN SPRINKLER PIPE WITHIN, VALVE WIRING MAY BE RUN IN THE SAME SLEEVES

GENERAL NOTE: REFER TO SHEET L421 to L422 FOR DETAILS

FIELD LOCATE BY STAKING, THE CONTROLLER, WATER METER, BACKFLOW DEVICE, MASTER VALVE AND FLOW SENSOR FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

1 LEGEND

STATEMENT OF IRRIGATION DESIGN STANDARDS CONFORMITY:
This plan is complete and conforms to the design and installation parameters of the irrigation design and equipment standards set out by the City of Alamo Heights, Texas and TCEQ (Texas Commission on Environmental Quality).

Wade O. Radlet TX LI # 22397

SPECIAL NOTES:
1. THE IRRIGATION CONTRACTOR SHALL COMPLY WITH ALL LOCAL AND STATE MANDATED IRRIGATION ORDINANCES AND CODES AND WILL SECURE ALL REQUIRED PERMITS.
2. ALL WIRES, CONTROL VALVES, AND PRESSURIZED WATER SUPPLY LINES SHALL NOT BE LOCATED WITHIN THE EXISTING ROW OR OUTSIDE PROPERTY BOUNDARIES.

"Irrigation in Texas is regulated by the Texas Commission on Environmental Quality (TCEQ), MC-178, PO Box 13087, Austin, Texas 78711-3087 TCEQ's website is: www.tceq.state.tx.us"

811.

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI. WGInc.com
FIRM NO: F-15065
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334

STATE OF TEXAS
WADE O. RADLET
22397
LICENSED
IRRIGATOR
01.30.26

IRRIGATION NOTES AND LEGEND

BROADWAY & OGDEN LN. INTERSECTION PLANS

L400

NOTE:
ALL DRIPLINE IRRIGATION SHALL BE INSTALLED IN A CONTINUOUS GRID PATTERN OVER THE ENTIRE PLANTING BED AREA, REGARDLESS OF PLANT SPACING. FREEFORM OR CONTOURED DRIPLINE LAYOUTS ARE NOT PERMITTED. PROVIDE PVC SUB-MAIN HEADERS AT BOTH ENDS OF EACH BED, PER DETAIL 2/L422. NARROW AREAS SHALL RECEIVE A MINIMUM OF TWO (2) EVENLY SPACED DRIPLINE ROWS.

BROADWAY

BROADWAY

OGDEN LANE

LANDSCAPE L.O.C.

CIVIL L.O.C.

ADJACENT SCHOOL PROPERTY

1" MAINLINE

1" MAINLINE

1" MAINLINE

W
DC
MV

5/8"

1
1" 6.0

2
1" 8.2

3
1" 3.4

4
1" 8.2

5
1" 9.0

VERIFY FINAL CONTROLLER PEDESTAL LOCATION WITH OWNERS REP. AND M.E.P. PROVIDE 2" MIN. WIRE CONDUIT, MOUNT PAD, AND 120V POWER.

NO MACHINE TRENCHING WITHIN THE DRIPLINE OF EXISTING TREES; REF. NOTE 2.7/L400

1 IRRIGATION PLAN
Plan

SCALE: 1"=10' NORTH

CITY OF ALAMO HEIGHTS
6116 BROADWAY;
ALAMO HEIGHTS, TEXAS 78209

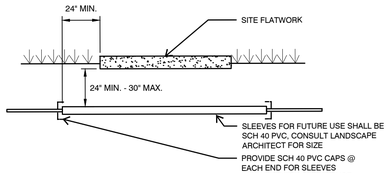
WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15065

STATE OF TEXAS
WADE O. RADLET
22397
LICENSED
PROFESSIONAL
ENGINEER
01.30.26

IRRIGATION PLAN

BROADWAY & OGDEN LN. INTERSECTION PLANS

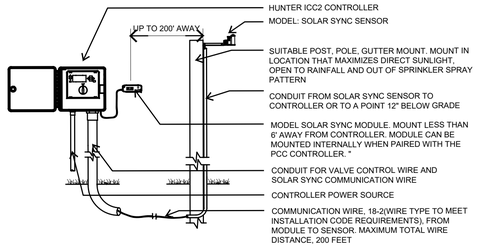
L411



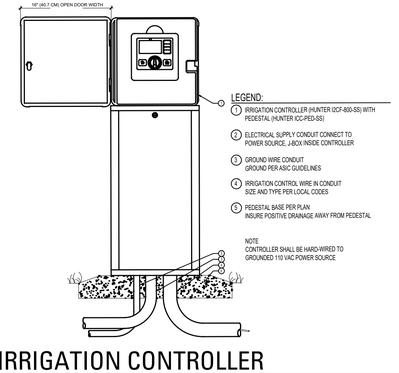
IRRIGATION SLEEVE NOTES:

1. PIPING AND CONTROL WIRES SHALL BE INSTALLED IN SEPARATE SLEEVES UNDER PAVING. REFER TO IRRIGATION SLEEVE PLAN FOR SIZE AND LOCATION.
2. SLEEVE ELEVATION SHALL BE TWENTY-FOUR (24") INCHES BELOW TOP OF PAVEMENT.
3. SLEEVES SHALL EXTEND ONE (1') FOOT BEYOND THE EDGE OF PAVEMENT AND BE STAKED FOR LOCATION.
4. ALL SLEEVES 4" OR LESS, SHALL BE SCH-40 PVC, ALL SLEEVES GREATER THAN 4" SHALL BE CLASS-200 SDR-21. SLEEVES SHALL BE CAPPED ON BOTH ENDS AND SIZED A MIN. OF TWO (2) TIMES THE DIAMETER OF THE PIPE INSIDE THE SLEEVE
5. SLEEVE LOCATIONS SHALL BE MARKED ONTO THE TOP OF CURB WITH A SAW-CUT OF TWO PARALLEL LINES THAT ARE TWO (2") INCHES LONG AND ONE (1") INCH APART ON BOTH SIDES OF THE STREET OR CROSSING.
6. THE CONTRACTOR RESPONSIBLE FOR INSTALLATION OF SLEEVES SHALL ALSO BE RESPONSIBLE TO LOCATE ANY SLEEVE WHICH CANNOT BE FOUND DURING THE INSTALLATION OF THE IRRIGATION SYSTEM.

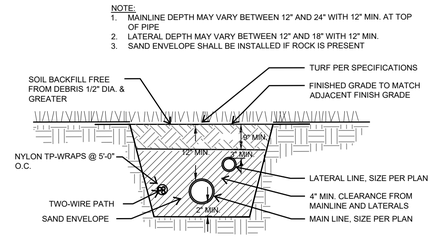
11 IRRIGATION SLEEVE



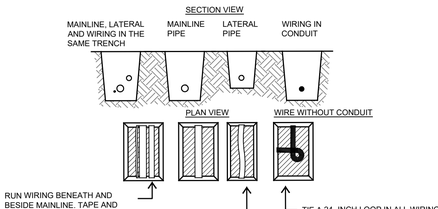
10 WEATHER SENSOR



9 IRRIGATION CONTROLLER



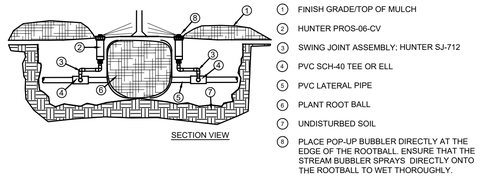
8 TRENCH PROFILE



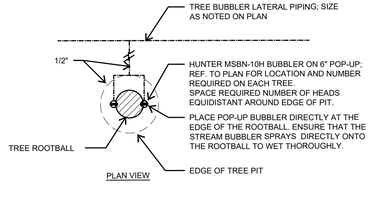
NOTES:

1. SLEEVE BELOW ALL HARDSCAPE ELEMENTS WITH SCH-40 PVC TWICE THE DIAMETER OF THE PIPE OR WIRE BUNDLE WITHIN
2. FOR PIPE AND WIRE BURIAL DEPTHS SEE TRENCH PROFILE DETAIL

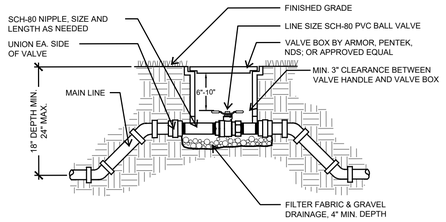
7 IRRIGATION TRENCH



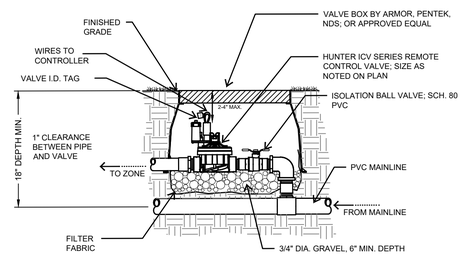
6 TREE BUBBLER ASSEMBLY- SECTION



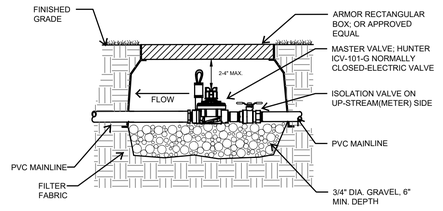
5 TREE BUBBLER ASSEMBLY- PLAN



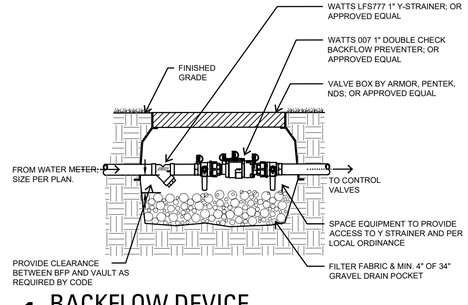
4 MANUAL ISOLATION VALVE



3 ZONE VALVE



2 MASTER VALVE



1 BACKFLOW DEVICE

CITY OF ALAMO HEIGHTS
6116 BROADWAY;
ALAMO HEIGHTS, TEXAS 78209

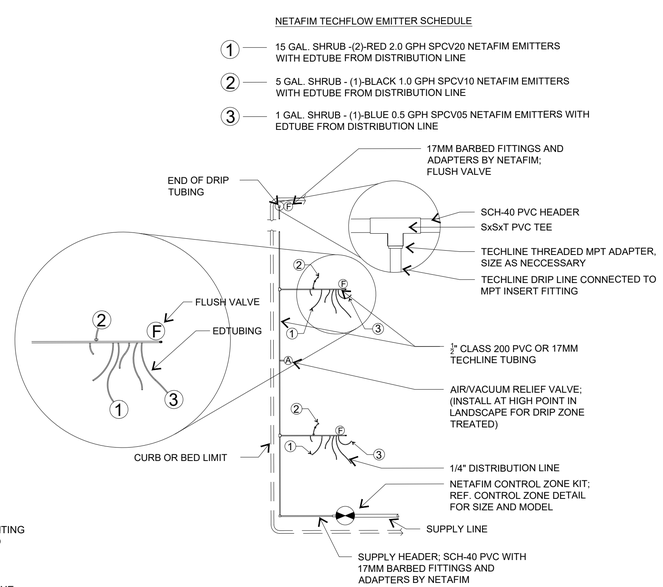
WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO.: F-15065

STATE OF TEXAS
WADE O. RADLET
22397
LICENSED
PROFESSIONAL
ENGINEER
01.30.26

IRRIGATION DETAILS

BROADWAY & OGDEN LN. INTERSECTION PLANS

L421



8 INDIVIDUAL DRIP EMITTERS

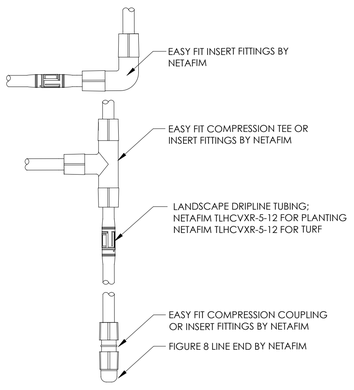
1.) DRIP LINE SHALL BE BURIED 3" TO 5" BELOW FINISHED SOIL GRADE IN PLANTING BEDS AFTER PLANTING AND BEFORE MULCH AND 4" TO 6" BELOW FINISHED GRADE IN TURF AREAS.
2.) STAGGER EMITTER SPACING IN PARALLEL ROWS TO CREATE TRIANGULAR WETTING PATTERN.
3.) ALL DRIP LINE SHALL BE SECURED USING SOIL STAPLES AS SUPPLIED BY THE MANUFACTURER SPACED A MAX. OF 3' ON CENTER.
4.) DRIP LATERALS SHOWN ON THE PLANS ARE USED TO INDICATE ZONING SIZES AND RELATIONSHIPS. INSTALLATION OF DRIP ZONES SHALL FOLLOW ONE OF THE TWO METHODS DESCRIBED IN DTL. 2/L422 AND NETAFIM'S RECOMMENDED INSTALLATION SPECIFICATIONS.
5.) NETAFIM HCVXR SERIES DRIP LINE SHALL BE USED AS FOLLOWS;
TURF AREAS; TLHCVXR-5-12, ROWS SPACED AT 12 INCHES
BED AREAS; TLHCVXR-5-12, ROWS SPACED AT 18 INCHES
BED AREAS WITH SLOPES GREATER THAN 3:1; TLHCVXR-5-12, ROWS SPACED AT 12 INCHES
6.) WHEN CONFLICTS OCCUR BETWEEN THESE DRAWINGS AND THE MANUFACTURER'S SPECIFICATIONS DEFER TO THE MANUFACTURER'S RECOMMENDED SPECIFICATIONS.
7.) EACH DRIP ZONE SHALL HAVE A DRIP SYSTEM OPERATION INDICATOR, AS MANUFACTURED BY NETAFIM. INSTALL PER NETAFIM RECOMMENDATIONS.

PROPER SIZING OF SUPPLY AND EXHAUST HEADERS
(17MM HCVXR SERIES DRIPLINE)

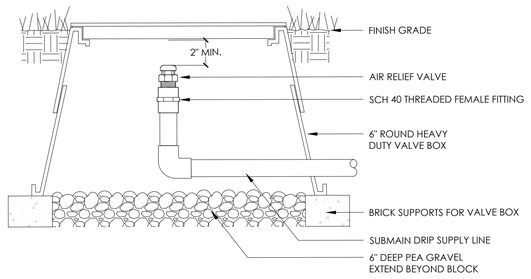
TOTAL ZONE FLOW	PIPE SIZE
UP TO 8 GPM	3/4" CLASS 200 PVC
8.1 TO 13 GPM	1" CLASS 200 PVC
13.1 TO 22 GPM	1-1/4" CLASS 200 PVC
22.1 TO 31 GPM	1-1/2" CLASS 200 PVC

NOTE: A 45 PSI PRESSURE REGULATOR IS RECOMMENDED TO OBTAIN MAXIMUM RUN LENGTHS AND MAXIMIZE ZONE SIZE WHEN INSTALLING HCVXR SERIES DRIPLINE.

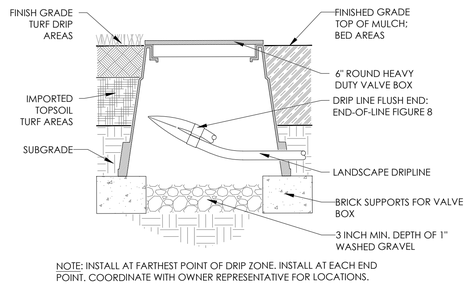
10 DRIP DESIGN NOTES



9 DRIPLINE FITTINGS

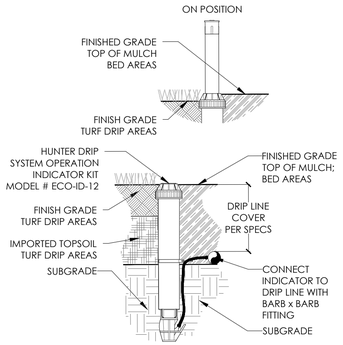


7 AIR RELIEF VALVE

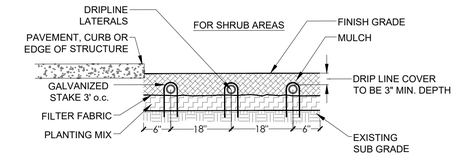


NOTE: INSTALL AT FARTHEST POINT OF DRIP ZONE. INSTALL AT EACH END POINT. COORDINATE WITH OWNER REPRESENTATIVE FOR LOCATIONS.

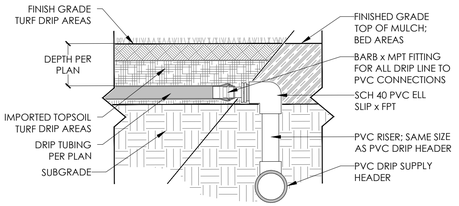
6 DRIPLINE FLUSH END



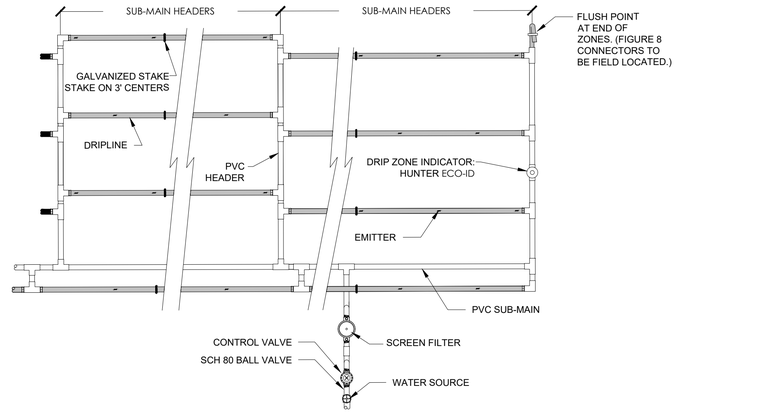
5 DRIP OPERATION INDICATOR



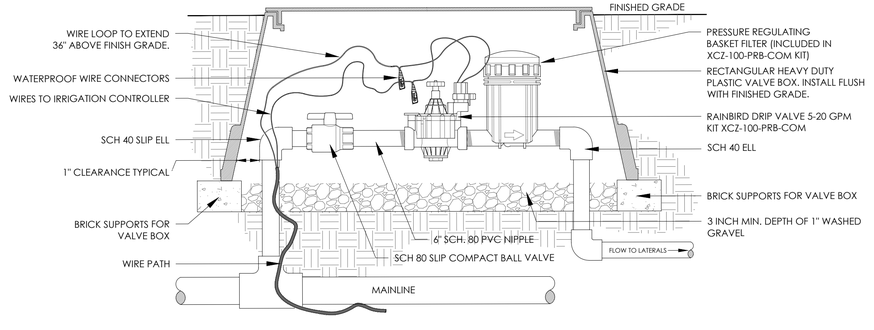
4 DRIPLINE SECTIONS



3 DRIPLINE TO PVC HEADER



2 DRIP LAYOUT



1 DRIP CONTROL VALVE

CITY OF ALAMO HEIGHTS
6116 BROADWAY;
ALAMO HEIGHTS, TEXAS 78209

WGI.
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15085

STATE OF TEXAS
WADE O. RADLET
22397
01.30.26

IRRIGATION DETAILS

BROADWAY & OGDEN LN. INTERSECTION PLANS

L422

PLANT SCHEDULE

SYMBOL	CODE	BOTANICAL NAME	COMMON NAME	CONTAINER	SIZE	REMARKS
SHADE TREES						
	QUE MUE	QUERCUS MUEHLENBERGII	CHINKAPIN OAK	B&B	5" CAL.	20' HEIGHT AND 15' SPREAD; MATCHED, FULL, SPACED AS SHOWN ON PLANS, STRAIGHT CENTRAL LEADER
	QUE POL	QUERCUS POLYMORPHA	MEXICAN WHITE OAK	B&B	5" CAL.	20' HEIGHT AND 15' SPREAD; MATCHED, FULL, SPACED AS SHOWN ON PLANS, STRAIGHT CENTRAL LEADER
	QUE VIR	QUERCUS VIRGINIANA	SOUTHERN LIVE OAK	B&B	6" CAL.	30' HEIGHT AND 22' SPREAD; MATCHED, FULL, SPACED AS SHOWN ON PLANS, STRAIGHT CENTRAL LEADER
ORNAMENTAL TREES						
	CER TEX	CERCIS CANADENSIS TEXENSIS	TEXAS REDBUD	B&B	2" CAL.	10' HT. AND 8' MIN. SPRD.; MULTI-TRUNK, 1-1/2" MIN. CANE CALIPER, FULL UNIFORM CANOPY, CONTAINER GROWN
	SOP SEC	SOPHORA SECUNDIFLORA	TEXAS MOUNTAIN LAUREL	BOX	2" CAL.	10' HEIGHT AND 8' SPREAD; MATCHED, FULL, SPACED AS SHOWN ON PLANS, STRAIGHT CENTRAL LEADER
SHRUBS						
	GAL GLA	GALPHIMIA GLAUCA	THRYALLIS	POT	5 GAL.	36" HEIGHT AND SPREAD; PLANT 48" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
	ILE NAN	ILEX VOMITORIA 'NANA'	DWARF YAUPON HOLLY	POT	5 GAL.	36" HEIGHT AND SPREAD; PLANT 36" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
	MOR CER	DWARF WAX MYRTLE	MORELLA CERIFERA PUMILA 'DON'S DWARF'	POT	10 GAL.	5' HEIGHT AND SPREAD; PLANT 8' O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
ORNAMENTAL GRASSES						
	MUH BIG	MUHLENBERGIA LINDHEIMERI 'BIG'	BIG LINDHEIMER'S MUHLY	POT	5 GAL.	30" HEIGHT AND SPREAD; PLANT 48" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
	MUH CAP	MUHLENBERGIA CAPILLARIS	PINK MUHLY GRASS	POT	3 GAL.	24" HEIGHT AND SPREAD; PLANT 30" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
PERENNIALS						
	ANI QUA	ANISACANTHUS QUADRIFIDUS WRIGHTII	MEXICAN FIRE DESERT HONEYSUCKLE	POT	5 GAL.	30" HEIGHT AND SPREAD; PLANT 48" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
	DIE BIC	DIETES BICOLOR	BICOLOR IRIS	POT	3 GAL.	36" HEIGHT AND 24" SPREAD; PLANT 30" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
	GAU LIN	GAURA LINDHEIMERI	GAURA	POT	1 GAL.	18" HEIGHT AND SPREAD; PLANT 30" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
	LAN MON	LANTANA MONTEVIDENSIS	TRAILING LANTANA	POT	3 GAL.	6" HEIGHT AND 18" SPREAD; PLANT 48" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS
	SAL ALB	SALVIA GREGGII 'ALBA'	WHITE SALVIA	POT	1 GAL.	18" HEIGHT AND SPREAD; PLANT 36" O.C.; MATCHED AND FULL; TRIANGULAR SPACING OR AS SHOWN ON PLANS

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE, SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15065

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KOENIG
3109
STATE OF TEXAS
01/30/2026

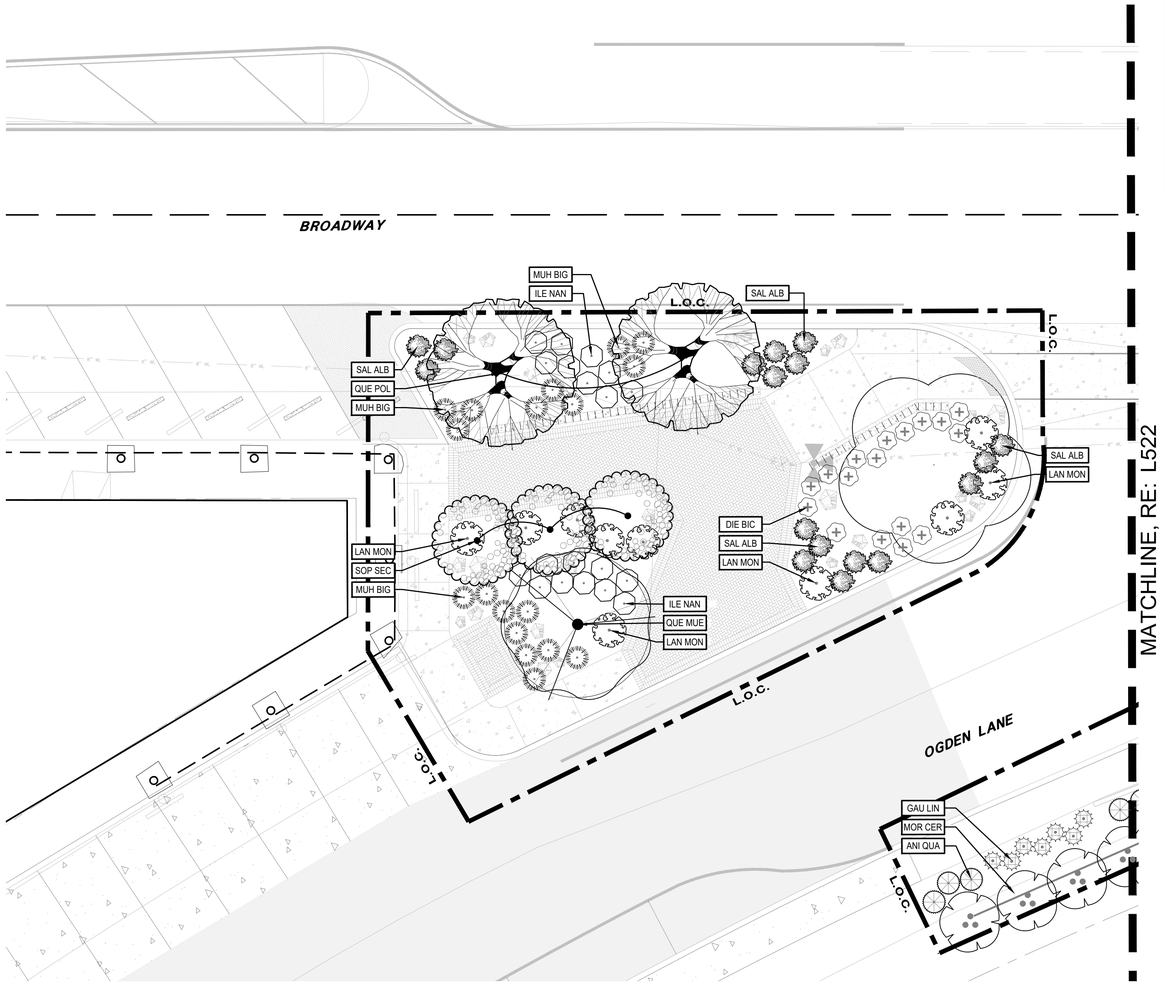
PLANTING SCHEDULE

BROADWAY & OGDEN LN. INTERSECTION PLANS

L501

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L5 Planting\S23362-L501 Schedule and Notes.dwg | ANSI A (8.50 X 11.00 Inches)

SYMBOL	CODE	BOTANICAL NAME
SHADE TREES		
	QUE MUE	QUERCUS MUEHLENBERGII
	QUE POL	QUERCUS POLYMORPHA
	QUE VIR	QUERCUS VIRGINIANA
ORNAMENTAL TREES		
	CER TEX	CERCIS CANADENSIS TEXENSIS
	SOP SEC	SOPHORA SECUNDIFLORA
SHRUBS		
	GAL GLA	GALPHIMIA GLAUCA
	ILE NAN	ILEX VOMITORIA 'NANA'
	MOR CER	DWARF WAX MYRTLE
ORNAMENTAL GRASSES		
	MUH BIG	MUHLENBERGIA LINDHEIMERI 'BIG'
	MUH CAP	MUHLENBERGIA CAPILLARIS
PERENNIALS		
	ANI QUA	ANISACANTHUS QUADRIFIDUS WRIGHTII
	DIE BIC	DIETES BICOLOR
	GAU LIN	GAURA LINDHEIMERI
	LAN MON	LANTANA MONTEVIDENSIS
	SAL ALB	SALVIA GREGGII 'ALBA'



1 PLANTING PLAN ENLARGEMENT

Plan

0' 5' 10' 20'

SCALE: 1"=10' NORTH

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE., SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO. F-15065

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KARNEI
3109
STATE OF TEXAS
01/30/2026

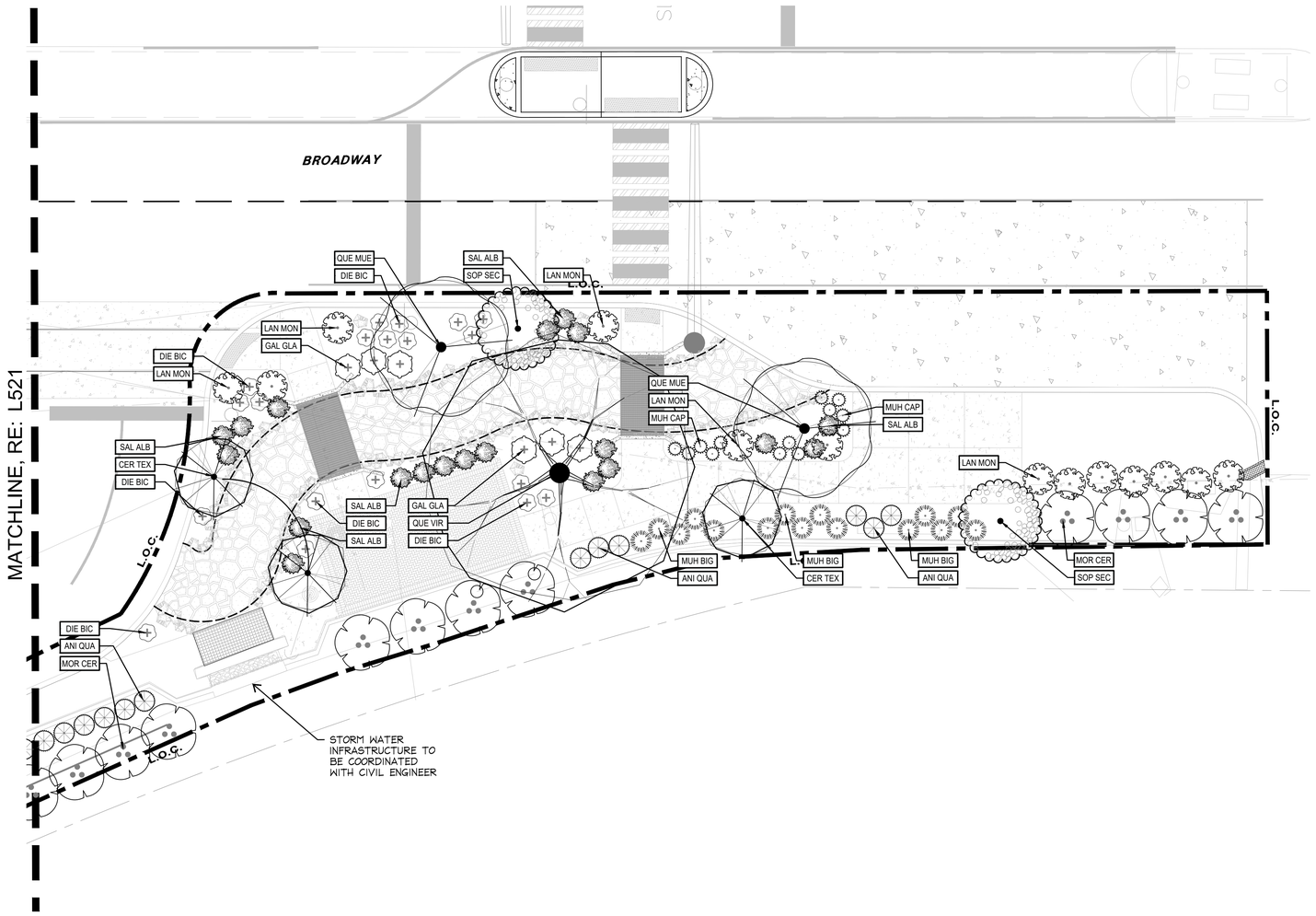
PLANTING PLAN

BROADWAY & OGDEN LN. INTERSECTION PLANS

L521

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L5 Planting\S23362-L511 Planting Plan.dwg | ANSI A (8.50 X 11.00 Inches)

SYMBOL	CODE	BOTANICAL NAME
SHADE TREES		
	QUE MUE	QUERCUS MUEHLENBERGII
	QUE POL	QUERCUS POLYMORPHA
	QUE VIR	QUERCUS VIRGINIANA
ORNAMENTAL TREES		
	CER TEX	CERCIS CANADENSIS TEXENSIS
	SOP SEC	SOPHORA SECUNDIFLORA
SHRUBS		
	GAL GLA	GALPHIMIA GLAUCA
	ILE NAN	ILEX VOMITORIA 'NANA'
	MOR CER	DWARF WAX MYRTLE
ORNAMENTAL GRASSES		
	MUH BIG	MUHLENBERGIA LINDHEIMERI 'BIG'
	MUH CAP	MUHLENBERGIA CAPILLARIS
PERENNIALS		
	ANI QUA	ANISACANTHUS QUADRIFIDUS WRIGHTII
	DIE BIC	DIETES BICOLOR
	GAU LIN	GAURA LINDHEIMERI
	LAN MON	LANTANA MONTEVIDENSIS
	SAL ALB	SALVIA GREGGII 'ALBA'



1 PLANTING PLAN ENLARGEMENT

Plan

SCALE: 1"=10' NORTH

CITY OF ALAMO HEIGHTS
6116 BROADWAY,
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE., SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO. F-15065

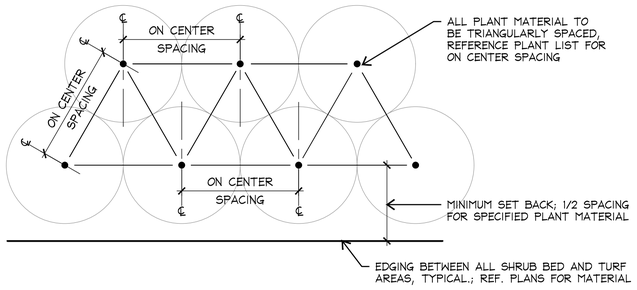
REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KEARNEY
3109
STATE OF TEXAS
01/30/2026

PLANTING PLAN

BROADWAY & OGDEN LN. INTERSECTION PLANS

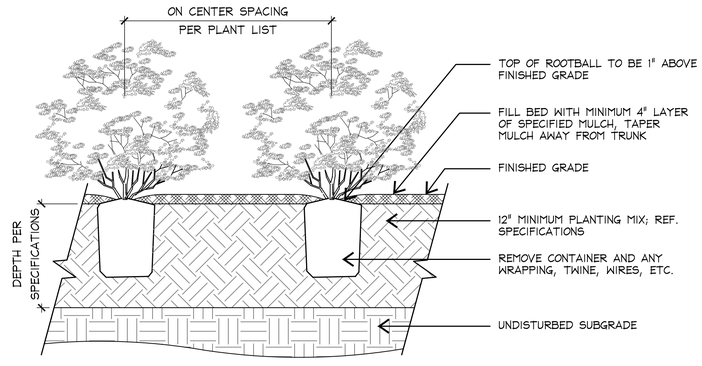
L522

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\S23362-title.dwg | ANSI A (8.50 X 11.00 Inches)



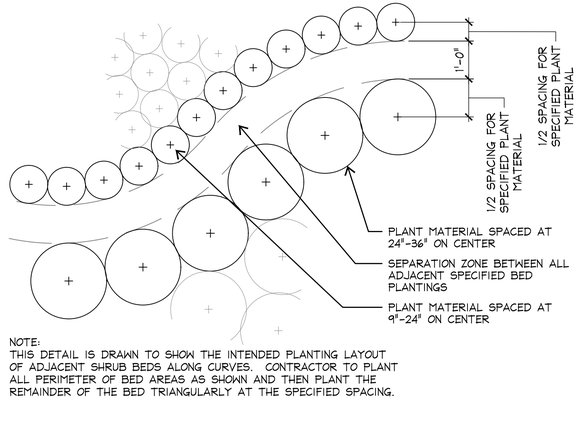
5 PLANT SPACING DIAGRAM

SECTION — SCALE: 1"=1'-0"



4 TYPICAL SHRUB PLANTING

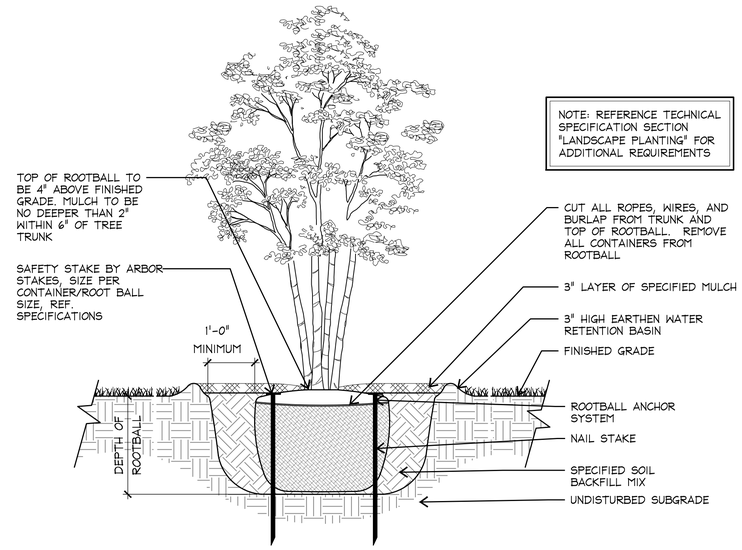
SECTION — SCALE: 3/4"=1'-0"



NOTE:
THIS DETAIL IS DRAWN TO SHOW THE INTENDED PLANTING LAYOUT OF ADJACENT SHRUB BEDS ALONG CURVES. CONTRACTOR TO PLANT ALL PERIMETER OF BED AREAS AS SHOWN AND THEN PLANT THE REMAINDER OF THE BED TRIANGULARLY AT THE SPECIFIED SPACING.

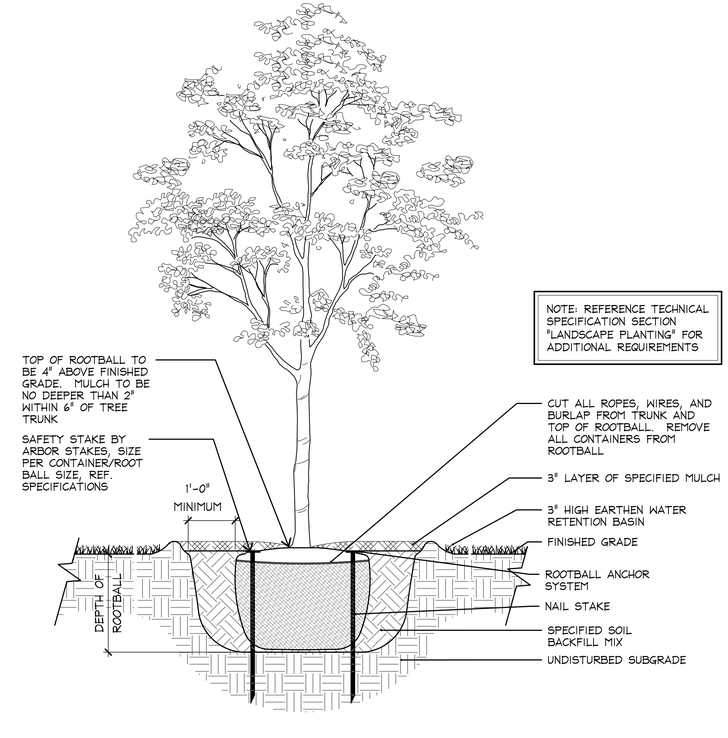
3 CURVED BED LAYOUT

PLANT — SCALE: 3/4"=1'-0"



2 TYPICAL ORNAMENTAL TREE PLANTING

SECTION — SCALE: 1/2"=1'-0"



1 TYPICAL SHADE TREE PLANTING

SECTION — SCALE: 1/2"=1'-0"

CITY OF ALAMO HEIGHTS
6116 BROADWAY;
ALAMO HEIGHTS, TEXAS 78209

WGI
WGInc.com
755 E. MULBERRY AVE., SUITE 501, SAN ANTONIO, TEXAS 78212
210.860.9334
FIRM NO: F-15065

REGISTERED LANDSCAPE ARCHITECT
SARAH ELAINE KENNEDY
3109
STATE OF TEXAS
01/30/2026

PLANTING DETAILS

BROADWAY & OGDEN LN. INTERSECTION PLANS

L531

P:\s23362 - broadway & ogden lane\03 development\04 contract documents\04 CAD\02 sheets\L5 Planting\L531 Planting Details.dwg | ANSI A (8.50 X 11.00 Inches)

Exhibit III - Pricing Workbook

Project: General Construction for Broadway and Ogden Lane Improvements **Project No.: 2026_78209_01**
Owner: City of Alamo Heights
Design Professional: WGI
Respondent: [ENTER NAME]

ITEM NO.	SPEC	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
1	103.1	REMOVE CONCRETE CURB (700 LF < X < 10,000 LF)	LF	986		
2	103.3	REMOVE SIDEWALKS AND DRIVEWAYS (1,000 SF < X < 3,000 SF)	SF	3924		
3	103.4	REMOVE MISCELLANEOUS CONCRETE	SF	536		
4	104.1	STREET EXCAVATION (1,000 CY < X < 10,000 CY)	CY	1636		
5	200.1	FLEXIBLE BASE (12" COMPACTED DEPTH)	SY	219		
6	202.1	PRIME COAT	GAL	119		
7	203.1	TACK COAT	GAL	139		
8	205.2	HOT MIX ASPHALTIC PAVEMENT TYPE B (4" COMP DEPTH) (< 10,000 SY)	SY	374		
9	205.3	HOT MIX ASPHALTIC PAVEMENT TYPE C (6" COMP DEPTH) (< 10,000 SY)	SY	219		
10	205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (1.5" COMP DEPTH) (< 10,000 SY)	SY	100		
11	205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (2" COMP DEPTH) (1,000 < X < 5,000 SY)	SY	1393		
12	205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (3" COMP DEPTH)	SY	100		
13	208.1	SALVAGING, HAULING, AND STOCKPILING RECLAIMABLE ASPHALTIC PAVMENT (2" DEPTH)	SY	1174		
14	208.1	SALVAGING, HAULING, AND STOCKPILING RECLAIMABLE ASPHALTIC PAVMENT (3" DEPTH)	SY	100		
15	208.1	SALVAGING, HAULING, AND STOCKPILING RECLAIMABLE ASPHALTIC PAVMENT (4" DEPTH)	SY	100		
16	209.1	CONCRETE PAVEMENT (6" DEPTH)	SY	374		
17	209.1	CONCRETE PAVEMENT (8" DEPTH)	SY	42		
18	209.1	CONCRETE PAVEMENT (8" DEPTH) (INTEGRATED COLOR)	SY	30		
19	209.2	REINFORCED CONCRETE BUS PAD	SY	264		
20	308.1	DRILLED SHAFTS (36")	LF	32		
21	413.1	FLOWABLE FILL (LOW STRENGTH)	CY	50		
22	500.1	CONCRETE CURB (> 1,000 LF)	LF	1067		
23	502.1	CONCRETE SIDEWALKS (> 1,000 SY)	SY	362		
24	502.3	SIDEWALK DRAIN (4')	EA	1		
25	503.2	PORTLAND CEMENT CONCRETE DRIVEWAY (COMMERCIAL)	SY	69		
26	504.1	CONCRETE MEDIAN	SY	32		
27	505.1	CONCRETE RIPRAP (4" THICK)	SY	50		
28	505.1	CONCRETE RIPRAP (5" THICK)	SY	170		
29	506.1	CONCRETE RETAINING WALLS (COMB. TYPE)	CY	10		
30	512.1	ADJUSTING EXISTING MANHOLES	EA	1		
31	512.3	VALVE BOX ADJUSTMENTS	EA	4		
32	515.1	TOPSOIL (< 500 CY)	CY	5.85		
33	516.1	BERMUDA SODDING (< 2,000 SY)	SY	52.7		

ITEM NO.	SPEC	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
34	530.1	BARRICADES, SIGNS AND TRAFFIC HANDLING	LS	1		
35	531.2	R7-1 METRO ST. NAME, BLK NUMBERS (VARIES x 24")(HIGH INTENSITY)	EA	2		
36	531.3	R1-1 STOP (30")(HIGH INTENSITY)	EA	1		
37	531.21	R7-1 NO PARKING ANYTIME (18" X 24")(HIGH INTENSITY)	EA	2		
38	531.44	W16-7 DIAGONAL ARROW SIGN(24"x12")(HIGH INTENSITY)	EA	4		
39	531.51	W11-2 PED CROSSING (30" X 30")(HIGH INTENSITY)	EA	4		
40	531.62	W16-9P AHEAD (36" X 20")(HIGH INTENSITY)	EA	2		
41	531.XX	R10-23 STOP ON RED SIGN	EA	2		
42	535.1	4 INCH WIDE YELLOW LINE (< 100,000 LF)	LF	1633		
43	535.2	4 INCH WIDE WHITE LINE (< 30,000 LF)	LF	1200		
44	535.3	6 INCH WIDE YELLOW LINE	LF	349		
45	535.3	8 INCH WIDE YELLOW LINE	LF	104		
46	535.4	6 INCH WIDE WHITE LINE	LF	1086		
47	535.4	8 INCH WIDE WHITE LINE	LF	92		
48	535.*	12 INCH WHITE LINE	LF	89		
49	535.7	24 INCH WIDE WHITE LINE (< 1,500 LF)	LF	346		
50	536.21	12 INCH WIDE BLACK LINE	LF	480		
51	540	TEMPORARY EROSION, SEDIMENTATION AND WATER POLLUTION PREVENTION CONTROL	LS	1		
52	615.1	TRAFFIC SIGNAL CONTROLLER ASSEMBLY (TYPE 332 CABINET)	EA	1		
53	618.1	CONDUIT (2 INCH/PVC SCHEDULE 40)	LF	60		
54	618.2	CONDUIT (3 INCH/PVC SCHEDULE 40)	LF	120		
55	618.5	CONDUIT (3 INCH/PVC SCHEDULE 40)(BORE)	LF	90		
56	620.1	ELECTRICAL CONDUCTORS (NO. 6)(BARE)	LF	82		
57	620.2	ELECTRICAL CONDUCTORS (NO. 8)(BARE)	LF	330		
58	620.3	ELECTRICAL CONDUCTORS (NO. 6)(INSULATED)	LF	290		
59	624.8	GROUND BOXES TYPE D (162922) WITH APRON	EA	3		
60	628.1	ELECTRICAL SERVICES (INSTALLATION)	EA	1		
61	655.1	TYPE 332 CONTROLLER FOUNDATION	EA	1		
62	682.1	INSTALL VEHICLE SIGNAL SECTION WITH BACK PLATE (12 INCH)(1 SECTION)	EA	12		
63	684.1*	TRAFFIC SIGNAL CABLES (TYPE A)(14 AWG)(CONDUCTOR NO. 4)	EA	250		
64	684.1	TRAFFIC SIGNAL CABLES (TYPE A)(14 AWG)(CONDUCTOR NO. 9)	EA	2420		
65	684.1	TRAFFIC SIGNAL CABLES (TYPE A)(16 AWG)(CONDUCTOR NO. 3)	EA	460		
66	686.1	INSTALL TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)(1 ARM 32')(LUM)	EA	2		
67	687.1	PEDESTAL POLE ASSEMBLY	EA	1		
68	688.2	PEDESTRIAN DETECTORS (2 INCH PUSH BUTTON)	EA	3		
69	805.1	POLICE OFFICER;	HR	80		
70	5073	PRECAST CONCRETE WHEEL STOP	EA	22		
71	6001	PORTABLE CHANGEABLE MESSAGE SIGN (TXDOT SPEC)	EA	3		
72	LA 1	FINE GRADING	LS	1		

ITEM NO.	SPEC	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
73	LA 2	BRICK PAVERS	SF	1380		
74	LA 4	RAW STEEL FOOT BRIDGE	EA	2		
75	LA 5	C.M.U. CONCRETE SEAT WALLS	LF	57		
76	LA 6	SHADE TREE 4-5" CAL.	EA	5		
77	LA 7	SHADE TREE 6" CAL.	EA	1		
78	LA 8	ORNAMENTAL TREE 2" CAL.	EA	8		
79	LA 9	SOIL AMENDMENT IN PLANTING BED	SF	4295		
80	LA 10	PLANT BEDS (GROUNDCOVER PLANTING)	SF	4295		
81	LA 11	PERMANENT IRRIGATION SYSTEM	SF	4295		
82	LA 12	BIKE RACK	EA	3		
83	LA 13	24" - 48" LIMESTONE BOULDER	EA	145		
84	LA 14	LIGHTING ALLOWANCE	ALW	1	$30,000.00	$30,000.00
85	SS845.5	TEMPORARY CONSTRUCTION SECURITY FENCE	LF	468		
86	SS845.6	TEMPORARY WOOD FENCE	LF	28		
87	SUP 1	CPS POLE RELOCATION	EA	3		
88	SUP 2	VIA BUS STOP (SHELTER) RELOCATION (PERMANENT)	LS	1		
89	SUP 3	SWALE	LS	1		
					SUBTOTAL (LINES 1-89)	
90	100	MOBILIZATION (MAX. 10% OF ITEMS 1 TO 89)	LS	1		
91	101	PREPARING RIGHT-OF-WAY (MAX. 5% OF ITEMS 1 TO 89)	LS	1		
					TOTAL (TO INCLUDE LINE ITEMS 1-89 AND 90-91)	

PROPOSAL SUBMITTED BY:

Respondent:
Signature:
Printed Name:
Title:
Date:

ATTACHMENT A – PROPOSAL FORM

1. The Proposal Form is included as Attachment A. All blanks on the Proposal Form must be filled by typing, or by writing in blue or black ink. Unfilled blanks may result in the proposal being disqualified.
2. A proposal showing omissions, alterations, conditions, exceptions or other qualifiers which modify the Proposal Form may be rejected as irregular.
3. Prices should be itemized. Unit prices shall be set to no more than two (2) decimal places. The Owner reserves the right to award by item or by lump sum. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

ATTACHMENT B – ORGANIZATION AND BUSINESS INFORMATION

1. Provide general information on your company including the company name, address, website, main telephone number(s) and email address(es) for communication regarding the Bid.
2. Briefly introduce your company, providing a summary of the administration, organization and staffing of your company. Include any information that makes your company unique and sets your company apart from others in your industry.
3. Include indicators of organization size: number of full-time employees, average number of projects per year, number of years in business, estimated revenue, and average project construction cost.
4. Provide the names of subcontractors completing ten percent (10%) or more of the work and include what aspects of the work they are completing and the approximate percent.

ATTACHMENT C – EXPERIENCE/PAST PERFORMANCE OF RESPONDENT WITH SIMILAR PROJECTS

1. Respondent shall include 3-5 similar current or previous projects completed in the last ten (10) years. Include project owner, name, description, cost, schedule, and personnel, for each relevant project.
2. Indicate whether the original contract price and schedule was met for each project. If not, please explain.
3. Include reference information for each project.
4. If Respondent is proposing the use of a Subcontractor for over fifty percent (50%) of the work or alternate work, at least one of the Projects provided must be representative of that Subcontractors work.

ATTACHMENT D – EXPERIENCE AND QUALIFICATIONS OF PROPOSED KEY PERSONNEL WITH SIMILAR PROJECTS

1. Provide experience and qualifications for the proposed project manager and superintendent including their years of relevant experience, years with company, education, licenses/certifications, and percent availability.

2. Provide a summary of relevant experience for the proposed Project Manager and superintendent that highlights similar projects and their respective role on those projects.

ATTACHMENT E – SAFETY PROGRAM

1. Provide details regarding Workers' Compensation Experience Modification Rate and OSHA 200 Log for the last five (5) years.
2. Complete safety questionnaire. Respondent does not need to submit their Safety Plan at this time. By evaluating the Respondent safety program, Owner does not endorse or take any responsibility for the effectiveness of the program or any activities to be carried out as part of the program.

ATTACHMENT F – LITIGATION, CLAIMS, AND COMPLIANCE (for Public Sector Owners in Texas)

1. Provide an explanation if the Respondent has defaulted on any project or failed to complete any project.
2. Provide an explanation if the Respondent has been assessed liquidated damages.
3. Provide an explanation if the Respondent has been charged or fined for non-compliance with any state and/or federal regulation.
4. Disclose any relevant civil or criminal judgments, litigation, or pending investigations which involves the Respondent.

ATTACHMENT F – CERTIFICATION AND ACKNOWLEDGEMENT

1. An authorized representative of the Respondent must complete and sign the Certification and Acknowledgment Form.

ATTACHMENTS

Respondent shall complete and return the following Attachments with the proposal.

Attachment A: Proposal Form

Attachment B: Organization and Business Information

Attachment C: Experience/Past Performance of Respondent with Similar Projects

Attachment D: Experience and Qualifications of Proposed Key Personnel with Similar Projects

Attachment E: Safety Program

Attachment F: Litigation, Claims, and Compliance

Attachment G: Certification and Acknowledgement

Attachment H: Ethics Statement / Disbarment/ Ciq Form/ Residence Certification

ATTACHMENT A

PROPOSAL FORM

PROPOSAL FORM

ARTICLE 1 – PROPOSAL RECIPIENT

1.01 Respondent submits this Proposal to:

City of Alamo Heights
Attn: Elsa Robles, City Secretary
6116 Broadway
San Antonio, Texas 78209

ARTICLE 2 – BASIS OF PROPOSAL

2.01 Respondent agrees that the Work will be complete in accordance with the Contract Documents at the prices shown in Exhibit III – Price Proposal.

2.02 Extended amounts have been computed in accordance with the General Conditions.

2.03 Respondent acknowledges that the estimated quantities are not guaranteed, and final payment for all price items will be based on actual quantities provided, measured as provided in the Contract Documents.

2.04 Prices shown in Exhibit III – Price Proposal will be used to compute the actual Proposal price.

ARTICLE 3 – TIME FOR COMPLETION

3.01 Respondent agrees that the Work will be Substantially Complete and will be completed and ready for final payment in accordance with the General Conditions in Exhibit VIII – General Conditions of the Contract.

ARTICLE 4 – RESPONDENT'S ACKNOWLEDGMENTS

4.01 Respondent proposes and agrees, if this Proposal is accepted, to enter into an agreement with Owner on the form included in the Contract Documents and to perform all Work specified or indicated in Contract Documents for the Contract Price indicated in this Proposal or as modified by Contract Amendment. Respondent agrees to complete the Work within the Contract Times established by the Agreement or as modified by Contract Amendment and comply with all other terms and conditions of the Contract Documents.

4.02 Respondent accepts all the terms and conditions of "Request for Proposals."

4.03 Respondent accepts all the terms and conditions of Exhibit ____ "Agreement," including those related to liquidated damages.

4.04 Respondent acknowledges receipt of the following Addenda:

Addendum No.	Addendum Date	Signature Acknowledging Receipt

ARTICLE 5 – RESPONDENT'S REPRESENTATIONS

5.01 Respondent is authorized to conduct business in the State of Texas or will obtain said authority prior to award of the Contract.

5.02 Respondent has examined and carefully studied the Contract Documents and the other related data identified in the Proposal Documents.

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

5.04 Respondent is familiar with Laws and Regulations that may affect cost, progress, and performance of the Work.

5.05 Respondent has considered the:

A. Information known to Respondent;

B. Information commonly known to contractors doing business in the locality of the Site;

C. Information and observations obtained from visits to the Site; and

D. The Contract Documents.

5.06 Respondent has considered the items identified in this Article with respect to the effect of such information, observations, and documents on:

A. The cost, progress, and performance of the Work;

B. The means, methods, techniques, sequences, and procedures of construction to be employed by Respondent; and

C. Respondent's safety precautions and programs.

5.07 Respondent agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents based on the information and observations referred to in the preceding paragraphs.

5.08 Respondent is aware of the general nature of Work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

5.09 Respondent has correlated the information known to Respondent, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

5.10 Respondent has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Respondent has discovered in the Contract Documents, and the written resolution provided by Owner is acceptable to Respondent.

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

5.12 Respondent's submittal of a Proposal constitutes an incontrovertible representation that, without exception, all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 6 – ATTACHMENTS TO THIS PROPOSAL

6.01 The following documents are attached to and made a condition of this Proposal:

A. "Proposal Form to Attachment A."

B. Organization And Business Information--Attachment B

C. Experience/Past Performance Of Respondent With Similar Projects--Attachment C

D. Experience And Qualifications Of Proposed Key Personnel With Similar Projects--Attachment D

E. Safety Program--Attachment E

F. Litigation, Claims, And Compliance--Attachment F

G. Proposal Security--Attachment G

H. Certification And Acknowledgment--Attachment H

I. Attachment I Forms:

i. Ethics Statement
ii. Certification Regarding Debarment, Suspension
iii. Conflicts of Interest Questionnaire
iv. Residence Certification

ARTICLE 7 – PROPOSAL DELIVERY

7.01 This Proposal is submitted by:

Respondent: _____
(typed or printed name of organization)

Signature: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed

Address for giving notices:

_____

_____

_____

Phone: _____ Email: _____

(Attach evidence of authority to sign if Respondent is a corporation, partnership, or a joint venture.)

END OF SECTION

ATTACHMENT A

PRICING WORKBOOK

ATTACH COMPLETED EXHIBIT III – PRICING WORKBOOK

ATTACHMENT B

ORGANIZATION AND BUSINESS INFORMATION

GENERAL INFORMATION	
Organization Doing Business As:	
Business Address of Principal Office:	
Business City, State and Zip Code:	
Main Telephone Number:	
Fax Number:	
Web Site Address:	
Form of Business (select one):	Corporation Partnership Individual Joint Venture
Main Contact:	
Main Contact's Direct Line:	
Main Contact's Mobile Phone:	
Main Contact's Email Address:	

Organization Introduction

Indicators of Organization Size	
Current Number of Full Time Employees:	
Average Number of Projects Per Year:	
Number of Years in Business:	
Number of Years of Experience in Projects Similar to the Proposed Project:	
Estimate of Current Year's Revenue:	
Average Project Construction Cost:	

List of Major Subcontractors Completing Ten Percent (10%) or More of the Work

Name of Subcontractor	Work to be Provided	Estimated Percent of Contract

ATTACHMENT C

EXPERIENCE/PAST PERFORMANCE OF RESPONDENT

WITH SIMLAR PROJECTS

Project 1

Project For: Prime Contractor Major Subcontractor(s) Name:_____

Project Owner:_____

Project Name:_____

General Description of Project:

Project Cost:_____ Date Project Started:_____

Project Manager:_____

Project Superintendent:_____

Was original contract price met: Yes No

If No, please explain:

Was original contract schedule met: Yes No

If No, please explain:

Reference contact information (listing names indicates approval to contacting the named individuals as a reference):

Owner Name:_____

Organization Name:_____

Owner Telephone Number:_____ Owner Email:_____

Designer Name:_____

Designer Organization Name:_____

Designer Telephone Number:_____ Designer Email:_____

Construction Manager Name:_____

Construction Manager Organization Name:_____

Construction Manager Number:_____ Construction Manager Email:_____

ATTACHMENT C

EXPERIENCE/PAST PERFORMANCE OF RESPONDENT

WITH SIMLAR PROJECTS (CONTINUED)

Project 2

Project For: Prime Contractor Major Subcontractor(s) Name:_____

Project Owner:_____

Project Name:_____

General Description of Project:

Project Cost:_____ Date Project Started:_____

Project Manager:_____

Project Superintendent:_____

Was original contract price met: Yes No

If No, please explain:

Was original contract schedule met: Yes No

If No, please explain:

Reference contact information (listing names indicates approval to contacting the named individuals as a reference):

Owner Name:_____

Organization Name:_____

Owner Telephone Number:_____ Owner Email:_____

Designer Name:_____

Designer Organization Name:_____

Designer Telephone Number:_____ Designer Email:_____

Construction Manager Name:_____

Construction Manager Organization Name:_____

Construction Manager Number:_____ Construction Manager Email:_____

ATTACHMENT C

EXPERIENCE/PAST PERFORMANCE OF RESPONDENT

WITH SIMLAR PROJECTS (CONTINUED)

Project 3

Project For: Prime Contractor Major Subcontractor(s) Name:_____

Project Owner:_____

Project Name:_____

General Description of Project:

Project Cost:_____ Date Project Started:_____

Project Manager:_____

Project Superintendent:_____

Was original contract price met: Yes No

If No, please explain:

Was original contract schedule met: Yes No

If No, please explain:

Reference contact information (listing names indicates approval to contacting the named individuals as a reference):

Owner Name:_____

Organization Name:_____

Owner Telephone Number:_____ Owner Email:_____

Designer Name:_____

Designer Organization Name:_____

Designer Telephone Number:_____ Designer Email:_____

Construction Manager Name:_____

Construction Manager Organization Name:_____

Construction Manager Number:_____ Construction Manager Email:_____

ATTACHMENT D

EXPERIENCE AND QUALIFICATIONS OF PROPOSED KEY PERSONNEL WITH SIMILAR PROJECTS

Provide experience and qualifications for the proposed **PROJECT MANAGER** including their years of relevant experience, years with company, education, licenses/certifications, and percent availability:

Project Manager: _____

Years of Relevant Experience: _____ Years with Company: _____

Education: _____

Licenses/Certifications: _____

Percent Availability: _____

Provide a summary of relevant experience for the proposed **PROJECT MANAGER** that highlights similar projects and his/her respective role on those projects:

ATTACHMENT D

EXPERIENCE AND QUALIFICATIONS OF PROPOSED KEY PERSONNEL WITH SIMILAR PROJECTS

(CONTINUED)

Provide experience and qualifications for the proposed **SUPERINTENDENT** including their years of relevant experience, years with company, education, licenses/certifications, and percent availability:

Superintendent: _____

Years of Relevant Experience: _____ Years with Company: _____

Education: _____

Licenses/Certifications: _____

Percent Availability: _____

Provide a summary of relevant experience for the proposed **SUPERINTENDENT** that highlights similar projects and his/her respective role on those projects:

ATTACHMENT E

SAFETY PROGRAM

1. List your organization's Workers' Compensation Experience Modification Rate (EMR) for thelast five years, as obtained from your insurance agent:

Year	EMR

2. Complete the matrix below for the last five years, as obtained from OSHA No. 200 Log:

Year					
Number of Injuries and Illnesses					
Number of Lost Time Accidents					
Number of Recordable Cases					
Number of Fatalities					
Number of employee direct hire fixed hours (round to 1,000's)					

3. Please answer the following questions regarding your safety program:
    1. Are regular project safety meetings held for FieldSupervisor(s)?
        Yes No
        If yes, frequency:
        Weekly
        Bi-Monthly
        Monthly
        As Needed
    2. Are project safety inspections conducted?
        Yes No
        If yes, who performs inspections?_____
        How often?_____
        Who is required to attend?_____
    3. Does your organization have a written safety program?
        Yes No
    4. Does your organization have a safety orientation program for new employees?
        Yes No
    5. Does your organization have a safety orientation program for employees promoted to Field Supervisor?
        Yes No
        If yes, does your Supervisor Safety Program include instructions on the following:
        Safety Work Practices Yes No
        Tool Box Safety Meetings Yes No
        First Aid Procedures Yes No
        Accident Investigation Yes No
        Fire Protection Yes No
        New Worker's Orientation Yes No

ATTACHMENT F

RESPONDENT'S LITIGATION, CLAIMS, AND COMPLIANCE

1. Provide an explanation if the Respondent has defaulted on any project or failed to complete any project:

2. Provide an explanation if Respondent has been assessed liquidated damages:

3. Provide an explanation if the Respondent has been charged or fined for non-compliance with any state and/or federal regulation:

4. Disclose any relevant civil or criminal judgments, litigation, or pending investigations which involves the Respondent:

ATTACHMENT G

CERTIFICATION AND ACKNOWLEDGMENT

The undersigned, as an authorized agent of the Respondent, hereby certifies:

Please check each box below.

☐The Respondent is in receipt of _____ Addenda. Respondent must attach signed Addenda coversheet.

☐The Respondent certifies:

- That (i) it does not Boycott Israel; and (ii) will not Boycott Israel during the term of the Contract. This section does not apply if the Company is a sole proprietor, a non-profit entity or a governmental entity; and only applies if: (i) the Company has ten (10) or more full-time employees and (ii) this Contract has a value of $100,000.00 or more to be paid under the terms of this Contract pursuant to Texas Government Code, Chapter 2271, Section 2271.002.
- That it does not do business with Iran, Sudan, or a foreign terrorist organization pursuant to Texas Government Code, Chapter 2252, Section 2252.153.
- That it does not boycott energy companies and will not boycott energy companies during the term of the Contract pursuant to Texas Government Code, Chapter 2274, Section 2274.002.
- That it (i) does not have a practice, policy, guidance or directive that discriminates against a firearm entity or firearm trade association; and (ii) will not discriminate against a firearm entity or firearm trade association during the term of the Contract pursuant to Texas Government Code, Chapter 2274, Section 2274.002.
- That it is not (i) owned or controlled by (a) individuals who are citizens of China, Iran, North Korea, Russia, or a designated country; or (b) a company or other entity, including a governmental entity, that is owned or controlled by citizens of or is directly controlled by the government of China, Iran, North Korea, Russia, or a designated country; or (ii) headquartered in China, Iran, North Korea, Russia or a designated country pursuant to Texas Government Code, Chapter 2274.

☐The Respondent is qualified to perform the work and services outlined in this Solicitation.

☐The proposal has been arrived at independently and submitted without collusion with any other Respondent, Owner staff or Owner Contractors, and the contents of the proposal have not been communicated by the Respondent or, to the Respondent's best knowledge and belief, by any one of its employees or agents to any person not an employee or agent of the Respondent, and will not be communicated to any person prior to the Owner's final action of this Solicitation prior to Contract award. Nothing in this paragraph shall be construed to prevent or preclude two or more companies or persons from joining together to submit a proposal for the work.

☐The offers, terms, and conditions of the proposal will remain valid and effective and may be relied upon by the Owner for a period of ninety (90) days following the proposal closing date and time as identified in this Solicitation or subsequent Addenda.

Respondent:_____

Signature:_____

Printed Name:_____

Title:_____

Phone Number:_____

Fax Number:_____

Email:_____

Proposal Address:

Order Address:

Remit Address:

Federal Tax ID No.:_____

DUNS No.:_____

ATTACHMENT H

ETHICS STATEMENT / DISBARMENT/ CIQ FORM/ RESIDENCE CERTIFICATION

ETHICS STATEMENT

(Complete and return with bid)

The undersigned bidder, by signing and executing this bid, certifies and represents to the City of Alamo Heights that bidder has not offered, conferred or agreed to confer any pecuniary benefit, as defined by (1.07 (a) (6) of the Texas Penal Code, or any other thing of value as consideration for the receipt of information or any special treatment of advantage relating to this bid; the bidder also certifies and represents that the bidder has not offered, conferred or agreed to confer any pecuniary benefit or other thing of value as consideration for the recipient's decision, opinion, recommendation, vote or other exercise of discretion concerning this bid, the bidder certifies and represents that bidder has neither coerced nor attempted to influence the exercise of discretion by any officer, trustee, agent or employee of the City of Alamo Heights concerning this bid on the basis of any consideration not authorized by law; the bidder also certifies and represents that bidder has not received any information not available to other bidders so as to give the undersigned a preferential advantage with respect to this bid; the bidder further certifies and represents that bidder has not violated any state, federal, or local law, regulation or ordinance relating to bribery, improper influence, collusion or the like and that bidder will not in the future offer, confer, or agree to confer any pecuniary benefit or other thing of value of any officer, trustee, agent or employee of the City of Alamo Heights in return for the person having exercised their person's official discretion, power or duty with respect to this bid; the bidder certifies and represents that it has not now and will not in the future offer, confer, or agree to confer a pecuniary benefit or other thing of value to any officer, trustee, agent, or employee of the City of Alamo Heights in connection with information regarding this bid, the submission of this bid, the award of this bid or the performance, delivery or sale pursuant to this bid.

THE VENDOR/CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD HARMLESS THE CITY OF ALAMO HEIGHTS, ALL OF THEIR OFFICERS, AGENTS AND EMPLOYEES FROM AND AGAINST ALL CLAIMS, ACTIONS, SUITS, DEMANDS, PROCEEDINGS, COSTS, DAMAGES, AND LIABILITIES, ARISING OUT OF, CONNECTED WITH, OR RESULTING FROM ANY NEGLIGENT ACTS OR OMISSIONS OF CONTRACTOR OR ANY AGENT, EMPLOYEE, SUBCONTRACTOR, OR SUPPLIER OF CONTRACTOR IN THE EXECUTION OR PERFORMANCE OF THIS BID.

I have read all of the specifications and general bid requirements and do hereby certify that all items submitted meet specifications.

COMPANY: _____

AGENT NAME: _____

AGENT SIGNATURE:_____

ADDRESS:_____

CITY: _____

STATE: _____ ZIP CODE: _____

TELEPHONE: _____ TELEFAX: _____

FEDERAL ID#: _____AND/OR SOCIAL SECURITY #: _____

DEVIATIONS FROM SPECIFICATIONS IF ANY:

NOTE: QUESTIONS AND CONCERNS FROM PROSPECTIVE CONTRACTORS SHOULD BE RAISED WITH OWNER AND ITS CONSULTANT (IF APPLICABLE) AND RESOLVED IF POSSIBLE, PRIOR TO THE BID SUBMITTAL DATE. ANY LISTED DEVIATIONS IN A FINALLY SUBMITTED BID MAY ALLOW THE OWNER TO REJECT A BID AS NON-RESPONSIVE.

CERTIFICATION REGARDING DEBARMENT, SUSPENSION,
AND OTHER RESPONSIBILITY MATTERS
(Complete and Return with Bid)

Name of Entity: _____

The prospective participant certifies to the best of their knowledge and belief that they and their principals:

a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency:
b) Have not within a three (3) year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, Local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and
d) Have not within a three (3) year period preceding this bid had one or more public transactions (Federal, State, Local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this bid or termination of the award. In addition, under 18 USC Section 1001, a false statement may result in a fine up to a $10,000.00 or imprisonment for up to five (5) years, or both.

_____
Name and Title of Authorized Representative (Typed)

_____ _____
Signature of Authorized Representative Date

☐ I am unable to certify to the above statements. My explanation is attached.

EPA FORM 5700-49 (11-88)

THIS FORM MUST BE COMPLETED IN ITS ENTIRETY & SUBMITTED WITH BID RESPONSE

CONFLICT OF INTEREST QUESTIONNAIRE — FORM CIQ

For vendor doing business with local governmental entity

OFFICE USE ONLY
Date Received

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.

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

Form provided by Texas Ethics Commission www.ethics.state.tx.us Revised 11/30/2015

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.

CITY OF ALAMO HEIGHTS

RESIDENCE CERTIFICATION

In accordance with Chapter 2252 of the Texas Government Code, the following will apply. The pertinent portion of the Code has been extracted and is as follows:

Section 2252.001

(3) "Nonresident bidder" refers to a person who is not a resident of Texas.

(4) " Resident bidder " refers to a person whose principal place of business is in this State, including a contractor whose ultimate parent company or majority owner has its place of business in this State.

Section 2252.002

A governmental entity may not award a governmental contract to a nonresident bidder unless the nonresident bidder underbids the lowest bid submitted by a responsible resident bidder by an amount that is not less than the amount by which a resident bidder would be required to underbid the nonresident bidder to obtain a comparable contract in:
(1) The state in which the nonresident's principal place of business is located; or
(2) A state in which the nonresident is a resident manufacturer.

I certify that_____(Company Name) is **a resident Texas bidder** as defined in Section 2252.001(4) of the Texas Government Code.

Signature: _____

Print Name: _____

I certify that_____(Company Name) is a **nonresident bidder** as defined in Section 2252.001(3) of the Texas Government Code and our principal place of

business is:_____
(City and State)

Signature: _____

Print Name: _____

BROADWAY & OGDEN LN.
INTERSECTION PLANS
CONSTRUCTION CONTRACT

GENERAL CONDITIONS &
SUPPLEMENTARY CONDITIONS

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

ACEC
American Council of Engineering Companies

ASCE
American Society of Civil Engineers

NSPE
National Society of Professional Engineers

Endorsed By

CSI
Building Knowledge
Improving Project Delivery

NUCA
We Dig America

EJCDC® C-700, Standard General Conditions of the Construction Contract.
Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Copyright© 2018

National Society of Professional Engineers

1420 King Street, Alexandria, VA 22314-2794

(703) 684-2882

www.nspe.org

American Council of Engineering Companies

1015 15th Street N.W., Washington, DC 20005

(202) 347-7474

www.acec.org

American Society of Civil Engineers

1801 Alexander Bell Drive, Reston, VA 20191-4400

(800) 548-2723

www.asce.org

The copyright for this EJCDC document is owned jointly by the three sponsoring organizations listed above. The National Society of Professional Engineers is the Copyright Administrator for the EJCDC documents; please direct all inquiries regarding EJCDC copyrights to NSPE.

NOTE: EJCDC publications may be purchased at www.ejcdc.org, or from any of the sponsoring organizations above.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

Page

Article 1—Definitions and Terminology 1
1.01 Defined Terms 1
1.02 Terminology 6
Article 2—Preliminary Matters 7
2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance 7
2.02 Copies of Documents 7
2.03 Before Starting Construction 7
2.04 Preconstruction Conference; Designation of Authorized Representatives 8
2.05 Acceptance of Schedules 8
2.06 Electronic Transmittals 8
Article 3—Contract Documents: Intent, Requirements, Reuse 9
3.01 Intent 9
3.02 Reference Standards 9
3.03 Reporting and Resolving Discrepancies 10
3.04 Requirements of the Contract Documents 10
3.05 Reuse of Documents 11
Article 4—Commencement and Progress of the Work 11
4.01 Commencement of Contract Times; Notice to Proceed 11
4.02 Starting the Work 11
4.03 Reference Points 11
4.04 Progress Schedule 12
4.05 Delays in Contractor's Progress 12
Article 5—Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions 13
5.01 Availability of Lands 13
5.02 Use of Site and Other Areas 14
5.03 Subsurface and Physical Conditions 15
5.04 Differing Subsurface or Physical Conditions 16

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

5.05 Underground Facilities....17
5.06 Hazardous Environmental Conditions at Site....19
Article 6—Bonds and Insurance....21
6.01 Performance, Payment, and Other Bonds....21
6.02 Insurance—General Provisions....22
6.03 Contractor's Insurance....24
6.04 Builder's Risk and Other Property Insurance....25
6.05 Property Losses; Subrogation....25
6.06 Receipt and Application of Property Insurance Proceeds....27
Article 7—Contractor's Responsibilities....27
7.01 Contractor's Means and Methods of Construction....27
7.02 Supervision and Superintendence....27
7.03 Labor; Working Hours....27
7.04 Services, Materials, and Equipment....28
7.05 "Or Equals"....28
7.06 Substitutes....29
7.07 Concerning Subcontractors and Suppliers....31
7.08 Patent Fees and Royalties....32
7.09 Permits....33
7.10 Taxes....33
7.11 Laws and Regulations....33
7.12 Record Documents....34
7.13 Safety and Protection....34
7.14 Hazard Communication Programs....35
7.15 Emergencies....35
7.16 Submittals....35
7.17 Contractor's General Warranty and Guarantee....38
7.18 Indemnification....39
7.19 Delegation of Professional Design Services....39
Article 8—Other Work at the Site....40
8.01 Other Work....40
8.02 Coordination....41
8.03 Legal Relationships....41

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Article 9—Owner's Responsibilities....42
9.01 Communications to Contractor....42
9.02 Replacement of Engineer....42
9.03 Furnish Data....43
9.04 Pay When Due....43
9.05 Lands and Easements; Reports, Tests, and Drawings....43
9.06 Insurance....43
9.07 Change Orders....43
9.08 Inspections, Tests, and Approvals....43
9.09 Limitations on Owner's Responsibilities....43
9.10 Undisclosed Hazardous Environmental Condition....43
9.11 Evidence of Financial Arrangements....43
9.12 Safety Programs....43
Article 10—Engineer's Status During Construction....44
10.01 Owner's Representative....44
10.02 Visits to Site....44
10.03 Resident Project Representative....44
10.04 Engineer's Authority....44
10.05 Determinations for Unit Price Work....45
10.06 Decisions on Requirements of Contract Documents and Acceptability of Work....45
10.07 Limitations on Engineer's Authority and Responsibilities....45
10.08 Compliance with Safety Program....45
Article 11—Changes to the Contract....46
11.01 Amending and Supplementing the Contract....46
11.02 Change Orders....46
11.03 Work Change Directives....46
11.04 Field Orders....47
11.05 Owner-Authorized Changes in the Work....47
11.06 Unauthorized Changes in the Work....47
11.07 Change of Contract Price....47
11.08 Change of Contract Times....49
11.09 Change Proposals....49
11.10 Notification to Surety....50

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Article 12—Claims 50
12.01 Claims 50
Article 13—Cost of the Work; Allowances; Unit Price Work 51
13.01 Cost of the Work 51
13.02 Allowances 55
13.03 Unit Price Work 55
Article 14—Tests and Inspections; Correction, Removal, or Acceptance of Defective Work 56
14.01 Access to Work 56
14.02 Tests, Inspections, and Approvals 56
14.03 Defective Work 57
14.04 Acceptance of Defective Work 58
14.05 Uncovering Work 58
14.06 Owner May Stop the Work 58
14.07 Owner May Correct Defective Work 59
Article 15—Payments to Contractor; Set-Offs; Completion; Correction Period 59
15.01 Progress Payments 59
15.02 Contractor's Warranty of Title 62
15.03 Substantial Completion 62
15.04 Partial Use or Occupancy 63
15.05 Final Inspection 64
15.06 Final Payment 64
15.07 Waiver of Claims 65
15.08 Correction Period 66
Article 16—Suspension of Work and Termination 67
16.01 Owner May Suspend Work 67
16.02 Owner May Terminate for Cause 67
16.03 Owner May Terminate for Convenience 68
16.04 Contractor May Stop Work or Terminate 68
Article 17—Final Resolution of Disputes 69
17.01 Methods and Procedures 69
Article 18—Miscellaneous 69
18.01 Giving Notice 69
18.02 Computation of Times 69

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

18.03 Cumulative Remedies 69
18.04 Limitation of Damages 70
18.05 No Waiver 70
18.06 Survival of Obligations 70
18.07 Controlling Law 70
18.08 Assignment of Contract 70
18.09 Successors and Assigns 70
18.10 Headings 70

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

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

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*

a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.

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

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

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

32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

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

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

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

37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

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

39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

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

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

    c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

48. *Unit Price Work*—Work to be paid for on the basis of unit prices.

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

50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

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

1. does not conform to the Contract Documents;

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

3. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

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

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

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

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

F. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

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

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:

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

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.

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

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

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

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

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

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

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

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

2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

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

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

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

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

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

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

4.03 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. Abnormal weather conditions;

3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and

4. Acts of war or terrorism.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;

2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.

G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ANY SUCH CLAIM, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY CLAIM OR ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY SUCH OWNER OR OCCUPANT AGAINST OWNER, ENGINEER, OR ANY OTHER PARTY INDEMNIFIED HEREUNDER TO THE EXTENT CAUSED DIRECTLY OR INDIRECTLY, IN WHOLE OR IN PART BY, OR BASED UPON, CONTRACTOR'S PERFORMANCE OF THE WORK, OR BECAUSE OF OTHER ACTIONS OR CONDUCT OF THE CONTRACTOR OR THOSE FOR WHICH CONTRACTOR IS RESPONSIBLE.**

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

5.03 *Subsurface and Physical Conditions*

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

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

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

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

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

5.04 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;

2. is of such a nature as to require a change in the Drawings or Specifications;

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

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

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

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

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

c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and

4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

c. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, OWNER SHALL INDEMNIFY AND HOLD HARMLESS CONTRACTOR, SUBCONTRACTORS, AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT, ARBITRATION, OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO A HAZARDOUS ENVIRONMENTAL CONDITION, PROVIDED THAT SUCH HAZARDOUS ENVIRONMENTAL CONDITION (1) WAS NOT SHOWN OR INDICATED IN THE DRAWINGS, SPECIFICATIONS, OR OTHER CONTRACT DOCUMENTS, IDENTIFIED AS TECHNICAL DATA ENTITLED TO LIMITED RELIANCE PURSUANT TO PARAGRAPH 5.06.B, OR IDENTIFIED IN THE CONTRACT DOCUMENTS TO BE INCLUDED WITHIN THE SCOPE OF THE WORK, AND (2) WAS NOT CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 5.06.I OBLIGATES OWNER TO INDEMNIFY ANY INDIVIDUAL OR ENTITY FROM AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE.**

J. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO THE FAILURE TO CONTROL, CONTAIN, OR REMOVE A CONSTITUENT OF CONCERN BROUGHT TO THE SITE BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE, OR TO A HAZARDOUS ENVIRONMENTAL CONDITION CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 5.06.J OBLIGATES CONTRACTOR TO INDEMNIFY ANY INDIVIDUAL OR ENTITY FROM AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE.**

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

7.05 *"Or Equals"*

A. *Contractor's Request; Governing Criteria*: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

4) is not objectionable to Owner.

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

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

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

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

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

    a. will certify that the proposed substitute item will:

        1) perform adequately the functions and achieve the results called for by the general design;

        2) be similar in substance to the item specified; and

        3) be suited to the same use as the item specified.

    b. will state:

        1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;

        2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

        3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

    c. will identify:

        1) all variations of the proposed substitute item from the item specified; and

        2) available engineering, sales, maintenance, repair, and replacement services.

    d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

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

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

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

B. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, OWNER SHALL INDEMNIFY AND HOLD HARMLESS CONTRACTOR, AND ITS OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY INFRINGEMENT OF PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY INVENTION, DESIGN, PROCESS, PRODUCT, OR DEVICE SPECIFIED IN THE CONTRACT DOCUMENTS, BUT NOT IDENTIFIED AS BEING SUBJECT TO PAYMENT OF ANY LICENSE FEE OR ROYALTY TO OTHERS REQUIRED BY PATENT RIGHTS OR COPYRIGHTS.**

C. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY INFRINGEMENT OF**

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY INVENTION, DESIGN, PROCESS, PRODUCT, OR DEVICE NOT SPECIFIED IN THE CONTRACT DOCUMENTS.

7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

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

7.11 *Laws and Regulations*

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

B. **IF CONTRACTOR PERFORMS ANY WORK OR TAKES ANY OTHER ACTION KNOWING OR HAVING REASON TO KNOW THAT IT IS CONTRARY TO LAWS OR REGULATIONS, CONTRACTOR SHALL BEAR ALL RESULTING COSTS AND LOSSES, AND SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH WORK OR OTHER ACTION. IT IS NOT CONTRACTOR'S RESPONSIBILITY TO MAKE CERTAIN THAT THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS IS IN ACCORDANCE WITH LAWS AND REGULATIONS, BUT THIS DOES NOT RELIEVE CONTRACTOR OF ITS OBLIGATIONS UNDER PARAGRAPH 3.03.**

C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

7.12 *Record Documents*

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

7.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

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

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

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

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.

2. *Samples*

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.

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

C. *Engineer's Review of Shop Drawings and Samples*

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

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

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

2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

   a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

   b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

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

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.

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

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

2. normal wear and tear under normal usage.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

1. Observations by Engineer;

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

5. Any review and approval of a Shop Drawing or Sample submittal;
6. The issuance of a notice of acceptability by Engineer;
7. The end of the correction period established in Paragraph 15.08;
8. Any inspection, test, or approval by others; or
9. Any correction of defective Work by Owner.

E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

A. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, AND IN ADDITION TO ANY OTHER OBLIGATIONS OF CONTRACTOR UNDER THE CONTRACT OR OTHERWISE, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM LOSSES, DAMAGES, COSTS, AND JUDGMENTS (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING FROM THIRD-PARTY CLAIMS OR ACTIONS RELATING TO OR RESULTING FROM THE PERFORMANCE OR FURNISHING OF THE WORK, PROVIDED THAT ANY SUCH CLAIM, ACTION, LOSS, COST, JUDGMENT OR DAMAGE IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE, OR DEATH, OR TO DAMAGE TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF), INCLUDING THE LOSS OF USE RESULTING THEREFROM, BUT ONLY TO THE EXTENT CAUSED BY ANY NEGLIGENT ACT OR OMISSION OF CONTRACTOR, ANY SUBCONTRACTOR, ANY SUPPLIER, OR ANY INDIVIDUAL OR ENTITY DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM ANY OF THE WORK, OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE.**

B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications,

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;

2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

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

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.

2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) **INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ANY SUCH CLAIMS, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH DAMAGE, DELAY, DISRUPTION, OR INTERFERENCE**.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

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

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

A. Engineer has the authority to reject Work in accordance with Article 14.

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

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

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

2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:
   1. A mutually acceptable fixed fee; or
   2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
      a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
      b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
      c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
      d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
      e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
      f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

11.08 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.

    a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

    b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

    The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:

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

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

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

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

5. Other costs consisting of the following:

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

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

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

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

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

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

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

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

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

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

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *Allowances*

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

B. *Cash Allowances*: Contractor agrees that:

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

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

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

13.03 *Unit Price Work*

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

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

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

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

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

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work;

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

    d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

    e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. The Contract Price has been reduced by Change Orders;

i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or

l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents;

b. consent of the surety, if any, to final payment;

c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

d. a list of all duly pending Change Proposals and Claims; and

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim, appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;
2. correct such defective Work;
3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

BROADWAY & OGDEN LN.
INTERSECTION PLANS
CONSTRUCTION CONTRACT

SUPPLEMENTARY CONDITIONS

00 73 00 SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement Section 00 72 00 “General Conditions.” The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below.

The paragraph numbers used in the Supplementary Conditions correspond to the General Condition paragraphs they modify with the prefix "SC" added—for example, “Paragraph SC-4.05.” modifies General Conditions Paragraph 4.05.

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01 Defined Terms

A. Supplement Paragraph 1.01.A by inserting the following defined terms as numbered items in their proper alphabetical positions:

1. *Bid Security*—The financial security provided by Offeror at the time the Bid is submitted and held by Owner until the Agreement is executed and the evidence of insurance and bonds required by the Contract Documents are provided.
2. *Construction Manager*—The individual or entity named as the Construction Manager in the Agreement and the consultants, subconsultants, individuals, or entities directly or indirectly employed or retained by them to provide construction management as advisor services to the Owner.
3. *Contract Amendment*—A document issued on or after the Effective Date of the Contract and signed by Owner and Contractor which:
    a. Authorizes new phases of the Work and establishes the Contract Price, Contract Times, or terms and conditions of the Contract for the new phase of Work; or
    b. Modifies the terms and conditions of the Contract, but does not make changes in the Work.
4. *Contractor’s Team*—Contractor, Subcontractors, Suppliers, and individuals or entities directly or indirectly employed or retained by Contractor, Subcontractors, or Suppliers to perform part of the Work, or anyone for whose acts they may be liable.
5. *Defective*—When applied to Work, refers to Work that is unsatisfactory, faulty, or deficient in that it:
    a. Does not conform to the Contract Documents;
    b. Does not meet the requirements of applicable inspections, reference standards, tests, or approvals referred to in the Contract Documents; or
    c. Has been damaged prior to Construction Manager’s recommendation of final payment unless responsibility for the protection of the Work has been assumed by Owner at Substantial Completion in accordance with Paragraphs 15.03 or 15.04.

6. *Design Professional*—The individuals or entity named as the Architect or Engineer in the Agreement and the subconsultants, individuals, or entities directly or indirectly employed or retained by Design Professional to provide design or other technical services to the Owner. Design Professional has responsibility for design and technical issues related to the Contract Documents.

7. *Final Completion*—The point where the Work is complete in accordance with the Contract Documents, items and documents required by the Contract Documents have been accepted by the Owner and the Project is ready for Final Payment.

8. *Indemnified Costs*—All costs, losses, judgments, and damages resulting from claims or demands against Owner's Indemnitees. These costs include fees for design professionals, attorneys, and other professionals and any legal, court, arbitration, or other dispute resolution costs.

9. *Manufacturer*—The individual or entity that designs, casts, fabricates, manufactures, assembles, tests, and provides materials or equipment to be incorporated in the Work.

10. *Modification*—Change made to the Contract Documents by Contract Amendment, Change Order, Field Order, or Work Change Directive.

11. *Offeror*—An individual or entity that submits a Bid or Proposal to Owner. When used in the Bidding Documents, Proposal Documents, or Contract Documents, the term Bidder has the same meaning as the term Offeror.

12. *Owner's Budget*—The amount budgeted by the Owner for the construction of the Project.

13. *Owner's Indemnitees*—Each member of the OPT and their officers, directors, members, partners, employees, agents, consultants, and subcontractors.

14. *Owner's Project Team (OPT)*—The Owner, Design Professional, Construction Manager, and the other entities identified in the Supplementary Conditions and the consultants, subconsultants, individuals or entities directly or indirectly employed or retained by them to provide services to the Owner. The OPT consists of the following organizations:

    a. City of Alamo Heights, Texas – 6116 Broadway, Alamo Heights, TX 78209

    b. WGI, Inc. – 755 E Mulberry Ave, Suite 501, San Antonio, TX 78212

15. *Project Construction Manager (PCM)*—The authorized representative of the OPT assigned to assist the Construction Manager at the Site. The term Project Construction Manager includes assistants and field staff of the Construction Manager.

16. *Project Management Information System (PMIS)*—The online project management system that will be used by OPT and Contractor to submit and share documentation and other related communications and information for this Project.

17. *Schedule of Anticipated Payments*—A detailed tabulation, prepared and maintained by Contractor, showing the anticipated amount of each Application for Payment and the month in which they will be submitted.

18. Schedule of Documents—A detailed tabulation, prepared and maintained by Contractor, of each required document submittal and the time requirements for review and approval of each submittal. When used in the Bidding Requirements, Proposal Requirements, or Contract Documents, the term Schedule of Submittals has the same meaning as the term Schedule of Documents.

19. *Set-off*–A reduction in payment due to Contractor under Article 15.

SC-1.02 Terminology

A. Supplement Paragraph 1.02 by adding the following paragraphs:

"H. The terms "includes" and "including" are used as terms of enlargement and not of limitation or exclusive enumeration, and use of these terms does not create a presumption that components not expressed are excluded. The terms "consist of" or "consisting of" limits the interpretation to only those items specifically listed."

"I. It is understood that the cost of providing Work is included in the Contract Price and no additional compensation is to be paid by Owner unless specifically stated otherwise in the Contract Documents. Expressions like "at no additional cost to Owner," "at Contractor's expense," or similar words mean that the Contractor is to include the cost of this Work in their Contract Price and perform or provide specified Work without an increase in the Contract Price."

"J. Written documents are required where reference is made to notices, reports, approvals, consents, statements, instructions, opinions, or other types of documentation or communications required by the Contract Documents. Approval and consent documents must be received by Contractor prior to the action or decision for which approval or consent is given. These may be made in printed or electronic format through the OPT's Project Management Information System or other electronic media as required by the Contract Documents or approved by the Construction Manager."

"K. Giving notice as required by the Contract Documents may be by printed or electronic media using a method that requires acknowledgment of the receipt of that notice."

ARTICLE 2—PRELIMINARY MATTERS

SC-2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance

A. Delete Paragraph 2.01.B in its entirety and insert the following in its place:

"B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver copies of the insurance policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in this Contract. Contractor may redact any confidential premium or pricing information contained in any policy or endorsement furnished under this provision."

B. Delete Paragraph 2.01.C in its entirety.

SC-2.02 Copies of Documents

A. Delete Paragraphs 2.02.A and 2.02.B in their entirety and insert the following in their place:

"A. Owner shall furnish one fully signed counterpart of the Agreement and one copy of the executed Contract Documents in electronic Portable Document Format (PDF). This document is the Project Record Copy of the Contract Documents. Contractor may make as many prints of the documents as needed for construction. Engineer will not provide printed or hard copies to the Contractor."

SC-2.06 Electronic Submittals

A. Delete Paragraphs 2.06.B and 2.06.C in their entirety and insert the following in their place:

"B. Electronic Documents Protocol: The parties shall conform to the provisions in Section 01 33 00 "Document Management" for exchange of electronic transmittals.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC-3.01 Intent

A. Delete Paragraph 3.01.A in its entirety and insert the following in its place:

"A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all. The Drawings and Specifications do not indicate or describe all of the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer. Provide any work, materials, or equipment required for a complete and functional system even if they are not detailed or specified.

1. The Contract requirements described in the General Conditions, Supplementary Conditions, and General Requirements apply to each and all Sections of the Specifications unless specifically noted otherwise.

2. Organization of Contract Documents is not intended to control or to lessen the responsibility of the Contractor when dividing Work among Subcontractors, or to establish the extent of Work to be performed by any trade, Subcontractor, or Supplier. Specifications or details do not need to be indicated or specified in each specification or drawing. Items shown in the Contract Documents are applicable regardless of location in the Contract Documents.

3. Standard paragraph titles and other identifications of subject matter in the Specifications are intended to aid in locating and recognizing various requirements of the Specifications. Titles do not define, limit, or otherwise restrict specification text."

B. Supplement Paragraph 3.01.D by adding the following sentence:

"The Contract Documents comprise the entire Agreement between Owner and Contractor and may be modified only by Field Order, Change Order, Contract Amendment, or Work Change Directive."

C. Supplement Paragraphs 3.01 by adding the following paragraphs:

"H. Where compliance with two or more standards is specified and they establish different or conflicting requirements for minimum quantities or quality levels, Contractor shall comply with the most stringent requirements unless the Contract Documents indicate otherwise.

1. Quantity or quality level shown or indicated shall be the minimum to be provided or performed in every instance.

2. Actual installation shall comply exactly with minimum quality indicated or may exceed that minimum within reasonable limits.

3. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for context of requirements.

4. Refer instances of uncertainty to the Engineer for a decision before proceeding."

"I. Provide materials and equipment comparable in quality to similar materials and equipment incorporated in the Project or as required to meet the minimum requirements of the application if the materials and equipment are shown in the Drawings but are not included in the Specifications."

SC-3.02 Reference Standards

A. Supplement Paragraph 3.02.A by adding the following subparagraph:

"3. Comply with applicable construction industry standards as if bound or copied directly into the Contract Documents regardless of lack of reference in the Contract Documents. Apply provisions of the Contract Documents where Contract Documents include more stringent requirements than the referenced standards.

a. Standards referenced directly in the Contract Documents take precedence over standards that are not referenced but recognized in the construction industry as applicable.

b. Comply with standards not referenced but recognized in the construction industry as applicable for performance of the Work except as otherwise limited by the Contract Documents. Engineer will determine whether codes or standards are applicable to the performance of the Work.

c. Make copies of reference standards available as requested by Engineer or Owner."

SC-3.03 Reporting and Resolving Discrepancies

A. Delete Paragraph 3.03.A.3 in its entirety and insert the following in its place:

"3. In the event of a conflict in the Drawings, Specifications, or other portions of the Contract Documents which were not reported prior to the bidding of the Contract, the Contractor shall be deemed to have included the most expensive item, system, procedure, etc. in its Bid or Proposal."

SC-3.05 Reuse of Documents

A. Delete the last sentence of Paragraph 3.05.B and insert the following in its place:

"Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes, unless specifically prohibited in writing by the Owner for security reasons. If the Owner so directs, Contractor shall surrender all copies of the construction Contract Documents and other related documents, in paper or digital format and remove these documents from computer equipment or storage devices as a condition of final payment."

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.04 Progress Schedule

A. Supplement Paragraph 4.04 by adding the following paragraph:

"C. Contractor assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents."

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.01 Availability of Lands

A. Supplement Paragraph 5.01.C by adding the following sentence:

"A copy of the written agreements for the use of such land shall be provided to the Owner for record purposes."

SC-5.02 Use of Site and Other Areas

A. Delete Paragraph 5.02.A.2 in its entirety and insert the following in its place:

"2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ANY SUCH CLAIM, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES**

(INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY CLAIM OR ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY SUCH OWNER OR OCCUPANT AGAINST OWNER, ENGINEER, OR ANY OTHER PARTY INDEMNIFIED HEREUNDER TO THE EXTENT CAUSED DIRECTLY OR INDIRECTLY, IN WHOLE OR IN PART BY, OR BASED UPON, CONTRACTOR'S PERFORMANCE OF THE WORK, OR BECAUSE OF OTHER ACTIONS OR CONDUCT OF THE CONTRACTOR OR THOSE FOR WHICH CONTRACTOR IS RESPONSIBLE."

SC-5.03 Subsurface and Physical Conditions

A. This Supplementary Condition identifies the reports and drawings referenced in Paragraph 5.03 of the General Conditions related to subsurface and physical conditions.

1. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Report Date	Technical Data
None		

2. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

Drawing Title	Drawing Date	Technical Data
None		

3. Copies of reports and drawings may be downloaded from the project procurement website.

SC-5.04 Differing Subsurface or Physical Conditions

A. Amend Paragraph 5.04.A by deleting the word "promptly" and inserting "promptly, but no later than within 3 days," in its place.

SC-5.05 Underground Facilities

A. Amend Paragraph 5.05.B by deleting the word "promptly" and inserting "promptly, but no later than within 3 days," in its place.

SC-5.06 Hazardous Environmental Conditions at Site

A. This Supplementary Condition identifies the reports and drawings referenced in Paragraph 5.06 of the General Conditions related to Hazardous Environmental Conditions at the Site.

1. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	Report Date	Technical Data
None		

2. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawing Title	Drawing Date	Technical Data
None		

3. Copies of reports and drawings may be downloaded from the project procurement website.

B. Delete Paragraph 5.06.I in its entirety.

C. Delete Paragraph 5.06.J in its entirety and insert the following in its place:

"J. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO THE FAILURE TO CONTROL, CONTAIN, OR REMOVE A CONSTITUENT OF CONCERN BROUGHT TO THE SITE BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE, OR TO A HAZARDOUS ENVIRONMENTAL CONDITION CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 5.06.J OBLIGATES CONTRACTOR TO INDEMNIFY ANY INDIVIDUAL OR ENTITY FROM AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE."

ARTICLE 6—BONDS AND INSURANCE

SC-6.01 Performance, Payment, and Other Bonds

A. Supplement Paragraph 6.01 by adding the following paragraphs:

"I. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond or payment bond. By Contractor furnishing and Owner accepting these bonds, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor under these bonds, subject to Owner's priority to use the funds for the completion of the Work."

"J. Contractor or surety on behalf of Contractor shall promptly notify the Owner of all claims filed against the payment bond. When a claimant has satisfied the conditions prescribed by Laws and Regulations, the Contractor, or surety on behalf of Contractor, shall, with reasonable promptness, notify the claimant and Owner of the amounts that are undisputed and the basis for challenging any amounts that are

disputed, including, but not limited to, the lack of substantiating documentation to support the claim as to entitlement or amount, and the Contractor, or surety on behalf of Contractor shall, with reasonable promptness, pay or make arrangements for payment of any undisputed amount; provided, however, that the failure of the Contractor or surety on behalf of Contractor to timely discharge its obligations under this paragraph or to dispute or identify any specific defense to all or any part of a claim shall not be deemed to be an admission of liability by the Contractor or surety as to such claim or otherwise constitute a waiver of the Contractor's or surety's defenses to, or right to dispute, such claim.

"K. Owner shall not be liable for payment of any costs or expenses of any claimant under payment bonds, and shall have no obligations to make payments to, give notices on behalf of, or otherwise have obligations to claimants under payment bonds."

SC-6.02 Insurance—General Provisions

A. Delete Paragraph 6.02.A in its entirety and insert the following in its place:

"A. Obtain and maintain insurance in accordance with Section 00 73 16 "Insurance Requirements.""

SC-6.05 Property Losses; Subrogation

A. Delete the words "Owner and Contractor waive" in the first sentence of Paragraph 6.05.A.1 and replace it with the words "Contractor waives".

B. Delete Paragraph 6.05.B.1 in its entirety.

SC-6.06 Receipt and Application of Property Insurance Proceeds

A. Delete Paragraph 6.06 in its entirety.

SC-6.07 Owner's Insurance for Project

A. Add a new Paragraph 6.07 as follows:

"6.07 *Owner's Insurance for Project*

A. Owner shall not be responsible for purchasing and maintaining any insurance to protect the interest of the Contractor, Subcontractors, or others in the Work. The stated limits of insurance required are minimum only. Contractor shall determine the limits that are adequate. These limits may be basic policy limits or any combination of basic limits and umbrella limits. In any event, Contractor is fully responsible for all losses arising out of, resulting from or connected with operations under this Contract whether or not said losses are covered by insurance. The acceptance of certificates or other evidence of insurance by the Owner, Engineer, and/or others listed as an additional insured, that in any respect do not comply with the Contract requirements does not release the Contractor from compliance herewith."

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

SC-7.03 Labor; Working Hours

A. Delete Paragraph 7.03.C in its entirety and insert the following in its place:

"C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, no Work shall be performed at the Site between 6:00 p.m. and 7:00 a.m. Contractor will not permit the performance of Work on a Saturday, Sunday, or any Owner holiday without Owner's written consent. Should Contractor desire to work on these days, Contractor shall contact the Owner, in writing, for approval at least 48 hours in advance. Emergency work may be done without prior permission. Tie ins and connections to existing facilities will be made at time authorized by the Owner. Owner's legal holidays are **Juneteenth, Independence Day, Labor Day, Columbus/Indigenous Peoples' Day, Veteran's Day, Thanksgiving Day, Christmas Eve, Christmas Day, and New Year's Day**."

B. Supplement Paragraph 7.03 by adding the following paragraph:

"D. **Contractor** shall be responsible for the cost of overtime pay or other expense incurred by the Owner for Construction Management Services, Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable Set-off against payments due under Article 15. For purposes of administering the foregoing requirement, additional overtime costs will be billed at rates shown in SC-15.01.E."

SC-7.08 Patent Fees and Royalties

A. Delete Paragraph 7.08.B in its entirety.

B. Delete Paragraph 7.08.C in its entirety and insert the following in its place:

"C. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY INFRINGEMENT OF PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY INVENTION, DESIGN, PROCESS, PRODUCT, OR DEVICE NOT SPECIFIED IN THE CONTRACT DOCUMENTS."

SC-7.10 Taxes

A. Supplement Paragraph 7.10 by adding the following paragraph:

"B. Owner qualifies as an exempt agency as defined by the statutes of the State of Texas. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work."

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

SC-7.11 Laws and Regulations

A. Delete Paragraph 7.11.B in its entirety and insert the following in its place:

"B. IF CONTRACTOR PERFORMS ANY WORK OR TAKES ANY OTHER ACTION KNOWING OR HAVING REASON TO KNOW THAT IT IS CONTRARY TO LAWS OR REGULATIONS, CONTRACTOR SHALL BEAR ALL RESULTING COSTS AND LOSSES, AND SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH WORK OR OTHER ACTION. IT IS NOT CONTRACTOR'S RESPONSIBILITY TO MAKE CERTAIN THAT THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS IS IN ACCORDANCE WITH LAWS AND REGULATIONS, BUT THIS DOES NOT RELIEVE CONTRACTOR OF ITS OBLIGATIONS UNDER PARAGRAPH 3.03."

SC-7.15 Emergencies

A. Amend Paragraph 7.15.A by deleting the last sentence and inserting the following in its place:

"Contractor may submit a Change Proposal if the incident giving rise to the emergency action was not the responsibility of the Contractor and a change in the Contract Documents is required because of the emergency or the action taken by Contractor in response to such an emergency."

SC-7.16 Submittals

A. Delete Paragraph 7.16.A.3 in its entirety and insert the following in its place:

"3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents on a Shop Drawing Deviation Request form provided by the Engineer and request that a Field Order or Change Order be issued for each of the specific variations submitted for approval. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in

addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation."

B. Delete Paragraph 7.16.C.4 in its entirety and insert the following in its place:

"4. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A and Engineer has given written approval of each such variation by issuing a Field Order or Change Order. If the proposed Modification is approved by the Engineer, the submittal will be considered to be in strict compliance with the Contract Documents and it will be reviewed in accordance with the Contract Documents. If the proposed Modification is not approved, the submittal will be returned to the Contractor with appropriate comments. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A."

C. Delete Paragraph 7.16.D.1 in its entirety and insert the following in its place:

"1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Resubmittals shall reference and respond directly to Engineer's previous comments. Any variations from strict compliance with the Contract Documents will be identified in the same manner as required in Paragraph 7.16.A and will require the same approvals."

SC-7.18 Indemnification

A. Delete Paragraph 7.18.A in its entirety and insert the following in its place:

"A. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, AND IN ADDITION TO ANY OTHER OBLIGATIONS OF CONTRACTOR UNDER THE CONTRACT OR OTHERWISE, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM LOSSES, DAMAGES, COSTS, AND JUDGMENTS (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING FROM THIRD-PARTY CLAIMS OR ACTIONS RELATING TO OR RESULTING FROM THE PERFORMANCE OR FURNISHING OF THE WORK, PROVIDED THAT ANY SUCH CLAIM, ACTION, LOSS, COST, JUDGMENT OR DAMAGE IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE, OR DEATH, OR TO DAMAGE TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF), INCLUDING THE LOSS OF USE RESULTING THEREFROM, BUT ONLY TO THE EXTENT CAUSED BY ANY NEGLIGENT ACT OR OMISSION OF CONTRACTOR, ANY SUBCONTRACTOR, ANY SUPPLIER, OR ANY INDIVIDUAL OR ENTITY DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM ANY OF THE WORK, OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE."

B. Supplement Paragraph 7.18 by adding the following paragraph:

"C. Contractor's obligations to indemnify or hold Owner's Indemnitees harmless against losses, damages, or expenses specified in these General Conditions shall be subject to the applicable limitations of Chapter 130 of the Texas Civil Practice and Remedies Code."

ARTICLE 8—OTHER WORK AT THE SITE

SC-8.03 Legal Relationships

A. Delete Paragraph 8.03.C in its entirety and insert the following in its place:

"C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) **INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ANY SUCH CLAIMS, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH DAMAGE, DELAY, DISRUPTION, OR INTERFERENCE**."

SC-8.04 Claims Between Contractors

A. Supplement Article 8 by adding the following paragraph:

"8.04 *Claims between Contractors*

A. Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner, Engineer, or the construction coordinator, then Contractor (without involving Owner, Engineer, or construction coordinator) shall either (1) remedy the damage, (2) agree to compensate the other contractor for remedy of the damage, or (3) remedy the damage and attempt to settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.

B. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS AND INDEMNIFIED COSTS ARISING DIRECTLY, INDIRECTLY OR CONSEQUENTIALLY OUT OF ANY ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY OTHER CONTRACTOR AGAINST MEMBERS OF THE OPT TO THE EXTENT SAID CLAIM IS BASED ON OR ARISES OUT OF CONTRACTOR'S PERFORMANCE OF THE WORK. SHOULD ANOTHER CONTRACTOR CAUSE DAMAGE TO THE WORK OR PROPERTY OF CONTRACTOR OR SHOULD THE PERFORMANCE OF WORK BY ANY OTHER CONTRACTOR AT THE SITE GIVE RISE TO ANY OTHER CLAIM, CONTRACTOR SHALL NOT INSTITUTE ANY ACTION, LEGAL OR EQUITABLE, AGAINST OWNER'S INDEMNITEES OR PERMIT ANY ACTION AGAINST ANY OF THEM TO BE MAINTAINED AND CONTINUED IN ITS NAME OR FOR ITS BENEFIT IN ANY COURT OR BEFORE ANY ARBITER WHICH SEEKS TO IMPOSE LIABILITY ON OR TO RECOVER DAMAGES FROM MEMBERS OF THE OPT ON ACCOUNT OF ANY SUCH DAMAGE OR CLAIM.**

C. Contractor may submit a Change Proposal for an extension of Contract Times, in accordance with Article 11, if Contractor is delayed at any time in performing or furnishing the Work by any act or neglect of another contractor. An extension of the Contract Times will be Contractor's exclusive remedy with respect to members of the OPT for any delay, disruption, interference, or hindrance caused by any other contractor."

ARTICLE 9—OWNER'S RESPONSIBILITIES

SC-9.13 Owner's Site Representative

A. Supplement Article 9 by adding the following paragraph:

"9.13 *Owner's Site Representative*

A. Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner's Site Representative is not Engineer's consultant, agent, or employee. Owner's Site Representative will be City of Alamo Heights Staff.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Resident Project Representative

A. Supplement Paragraph 10.03.A by adding the following subparagraph:

"1. Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work on this Project by agreement with the Owner."

ARTICLE 11—CHANGES TO THE CONTRACT

SC-11.02 Change Orders

A. Supplement Paragraph 11.02 by adding the following paragraph:

"C. Contractor assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents unless the variation is specifically approved by Change Order."

SC-11.11 No Damage for Delays

A. Supplement Article 11 by adding the following paragraph:

"11.11 *No Damage for Delays*

A. Contractor agrees to make no Claims for damage for delay in the performance of the Contract occasioned by any act or omission to act of the Owner, Engineer, or any of the Engineer's or Owner's agents, and agrees that any such Claim shall be fully compensated by an extension of time, as set forth in a Change Order, to complete performance of the Work as provided herein."

ARTICLE 12—CLAIMS

SC-12.01 Claims

A. Amend Paragraph 12.01.B by deleting "but in no event later than 30 days" and inserting "but in no event later than 7 days" in its place.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-13.01 Cost of the Work

A. Amend Paragraph 13.01.B by deleting the following words in the first sentence:

"commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:"

and insert the following in its place:

"those paid for the Work included in the Contract Price, and shall not include any of the costs itemized in Paragraph 13.01.C. Contractor shall provide certified payroll records listing personnel classifications and salaries for all individuals involved in additional Work. Salaries for those not included in the certified payroll will be considered as being compensated under Paragraph 13.01.C, and shall include only the following items:"

B. Amend Paragraph 13.01.B.1 by deleting the following words in the second sentence:

", without limitation, superintendents, foremen"

and inserting the following in its place:

"one foreman (unless agreed upon prior to beginning Work)"

C. Amend Paragraph 13.01.B.1 by deleting the following words in the last sentence:

"be included in the above"

and inserting the following in its place:

"not exceed 1.5 times regular pay and shall be included in the above"

D. Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

"The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of EquipmentWatch Cost Recovery Rental Rate Blue Book, which now online at https://equipmentwatch.com/blue-book-cost-recovery/.

E. Amend Paragraph 13.01.C.1 by adding "superintendents" to the list of excluded personnel in the first sentence.

SC-13.03 Unit Price Work

A. Delete Paragraph 13.03.E in its entirety and insert the following in its place:

"E. *Adjustments in Unit Price*

1. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

    a. If the total cost of a particular item of Unit Price Work amounts to 20 percent or more of the total Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by the Contractor differs by more than 20 percent from the estimated quantity of such item indicated in the Agreement; and

    b. If there is no corresponding adjustment with respect to any other item of Work; and

    c. If Contractor believes that Contractor has incurred additional expense as a result thereof; or if Owner believes that the quantity variation entitles Owner to an adjustment in the Unit Price, either the Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the effect of any such variation in the quantity of the Unit Price Work performed."

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

SC-15.01 Progress Payments

A. Delete Paragraph 15.01.B.1 in its entirety and insert the following in its place:

"1. On the first working day following the 25th of each month, Contractor shall submit to Owner for review an Application for Payment, filled out and signed by Contractor, covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents."

B. Amend Paragraph 15.01.C.1 by deleting "10" and inserting "30" in its place.

C. Amend Paragraph 15.01.E.1 by deleting Subparagraph 15.01.E.1.l and adding the following in its place:

"l. Owner has been notified of failure to make payments to Subcontractors or Suppliers or for labor;"

"m. failure to submit up to date record documents as required by the Contract Documents;"

"n. failure to submit monthly Progress Schedule updates or revised schedules as requested by the Owner or Engineer;"

"o. failure to provide Project videos or photographs required by the Specifications;"

"p. Other items entitle Owner to a set off against the amount recommended."

D. Amend Paragraph 15.01.E.3 by deleting "and subject to interest as provided in the Agreement."

E. Supplement Paragraph 15.01.E by adding the following subparagraph:

"4. Owner may permanently withhold payment from Contract Price for:

    a. Liquidated damages incurred by Contractor.

b. Compensation for OPT for overtime charges of Design Professional, Construction Manager, Resident Project Representative, third review of submittals, review of substitutions, re inspection fees, inspections, or designs related to correction of defective Work, or other Services identified as requiring payment by the Contractor.

1) Compensation will be based on the following rates:

Position	Hourly Rate
Principal in Charge	$267
Project Manager	$200
Project Engineer	$155
Construction Manager	$197
Resident Engineer	$173
Resident Project Representative	$200
Senior Resident Representative	$267
Design Engineer	$108
Engineering Technician	$108
Clerk	$165

2) Expenses will be billed at the actual cost multiplied by 1.15.

c. Costs for tests performed by the Owner to verify that Work previously tested and found to be defective has been corrected. Verification testing is to be provided at the Contractor's expense to verify products or constructed works are in compliance after corrections have been made."

SC-15.03 Substantial Completion

A. Supplement Paragraph 15.03.B by adding the following subparagraphs:

"1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable Set-off against payments due under this Article 15."

B. Add a new paragraph immediately after Paragraph 15.03.F.

"G. The following items must be fully functional and suitable for Substantial Completion:

1. Final mat of asphalt pavement has been installed, and tests passed.

2. Any damages have been restored to their original or better condition.

SC-15.06 Final Payment

A. Delete Paragraph 15.06.E in its entirety and insert the following in its place:

"E. *Final Payment Becomes Due*: The first working day following the 10th day of the second month following the submittal of the final Application for Payment and accompanying documentation, the amount recommended by the Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set offs for liquidated damages and set offs allowed under the provisions above with respect to progress payments) will become due and will be paid by Owner to Contractor."

SC-15.08 Correction Period

A. Supplement Paragraph 15.08 by adding the following paragraph:

"G. When early acceptance of a Substantially Completed portion of the Work is accomplished in the manner indicated in the Contract Documents, the correction period for that portion of the Work shall commence at the time of Substantial Completion of that Work."

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

SC-16.02 Owner May Terminate for Cause

A. Delete Subparagraphs 16.02.A.3 and 16.02.A.4 in their entirety and replace them with the following:

"3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;"

"4. Contractor's repeated disregard of the authority of Owner or Engineer;"

"5. Contractor fails to provide a replacement bond or insurance coverage as required by the General Conditions and as amended by the Supplementary Conditions; or"

"6. If any petition of bankruptcy is filed by or against Contractor, or if Contractor is adjudged as bankrupt or insolvent or makes a general assignment for the benefit of creditors, or if a receiver is appointed for the benefit of Contractor's creditors, or if a receiver is appointed on account of Contractor's insolvency, upon the occurrence of any such event, Owner shall be entitled to request of Contractor or its successor in interest adequate assurance of future performance in accordance with the terms and conditions hereof. Failure to comply with such request within 7 days of delivery of the request shall entitle Owner to terminate this Agreement and to the accompanying rights set forth in Article 16 of the General Conditions. In all events pending receipt of adequate assurance of performance and actual performance in accordance therewith, Owner shall be entitled to proceed with the Work with its own forces or with other contractors on a time and material or other appropriate basis. The cost of work by Owner or other contractors will be back charged against the Contract Sum hereof."

B. Delete Paragraph 16.02.G in its entirety.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

SC-17.01 Methods and Procedures

A. Delete Paragraph 17.01 in its entirety and insert the following in its place:

"17.01 *Methods and Procedures*

A. The Owner and Contractor may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Law."

ARTICLE 18—MISCELLANEOUS

SC-18.02 Computation of Times

A. Supplement Paragraph 18.02 by adding the following paragraph:

"B. All references and conditions for a "Calendar Day Contract" in the General Conditions and Supplementary Conditions shall apply for a "Fixed Date Contract." A "Fixed Date Contract" is one in which the calendar dates for reaching Substantial Completion and/or final completion are specified in lieu of identifying the actual calendar days involved."

SC-18.10 Headings

A. Delete Paragraph 18.08.A in its entirety and insert the following in its place:

"A. The Article and paragraph headings in this Agreement are inserted for convenience only and do not constitute parts of these General Conditions or act as a limitation of the scope of the particular section to which they refer. This Agreement will be fairly interpreted in accordance with its terms and conditions and not for or against either party."

SC-18.09 Independent Contractor

A. Supplement Article 18 by adding the following paragraph:

"18.11 *Independent Contractor*

A. Each Party will perform its duties under this Agreement as an independent contractor. The Parties and their personnel will not be considered to be employees or agents of the other Party. Nothing in this Agreement will be interpreted as granting either Party the right or authority to make commitments of any kind for the other. This Agreement will not constitute, create, or be interpreted as a joint venture, partnership, or formal business organization of any kind."

SC-18.12 Severability

A. Supplement Article 18 by adding the following paragraph:

"18.12 *Severability*

A. If a court of competent jurisdiction renders any part of this Agreement invalid or unenforceable, that part will be severed and the remainder of this Agreement will continue in full force and effect."

SC-18.13 No Third Party Beneficiaries

A. Supplement Article 18 by adding the following paragraph:

"18.13 *No Third Party Beneficiaries*

A. Nothing in this Agreement shall be construed to create any right in any third party not a signatory to this Agreement, and the parties do not intend to create any third party beneficiaries by entering into this Agreement."

SC-18.14 Sovereign Immunity

A. Supplement Article 18 by adding the following paragraph:

"18.14 *Sovereign Immunity*

A. The parties agree that the Owner has not waived its sovereign immunity by entering into and performing its obligations under this Agreement."

END OF SECTION

BROADWAY & OGDEN LN.
INTERSECTION PLANS
CONSTRUCTION CONTRACT

PROJECT SPECIFICATIONS

TECHNICAL SPECIFICATIONS

SAWS SPECIFICATIONS FOR WATER & SANITARY SEWER CONSTRUCTION (February 2021 Edition)

https://apps.saws.org/Business_Center/Specs/constspecs/

CITY OF SAN ANTONIO (COSA) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (Latest Edition)

https://www.sanantonio.gov/PublicWorks/Current-Vendor-Resources/Standard-Specifications-and-Details

TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES (2024)

https://www.txdot.gov/content/dam/docs/specifications/2024/spec-book-0924.pdf

CITY OF ALAMO HEIGHTS MUNICIPLE CODE

https://ecode360.com/AL6722

BROADWAY & OGDEN LN.
INTERSECTION PLANS
CONSTRUCTION CONTRACT

SPECIAL PROVISIONS TO TECHNICAL SPECIFICATIONS

SPECIAL PROVISION TO STANDARD SPECIFICATION

ITEM NO. 530 (BARRICADES, SIGNS, AND TRAFFIC HANDLING)

530.4 CONSTRUCTION

DELETE:

> *The contractor must maintain all streets open to through traffic by repairing trenches, potholes, etc., at no direct payment...*

REPLACE with the following:

> *The contractor must maintain all streets open to through traffic by repairing trenches, potholes, temporary steel plating etc., at no direct payment...*

All other language in specification 530 shall remain in full force.

END OF SECTION

SPECIAL PROVISION TO STANDARD SPECIFICATION

ITEM NO. 540 (TEMPORARY EROSION, SEDIMENTATION, WATER POLLUTION PREVENTION AND CONTROL)

540.1 DESCRIPTION

ADD:

For additional Stormwater Pollution Prevention Requirements, reference the attached SW3P Notice to Permit Holder regarding updates to the Construction Stormwater Ordinance (Ord. 94002) effective January 1, 2017 attached to the end of the Special Provisions to the Technical Specifications.

540.4.A.1 CONSTRUCTION

DELETE:

SW3P, Implement the City's Storm Water Pollution Prevention Plan (SW3P) for the project site in accordance with the specific or general storm water permit requirements.

REPLACE with the following:

SW3P, Prepare and implement the City's Storm Water Pollution Prevention Plan (SW3P) for the project site in accordance with the specific or general storm water permit requirements.

540.4 CONSTRUCTION

ADD the following at the end of the section 540.4(A)(2):

(c) Stormwater Pollution Prevention Plan (SW3P). Contractor shall prepare and submit a Stormwater Pollution Prevention Plan with all documents designed and signed by either a licensed Professional Engineer registered in Texas (PE), Certified Professional in Erosion and Sedimentation Control (CPESC) or a licensed Landscape Architect. The Contrator's SWPPP shall reflect the Contractor's planned sequencing of work, selected construction, methods, staging area(s), stormwater BMP's, etc.

ADD the following at the end of the section 540.4(B)(3):

Erosion control best management practice inspections can only be performed by Licensed Engineers, CPESC, Certified Erosion, Sediment and Stormwater Inspector (CESSWI), or Certified Inspector of Sediment and Erosion Control (CISEC).

All other language in specification 540 shall remain in full force.

END OF SECTION

BROADWAY & OGDEN LN.
INTERSECTION PLANS
CONSTRUCTION CONTRACT

SPECIAL SPECIFICATIONS

ITEM 845 – TEMPORARY CONSTRUCTION SECURITY FENCING

PART 1 GENERAL

1.0 Reference

A. ASTM F3342 – 19 Standard Guide for Temporary Fence Applications for Construction Sites
B. ASTM A121 Specification for Metallic-Coated Carbon Steel Barbed Wire
C. ASTM A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric
D. ASTM A491 Specification for Aluminum-Coated Steel Chain-Link Fabric
E. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
F. ASTM A817 Specification for Metallic-Coated Steel Wire for Chain Link Fence Fabric and Marcelled Tension Wire
G. ASTM F552 Standard Terminology Relating to Chain Link Fencing
H. ASTM F567 Standard Practice for Installation of Chain Link Fence
I. ASTM F626 Specification for Fence Fittings
J. ASTM F900 Specification for Industrial and Commercial Swing Gates
K. ASTM F1043 Specification for Strength and Protective Coatings of Steel Industrial Chain Link Fence Framework
L. ASTM F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
M. ASTM F1184 Specification for Industrial and Commercial Horizontal Slide Gates
N. ASTM F2200 Specification for Automated Vehicular Gate Construction
O. UL325 Automatic operators: Door, Drapery, Gate, Louver and Window

1.1 Submittals

A. Shop drawings: Site plan showing the layout of fence location with dimensions, location of gates and opening size (as needed), cleared area, the elevation of fence, gates, footings, and details of attachments.
B. Material samples: When required, provide representative samples of chain link fabric, framework, and fittings.

1.2 Quality Assurance

A. Fence contractor: A company with demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and at least 5 years experience in accordance with the provisions of this section.
B. Tolerances: Current published edition of ASTM specifications tolerances apply. ASTM specification tolerances supersede any conflicting tolerance.

PART 2 – PRODUCTS

2.0 Temporary fence to be constructed from welded temporary fence panel systems to include.

A. Chain link fabric not less than 11 ½ gauge, 2 3/8” opening and galvanized in good condition free from defects.
B. Fencing and Fabric to be 6’ tall.
C. If required, the top rail to be not less than 1 3/8” O.D. x 18 gauge in good condition and free from defects.
D. Fencing panels are not to exceed 12’ in width and shall not be constructed by use of in-ground posts.
E. Where required for privacy or dust control, provide high-density polyethylene (HDPE) or reinforced polyester screening. Screening must be attached to the wire mesh using heavy-duty UV-rated ties to prevent removal or destruction during standard wind conditions. The fabric must provide 90% or greater opacity.
F. Barbed wire, concertina, razor wire, etc., are all prohibited.
G. Fencing footings shall be installed with 36” Base Stands for added stability and secured with Sandbags or High-Visibility Fence Weights.

2.1 Temporary Cedar Fencing: In designated areas abutting the coffee shop patio or public-facing plaza excavation, the following requirements apply:
A. Material: Fencing shall be constructed of No. 2 grade or better Western Red Cedar or equivalent rot-resistant wood.
B. Dimensions: Vertical pickets shall be 1” x 4” x 6” with a "dog-ear" or flat-top cut. The total height of the fence shall be 6’ to match the standard temporary fencing.
H. Structure: Cedar panels shall be supported by a minimum of three (3) horizontal 2x4 pressure-treated rails.

PART 3 EXECUTION

3.0 Install temporary fence per ASTM F3342 – 19 Standard Guide for Temporary Fence Applications for Construction Sites.

A. Contractor shall coordinate with the property owner before installation for determination of adequate placement of temporary construction fencing. Construction fencing shall not obstruct emergency fire entrances and exits and shall not obstruct access to critical property owner services such as parking, garbage collection services, etc.
B. Posts to be 12’ o.c. and secured with adequate base stand weights to support wind loading.
C. Fabric to be installed in accordance with ASTM F 567, stretched taut, and attached to each post and panel.

3.1 Cedar Fence Installation:

A. Foundation: Because "in-ground posts" are prohibited by the general spec , cedar panels must be mounted to a weighted, self-supporting frame system or "feet" similar to the 36” Base Stands used for chain link.
B. Ballast: The cedar fence acts as a "sail" in high winds. The Contractor must increase the number of Sandbags or High-Visibility Fence Weights at the base to ensure the fence remains plumb and stable during excavation activities.
C. Clearance: The fence must be positioned to provide a minimum $3^{\prime}$ clear buffer between the coffee shop patio and the excavation limit for the new park/plaza to ensure pedestrian safety and accessibility.
D. No In-Ground Posts: All temporary fencing, including the cedar sections, must remain portable and not involve digging posts into the existing pavement or sidewalk.
E. Access: The installation must not obstruct the coffee shop’s emergency exits or the city's garbage collection routes.

END OF SECTION

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. The Work of this Section Includes: General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Requirements:

1. Section 311000 "Site Clearing" for removing existing trees and shrubs and for temporary erosion- and sedimentation-control measures if not specified in Section 015000 "Temporary Facilities and Controls".
2. Section 329115 “Soil Preparation (Performance Specification)” for specification of Planting Soil.
3. Reference state and local authorities having jurisdiction for other requirements and standards related to tree protection and Oak Wilt prevention.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.

B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape or the average of the smallest and largest diameters at a height 54 inches above the ground line for trees with caliper of 8 inches or greater as measured at a height of 12 inches above the ground.

C. Critical Root Zone (CRZ) is the distance from the trunk that equals one foot for every inch of the tree's diameter. E.g., if the tree has a trunk 12 inches in diameter, the CRZ is a 12 foot radius around the tree. If the tree has a drip line that extends beyond the CRZ, the greater of the two will define the tree protection zone.

D. Oak Wilt: Oak wilt is an infectious disease caused by the fungus Bretziella fagacearum, which invades and disables the water-conducting system (xylem) in oaks. All oaks can be infected by the fungus that causes oak wilt; however, some oak species are affected more than others.

E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings. The area is the greater of either defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated or defined by a circle concentric with each tree with a radius 12 times the tree's caliper size and with a minimum radius of 96 inches unless otherwise indicated.

G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
b. General plant protection.
c. Tree-service firm's personnel and equipment needed to make progress and avoid delays.
d. Arborist's responsibilities.
e. Quality-control program.
f. Coordination of Work and equipment movement with the locations of protection zones.
g. Trenching by hand or with air spade within protection zones.
h. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data:

1. General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction

B. Shop Drawings:

1. Include plans, elevations, and sections showing trees and plants to be protected, locations of protection-zone fencing and signage, and the relationship between equipment-movement routes and material storage locations with protection zones.
2. Detail fabrication and assembly of protection-zone fencing and signage.
3. Indicate extent of utility boring and trenching by hand or with air spade within protection zones.
4. Include existing irrigation system that will be used to water plants.

C. Samples: For each type of the following:

1. Organic Mulch: 1-quart volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

D. Tree-Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

E. Tree-Pruning for Oak (Quercus Species): For Oak Wilt spread prevention follow the guidelines provided by The Oak Wilt Information Partnership (www.texasoakwilt.org), the Forest Health Protection branch of the U.S. Department of Agriculture (USDA) Forest Service and the Texas A&M Forest Service.

1. Do not prune or wound Oak trees from February to August.
2. For Oak trees only, paint all pruning wounds immediately with non-phytotoxic tree wound dressing. Include stumps and damaged roots both above and below grade.
3. Sterilize tools between trees.
4. Reference state and local authorities having jurisdiction for all other requirements.

F. Mitigation Requirements: As required by jurisdiction or as developed by arborist, for mitigation of damage to trees and other plantings. Include the following:

1. Local ordinances governing tree mitigation.
2. Standards established under the approved tree mitigation report developed by the arborist.
3. "Digital Guide for Plant Appraisal" by Council of Tree and Landscape Appraisers.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For arborist and tree service firm.

B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction in accordance with recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

E. Quality-control program.

1.7 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA and a Licensed arborist in jurisdiction where Project is located.

B. Tree-Service Firm Qualifications: An experienced tree-service firm that has successfully completed temporary tree- and plant-protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection-zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.8 PROJECT CONDITIONS

A. The following practices are prohibited within the extent of tree canopies to be protected, identified, and fenced off within the construction site tree and plant protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

D. Take precautions to protect plants from airborne contaminants, such as paint or fireproofing overspray.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

1. Planting Soil: Planting soil as specified in Section 329115 "Soil Preparation (Performance Specification."

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:

1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch-diameter wire chain-link fabric; with pipe posts, minimum 2- 3/8-inch-OD line posts, and 2-7/8-inch-OD corner and pull posts; with 1-5/8-inch-OD top rails and 0.177-inch-diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.

a. Height: 6’-0.”

2. Gates: Single- swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Tie a 1-inch blue vinyl tape around each tree trunk at 54 inches above the ground.

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.

3.3 TREE PROTECTION

A. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.

1. Apply 4-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 12 inches of tree trunks.
2. Install temporary root-protection matting over mulch.

B. Trunk Protection: Protect the trunk of each tree to remain as follows:

1. Install 2-by-4-inch wood planks around trunk at maximum 3 inches apart. Minimum five planks per tree. Band together with no less than three steel bands stapled to the planks to hold them securely in place.

    a. Height: 96 inches.

3.4 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Chain-Link Fencing: Install to comply with ASTM F567 and with manufacturer's written instructions.
2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Landscape Architect.

3. Access Gates: Install; adjust to operate smoothly, easily, and quietly; free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Landscape Architect. Install one sign spaced approximately every 20 ft. on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Maintain hydration of plants to assure plant survival.

E. Maintain protection-zone fencing and signage in good condition as acceptable to Landscape Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.5 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones in accordance with requirements in Division 01 and Division 31 unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

C. 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 and as required for root pruning.

D. 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.

3.6 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.

3. Temporarily support and protect roots from damage until they are permanently covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible in accordance with requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.7 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees in accordance with ANSI A300 (Part 1).

B. Unless otherwise directed by arborist and acceptable to Landscape Architect, do not cut tree leaders.

C. Cut branches with sharp pruning instruments; do not break or chop.

D. Do not paint or apply sealants to wounds, except for oak wilt prevention, or as directed by arborist.

E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

F. Chip removed branches and dispose of off-site.

3.8 REGRADING

A. Grading within the 1/2 Critical Root Zone is not permitted. Cut or fill of more than 2” within the CRZ is not permitted.

B. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Lowering Grade within Protection Zone: 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 by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

D. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

E. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.9 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.10 REPAIR AND REPLACEMENT

A. Upon identification of damage to existing trees to be preserved, notify Landscape Architect immediately.

B. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Landscape Architect.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours in accordance with arborist's written instructions.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

C. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.

1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.
2. Large Trees: Provide new tree(s) of 8-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size. Provide quantity of new trees to equal caliper inches of damaged trees, rounding up.

    a. Species: As selected by Landscape Architect.

3. Plant and maintain new trees as specified for minimum of 90 days and in conformance to specification Section 329300 "Plants."

D. Soil Aeration: Where soil has been compacted from construction operations or as directed by Landscape Architect, aerate surface soil. Aerate 10 ft. 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 on center. Backfill holes with an equal mix of augered soil and sand.

E. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch uniform thickness to remain after completion of construction activities.

3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris, and legally dispose off Owner’s property.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Furnish all labor, material, equipment, supervision, and related services necessary or incidental to the installation of the Work as shown or indicated on the Drawings and/or as specified.

B. Section includes:

1. Delegated design and engineering.
2. Concrete formwork.
3. Concrete reinforcement.
4. Cast-in-place concrete
5. Concrete materials, mixture design, placement procedures.
6. Concrete finishes.

C. Related Requirements:

1. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.
2. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 REFERENCES

A. American Concrete Institute International (ACI):

1. 301 - Structural Concrete for Buildings.
2. 302.1 - Guide for Concrete Floor and Slab Construction.
3. 303.1 – Cast-In-Place Architectural Concrete.
4. 305R - Hot Weather Concreting.
5. 306R - Cold Weather Concreting.
6. 318 Building Code Requirements for Structural Concrete.

B. ASTM International (ASTM):

1. A615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
2. C33 - Standard Specification for Concrete Aggregates.
3. C94 - Standard Specification for Ready Mixed Concrete.
4. C150 - Standard Specification for Portland Cement.
5. C171 - Standard Specification for Sheet Materials for Curing Concrete.
6. C260 - Standard Specification for Air Entraining Admixtures for Concrete.
7. C309 - Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete.
8. C494 - Standard Specification for Chemical Admixtures for Concrete.
9. C618 - Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.

10. D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

C. Concrete Reinforcing Steel Institute (CRSI) - Manual of Practice.

1.4 DEFINITIONS

A. Cementitious Materials: Portland cement or blended hydraulic cement alone or in combination with one or more of the following:

1. Fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cementitious Materials (w/c) Ratio: The ratio by weight of mixing water to cementitious materials.

1.5 COORDINATION

A. Designer Requirements:

1. Engage and pay for the services of an engineer to design the cast in place concrete components shown including but not limited to compaction, footings, foundations, footings, reinforcement, concrete mix design, formwork, embedments, etc. for the complete performance of the Work.

2. Engage and pay for the services of a qualified geotechnical engineering firm, licensed in Texas, to perform all necessary investigations and provide recommendations for subgrade support of cast-in-place concrete foundations and slabs.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture prepared in accordance with ACI 301, chapter 3.9. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Shop Drawings:

1. Provide engineering and formwork shop drawings signed and sealed by an engineer licensed within the applicable jurisdiction showing all site conditions, field measurements as applicable, fabrication, attachments, reinforcements, footings, and materials required. Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer’s standard product data, including, but not limited to, plans, elevations, and details of sections and connections. Show anchorage and accessory items. Submit templates for anchor and bolt installation.
2. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, embedments, and supports for concrete reinforcement.
3. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

a. Location of construction joints is subject to approval of the Landscape Architect.

D. Samples: For waterstops and vapor retarder.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer, manufacturer, and testing agency.

B. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include sieve analysis and service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

F. Construction Joints: Submit drawings identifying proposed construction joints for other than those indicated on the Contract Drawings.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.8 QUALITY ASSURANCE

A. Geotechnical Services are included in the Contractor’s responsibilities.

1. Engage a qualified geotechnical engineering firm, licensed in Texas, to perform all necessary investigations and provide recommendations for subgrade support of cast-in-place concrete foundations and slabs. The investigation shall include soil borings,

laboratory testing, and analysis to identify expansive clays, soft soils, shallow groundwater, and other conditions typical of the Project area.

2. The geotechnical report shall include allowable bearing pressures, estimated settlements, subgrade preparation methods, and foundation support recommendations including k-values. Where expansive soils are present, provide mitigation strategies such as moisture conditioning, chemical stabilization, or void forms. Recommendations shall address undercut and replacement requirements, fill specifications, and concrete durability considerations if applicable.

3. During construction, the geotechnical engineer shall observe subgrade preparation, perform field density testing, and provide written approval of subgrade conditions prior to concrete placement. Coordinate findings with the Structural Engineer and Contractor, and update recommendations if subsurface conditions differ from those anticipated in the report.

B. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for the Project and whose work has resulted in construction with a record of successful in-service performance. The qualified Installer shall employ personnel qualified as an ACI-certified Concrete Flatwork Technicians and Finishers and a supervisor who is a certified ACI Advanced Concrete Flatwork Finisher/Technician.

C. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer's production facilities and delivery vehicles certified in accordance with NRMCA's certification requirements or equivalent approval by a State DOT.

D. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing that performs duties on behalf of the Landscape Architect/Engineer.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Level 1. Testing agency laboratory supervisor tests to be an ACI-certified Concrete Laboratory Testing Technician, Level 2.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D1.4M.

F. Mockups: Cast concrete, board-formed, and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Build panel approximately 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Landscape Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.11 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 as follows:

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When air temperature has fallen to, or is expected to fall below 40 deg F during the protection period, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 90 deg F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.12 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE STANDARDS

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents.

1. ACI 301.
2. ACI 117.
3. ACI 347R.
4. ACI 318
5. ACI 302.1R.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

3. Overlaid Finnish birch plywood.
4. Modular steel forming system such as “Max-a-Form” system by Symons or equal.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Board-Formed Finished Concrete: Structural Grade or better 2x6 Cedar, rough, or as indicated. Final approval pending mock-up review by Landscape Architect. Sandblast board forms prior to installation to enhance texture of board surface.

D. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

G. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agents with rust inhibitor for steel form-facing materials.

H. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave not corrodible material closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damproofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 deformed bars, assembled with clips.

D. Deformed-Steel Wire: ASTM A 1064/A 1064M.

E. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

F. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

G. Galvanized-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from galvanized-steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Zinc Repair Material: ASTM A 780/A 780M.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer’s plant, obtain aggregate from single source, and obtain admixtures from a single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I/II LA (Low Alkali), gray.
2. Fly Ash: The use of fly ash is required. Concrete shall be proportioned with a fly ash content equal to 25 percent of the total weight of the fly ash plus cement.

    a. Fly Ash may be ASTM C618, Class F or C. Concrete mixed with Class C Fly Ash shall be subject to the following restrictions:

        1) Coarse Aggregate shall consist of crushed limestone. The use of river gravel aggregate will not be permitted.
        2) Cement shall be Type II LA (Low Alkali) or Type I/II LA (Low Alkali). Alkali content of the cement shall be less than 0.60%. Contractor shall submit evidence of the Alkali content certified by an independent testing laboratory.

b. Carbon content of fly ash (LOI) shall not exceed 3 percent by volume.

3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IS, Portland blast-furnace slag cement.
5. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: ASTM C33/C33M free of materials with deleterious reactivity to alkali in cement.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C260/C260M.

B. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute to water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Water: ASTM C94/C 94M and potable.

2.7 FIBER REINFORCEMENT

A. Synthetic Monofilament Microfiber: Monofilament polypropylene microfibers complying with ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches long.

B. Synthetic Fibrillated Microfiber: Fibrillated polypropylene microfibers complying with ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches long.

2.8 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

a. Greenstreak.
b. Progress Unlimited, Inc.
c. Williams Products, Inc.

2. Profile: Flat dumbbell with center bulb.

3. Dimensions: 4 inches by 3/16 inch thick; nontapered.

B. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

a. Bometals, Inc.
b. Greenstreak.
c. Meadows, W. R., Inc.
d. Murphy, Paul Plastics Co.
e. Progress Unlimited, Inc.
f. Tamms Industries, Inc.
g. Vinylex Corp.

2. Profile: Flat dumbbell with center bulb.
3. Dimensions: 4 inches by 3/16 inch thick; nontapered.

C. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CETCO, a Minerals Technologies company; Waterstop-RX-101.
b. Concrete Sealants Inc.; Conseal CS-231.
c. Sika Corporation; Swellstop.
d. Henry Company; Hydro-Flex.
e. JP Specialties, Inc.; Earth Shield Type 20.

D. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Deneef Construction Chemicals; Swellseal.
b. Greenstreak; Hydrotite.
c. Mitsubishi International Corporation; Adeka Ultra Seal.
d. Progress Unlimited, Inc.; Superstop.

2.9 CURING MATERIALS

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

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Axim Concrete Technologies; Cimfilm.
b. Burke by Edoco; BurkeFilm.
c. ChemMasters; Spray-Film.

d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
e. Dayton Superior Corporation; Sure Film.
f. Euclid Chemical Company (The); Eucobar.
g. Kaufman Products, Inc.; Vapor Aid.
h. Lambert Corporation; Lambco Skin.
i. L&M Construction Chemicals, Inc.; E-Con.
j. MBT Protection and Repair, Div. of ChemRex; Confilm.
k. Meadows, W. R., Inc.; Sealtight Evapre.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
n. Sika Corporation, Inc.; SikaFilm.
o. Symons Corporation, a Dayton Superior Company; Finishing Aid.
p. Unitex; Pro-Film.
q. US Mix Products Company; US Spec Monofilm ER.
r. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

D. Water: Potable water that does not cause staining of the surface.

E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. Burke by Edoco; Aqua Resin Cure.
c. ChemMasters; Safe-Cure Clear.
d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; W.B. Resin Cure.
e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
f. Euclid Chemical Company (The); Kurez DR VOX.
g. Kaufman Products, Inc.; Thinfilm 420.
h. Lambert Corporation; Aqua Kure-Clear.
i. L&M Construction Chemicals, Inc.; L&M Cure R.
j. Meadows, W. R., Inc.; 1100 Clear

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Burke by Edoco; Cureseal 1315 WB.
b. ChemMasters; Polyseal WB.
c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315 WB.
d. Euclid Chemical Company (The); Super Diamond Clear VOX.
e. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
f. Lambert Corporation; UV Safe Seal.
g. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.

h. Meadows, W. R., Inc.; Vocomp-30.

2.10 ACCESSORIES

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

G. Adjustable wedge inserts for anchoring masonry shelf angles to concrete shall be Dayton/Richmond ("F" type) wedge inserts, by Dayton/Richmond Concrete Accessories or equal.

H. Non-Shrink Grout: Premixed cementitious compound containing non metallic aggregate. Grout shall conform to ASTM C1107, Grade B or C when tested at fluid consistency equal to 20 to 30 seconds. Grout shall be bleed free and attain 7,000 psi compressive strength in 28 days at fluid consistency. Available grout manufacturers products are "Euco NS" by the Euclid Chemical Company or "Masterflow 713" by Master Builders.

I. High Flow Grout: Where high fluidity and/or increased placing time is required, use high flow grout. The factory pre-mixed grout shall conform to ASTM C1107, “Standard Specification for Packages Dry, Hydraulic-Cement Grout (Non-Shrink).” In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 18” x 36” base plate. Provide “Hi-Flow Grout” by The Euclid Chemical Co. or “Masterflow 928” by Master Builders.

J. Soil Retainers: SureRetainer by Motzblock or approved equal. Size as indicated or as required for void sizes indicated.

K. G.Abrasive Blast Media: Clean, dry, sharp-edged, graded silica sand, free from contaminants (oil, clay, etc.). Particle size range from 0.3 to 1.0 mm (fine to medium).

2.11 REPAIR MATERIALS

A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent slab elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.12 CONCRETE MIXTURE MATERIALS

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

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

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.13 CONCRETE MIXTURE FOR SITE ELEMENTS

A. Pier Caps, Footings, Foundations: Normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: .45.
3. Slump Limit: 6 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2 inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

B. Walls and slabs: Normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: .45.
3. Slump Limit: 5 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2 inch nominal maximum aggregate size.

5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction load that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer or radius as indicated, exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

1. Leave formwork for slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Landscape Architect.

3.4 VAPOR RETARDERS INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

3.5 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Securely fasten steel reinforcement and wire ties against shifting during concrete placement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

G. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780/A 780M. Use galvanized-steel wire ties to fasten zinc-coated steel reinforcement.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Landscape Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams and slabs, in the middle third of spans.
4. Locate horizontal joints in walls and columns at underside of slabs and beams, and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated, and at 10’ on center maximum. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth as indicated in the contract drawings as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: The Soff-Cut Early Entry Dry-Cut Saw shall be used immediately after final finishing and to a depth of 1-1/4". Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 WATERSTOP INSTALLATION

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of concrete formwork, accessories, reinforcement, and embedded items is complete and that required inspections have been performed. Do not proceed until unsatisfactory conditions have been corrected.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Landscape Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water reducing admixtures to concrete mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Level concrete, cut high areas, and fill low areas.
5. Slope surfaces uniformly to drains where required.
6. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
7. Do not further disturb slab surfaces before starting finishing operations.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.

1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious slab finishes.

C. Float Finish: Consolidate surface by hand floating. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.

1. Apply float finish to surfaces to receive trowel finish.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete 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.

1. Do not add water to concrete surface. Use of an approved finishing aid is acceptable.
2. Do not apply troweled finish to concrete, which has a total air content greater than 3 percent.
3. Apply a trowel finish to surfaces exposed to view or as indicated.
4. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

a. Specified overall values of flatness, F_F 25; and of levelness, F_L 20; with minimum local values of flatness, F_F 17; and of levelness, F_L 15.
b. Specified overall values of flatness, F_F 35; and of levelness, F_L 25; with minimum local values of flatness, F_F 24; and of levelness, F_L 17.

E. Trowel and Fine-Broom Finish: First apply a trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished slab surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with a fiber-bristle broom perpendicular to main traffic route.

3.11 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes, ACI 301 (ACI 301M) Surface Finish SF-3.0:

1. Patch voids larger than 1/2 inch wide or 1/2 inch deep.
2. Remove projections larger than 1/8 inch.
3. Patch tie holes.
4. Surface Tolerance: ACI 117 Class A.

5. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

B. Smooth Rubbed Finish: Apply the following to as-cast surface finishes where indicated on Drawings:

1. Perform no later than one day after form removal.
2. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
3. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
4. Maintain required patterns or variances as shown on Drawings or to match mockups.

C. Abrasive-Blast Finish: Apply the following to as-cast surface finishes where indicated on Drawings:

1. Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi.
2. Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at the same age.
3. Surface Continuity:

a. Perform abrasive-blast finishing as continuous operation, maintaining continuity of finish on each surface or area of Work.
b. Maintain required patterns or variances in depths of blast to match mockups.

4. Abrasive Blasting:

a. Abrasive-blast corners and edges of patterns carefully, using backup boards to maintain uniform corner and edge lines.
b. Determine type of nozzle pressure and blasting techniques required to match field sample.
c. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match field sample, as follows:

1) Brush Texture: Remove cement matrix to dull surface sheen and expose face of fine aggregate, with no significant reveal.
2) Light Texture: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color, with maximum reveal of 1/16 inch.
3) Medium Texture: Generally, expose coarse aggregate with slight reveal and with a maximum reveal of 1/4 inch.
4) Heavy Texture: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter, with reveal range of 1/4 to 1/2 inch.

d. Maintain required patterns or variances in reveal projection to match mockups.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 301 and ACI 306.1for cold weather protection and ACI 301 and ACI 305.1for hot-weather protection during curing.

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

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive Cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer**.**

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Landscape Architect. Remove and replace concrete that cannot be repaired and patched to Landscape Architect’s approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins, and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding

agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and match surrounding surface.
3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance, as determined by Landscape Architect.
4. Test repair technique on a mockup or surface to be concealed later, before repairing surfaces.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as slabs, for finish, and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during, or immediately after, completing surface-finishing operations by adding patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to remain exposed with repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
5. Repair defective areas, except random cracks and single holes 1/2 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
6. Repair random cracks and single holes 1/2 inchor less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Landscape Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Landscape Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs, embedded plates, and deformed bar anchors.
4. Verification of use of required design mixture.
5. Continuous inspection of concrete placement, including conveying and depositing, for proper application techniques.
6. Maintenance of specified curing procedures and temperature.
7. Verification of concrete strength before removal of forms.
8. Formwork for shape, location, and dimensions of the concrete member being formed.
9. Slab flatness and levelness.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 150 cu. yd. or fraction thereof.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing is to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M: One test at point of delivery for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests as needed, and when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete. One test for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M: One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample when strength test specimens are cast.
5. Concrete Density: ASTM C138/C138M: One test for each composite sample when strength test specimens are cast.
6. Compression Test Specimens: ASTM C31/C31M:

    a. Cast and laboratory cure two sets of two standard cylindrical specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C39/C39M. Test one set of two laboratory cured specimens at seven days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
    b. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests of standard cured cylinders equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Landscape Architect but will not be used as sole basis for approval or rejection of concrete.

11. Additional Tests: Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Landscape Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Landscape Architect.

    a. Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.7.6.3.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure slab flatness and levelness in accordance with ASTM E1155 within 24 hours of completion of floor finishing and promptly report test results to Landscape Architect.

3.16 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.

END OF SECTION

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout materials.
3. Reinforcement.
4. Ties and anchors.
5. Embedded flashing.
6. Accessories.
7. Mortar and grout mixes.

B. Related Requirements:

1. Section 033000 “Cast-In-Place Concrete” for footings and dovetail slots for masonry anchors.
2. Section 321400 "Unit Paving" for exterior unit masonry paving.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Indicate bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315R. Indicate elevations of reinforced walls.

C. Delegated Design Submittals: For structural design of wall systems, footings, reinforcement, cell grouting, masonry anchors and ties, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type of the following:

1. Masonry units.

a. Include data on material properties and material test reports substantiating compliance with requirements.

2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
4. Mortar admixtures.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

C. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Delegated Design Engineer: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the type indicated.
2. Testing Agency Qualifications: Qualified in accordance with ASTM C1093 for testing indicated.

1.7 MOCKUPS

A. Wall Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for installation.

1. Build mockups facing south for typical wall in sizes approximately 60 inches long by 60 inches high by full thickness, including face and backup wythes and accessories.

a. Include a sealant-filled joint at least 16 inches long in mockup.
b. Include through-wall flashing installed for a 24-inch length in corner of wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).

2. Protect accepted mockups from the elements with weather-resistant membrane.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations by Change Order.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls and projections with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.

B. Do not apply loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect projections from mortar droppings.
3. Protect surfaces with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain exposed masonry units, cementitious mortar components, and mortar aggregate from single manufacturer.

2.2 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 ft. vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

2.3 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested in accordance with ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, will show no visible water or leaks on the back of test specimen.

C. CMUs: ASTM C90, normal weight.

1. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
2. Exposed Faces: Provide color and texture matching the range represented by Landscape Architect's sample.
3. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.4 STEEL SUPPORTS

A. Offset Angle Supports: Steel plate brackets anchored to structure, allowing continuous support of design components or veneer. Component and anchor size and spacing engineered by manufacturer.

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 316.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, 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.

1. Alkali content will not be more than 0.1 percent when tested in accordance with ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.

E. Colored Cement Products: Packaged blend made from portland cement and hydrated lime 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.

F. Aggregate for Mortar: ASTM C144.

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.

G. Aggregate for Grout: ASTM C404.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

I. Water: Potable.

2.6 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Exterior Walls: Hot-dip galvanized carbon or Stainless steel.
2. Wire Size for Side Rods: 0.187-inch diameter.
3. Wire Size for Cross Rods: 0.187-inch diameter.

4. Wire Size for Veneer Ties: 0.187-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 ft., with prefabricated corner and tee units.

2.7 TIES AND ANCHORS

A. General: Ties and anchors extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M, with ASTM A641/A641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M, with ASTM A153/A153M, Class B-2 coating.
3. Stainless Steel Wire: ASTM A580/A580M, Type 304.
4. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 zinc coating.
5. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
6. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
7. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
8. Stainless Steel Bars: ASTM A276 or ASTM A666, Type 304.

C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.105-inch-thick steel sheet, galvanized after fabrication.

a. 0.108-inch-thick, galvanized-steel sheet may be used at interior walls unless otherwise indicated.

2.8 EMBEDDED FLASHING

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16 oz./sq. ft. weight or 0.0216 inch thick or ASTM B370, Temper H01, high-yield copper sheet, 12 oz./sq. ft. weight or 0.0162 inch thick.
3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 ft.. Provide splice plates at joints of formed, smooth metal flashing.
4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees.
6. Fabricate metal drip edges and sealant stops for sawtooth metal flashing from plain metal flashing of same metal as sawtooth flashing and extending at least 3 inches into wall with hemmed inner edge to receive sawtooth flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam sheds water.
7. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.

8. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
9. Solder metal items at corners.

B. Flexible Flashing: Use the following unless otherwise indicated:

1. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637/D4637M, 40 mil thick.

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

D. Termination Bars for Flexible Flashing: Stainless steel bars 1/8 inch by 1-1/8 inch.

E. Termination Bars for Flexible Flashing, Flanged: Stainless steel sheet 0.019 inch by 1-1/2 inches with a 3/8-inch flange at top and bottom.

2.9 ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands the will not degrade within the wall cavity.

2.10 MORTAR AND GROUT MIXES

A. General: 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 or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For exterior, above-grade walls; and for other applications where another type is not indicated, use Type S.

C. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1.
3. Provide grout with a slump of 10 to 11 inches as measured in accordance with ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

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

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft., or 1/2-inch maximum.

2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft., or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

1. At anchors and ties, fully bed units and fill cells with mortar as needed to fully embed anchors and ties in mortar.

C. Set stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.
3. Rake out mortar joints for pointing with sealant.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.8 STEEL SUPPORTS

A. Install steel supports where indicated.

B. Provide concrete, masonry, or offset angle support where indicated.

3.9 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels extend flashing 6 inches minimum at each end.
3. Interlock end joints of sawtooth sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant for application indicated.
4. Install metal drip edges and sealant stops with sawtooth sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements for application indicated.
5. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are indicated to be built into masonry.

3.10 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie,

and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.

B. Inspections: Special inspections in accordance with Level 2 in TMS 402.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

D. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.

E. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.

3.12 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Masonry Waste Recycling: Return broken CMUs to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 044100 - DRY PLACED STONE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Section Includes:

1. Stone seating.
2. Stone boulders.
3. Bedding course.
4. Geotextiles.

B. Related Sections:

1. Section 312000 “Earth Moving” for excavation and compaction.

1.3 REFERENCES

A. ASTM International (ASTM) C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

1.4 SUBMITTALS

A. Submittals for Review:

1. Photo Samples: Prior to purchasing, provide photo samples of representative stone selected at quarry showing top, side, and end faces. Note if quarried block will have visible drill holes from split faces.

1.5 QUALITY ASSURANCE

A. Supplier Qualifications: Stonework supplier shall be by a firm or firms that have successfully supplied natural stonework of each material type and condition, similar to the quality specified, and in the quantity shown for a period of not less than ten years. Stone shall be obtained from quarries or suppliers capable of furnishing quantity, sizes and character of the stone required. Contractor will be held responsible for any delay in the completion of the Work due to failure to supply satisfactory stone in ample quantities and proper sequence.

B. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing stone similar in type and scope to that required for this Project.

C. Obtain stone from a single quarry and from the same area within the quarry.

D. Mockup:

1. Size: Minimum of two full-size stones.

2. Show stone color and texture range.
3. Locate where directed.
4. Approved mockup may remain as part of the Work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store and handle materials to prevent deterioration or damage.

1. Stone shall be carefully packed and loaded for shipment using reasonable care and customary precautions against damage in transit. Material which may cause staining or discoloration shall not be used for blocking or packing.
2. Handling and Unloading: Handle stone to prevent chipping, breakage, soiling or other damage. Do not use pinch or wrecking bars without protecting edges of stone with wood or other rigid materials. Lift with wide-belt type slings wherever possible; do not use wire rope or ropes containing tar or other substances which might cause staining. If required, use wood rollers and provide cushion at end of wood slides.

B. Store aggregate to prevent inclusion of foreign matter.

PART 2 - PRODUCTS

2.1 STONE, GENERAL

A. Provisions for Examinations at the Quarry: The Landscape Architect may choose to select stone at the source. The Contractor shall accompany the Landscape Architect and assist in the tagging process. Provide removable marking paint, coordinate stone selection trips, and arrange for equipment to move stockpiled stone.

B. Visual Criteria for Stone: All examinations, selections, and approvals shall be for the purpose of achieving a final appearance of stone with greatest possible uniformity, or as shown on the drawings, and based on the following:

1. Stone to be of sound stock and uniform texture, and shall be free from holes, seams, chips, cracks, shakes, clay pockets, spalls, stains, starts, and other defects that are not natural to the stone specified and that would impair the strength, durability, or appearance of the Work, as determined by the Landscape Architect.
2. Present inherent variations characteristic of the stone and the quarry from which the stone is obtained for approval.

2.2 STONE SOURCE

A. Varieties and Source: Subject to compliance with requirements, provide stone from source indicated on Material Schedule.

B. Each color of stone shall come from a single quarry, with sufficient reserves to satisfy the requirements of the Project. The stone supplier shall have the capabilities to cut and finish the stone without delaying the Project.

2.3 MATERIALS

A. Stone, General:

1. Type, size, and color: As indicated.
2. Free from defects that could impair its structural integrity or function. Inherent variations characteristic to quarry from which it is obtained are acceptable.

3. Color within range of samples approved by Landscape Architect.

B. Limestone Blocks: Sound, durable limestone, free from structural defects, uniform in color and texture, and shall be clean of earth, clay, oil or other foreign substances and meeting the following specifications.

1. Classification: Natural Limestone, as defined by ASTM C119.
2. Type II Medium-Density or Type III High-Density, as defined by ASTM C119.
3. Absorption and bulk specific gravity of dimension stone: ASTM C-97, bulk specific gravity: 2.193, Absorption % - 6.13, Density Lbs/ft3 – 136.8.
4. Compressive Strength of dimension stone: ASTM C-170, Lbs/in2 – 6560, MPa – 45.3.
5. Modulus of Rupture of dimension stone: ASTM C-99, Lbs/in2 – 824, MPa – 5.67.
6. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C241 or ASTMC1353.

C. Aggregate: Crushed stone or gravel, free of shale, friable materials, and debris, graded as follows per ASTM C136:

SIEVE SIZE	PERCENT PASSING
1 inch	100
3/4-inch	90 to 100
1/2 inch	20 to 50
3/8 inch	0 to 15
No. 4	0 to 5

2.4 GEOTEXTILES

A. Geotextile: Nonwoven needle-punched geotextile, manufactured for material separation and subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability:

a. Class 2; AASHTO M 288.
b. As follows:

1) Grab Tensile Strength: 157 lbf; ASTM D4632.
2) Sewn Seam Strength: 142 lbf; ASTM D4632.
3) Tear Strength: 56 lbf; ASTM D4533.
4) Puncture Strength: 56 lbf; ASTM D4833.

c. Apparent Opening Size: No. 70 sieve, maximum; ASTM D4751.
d. Permittivity: 0.5 per second, minimum; ASTM D4491.
e. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

PART 3 - EXECUTION

3.1 PREPARATION

A. Establish lines, levels, and coursing. Protect from disturbance.

3.2 INSTALLATION

A. Excavate to required lines and elevations. Form bottom of excavations smooth and level.

B. Place aggregate bedding course to minimum 4-inch depth. Compact to minimum 95 percent relative density.

C. Set stone dry on bedding course.

D. Final locations and arrangement are subject to Landscape Architect’s approval.

3.3 CLEANING

A. Clean stone with detergent and water applied with fiber brush.

B. If initial cleaning does not produce acceptable results, apply cleaner in accordance with manufacturer's instructions.

1. Protect adjacent surfaces.
2. Thoroughly rinse surfaces with clean water after completion of cleaning; remove traces of cleaning solution.

END OF SECTION

SECTION 044300 - STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Division 01 - General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for stone masonry as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. The work specified in this Section includes, but shall not be limited to, following applications of stone masonry:

1. Delegated Design for structural engineering.
2. Stone and Stone Veneer Walls and Stairs.
3. Stone Embankments.
4. Other site stone elements shown.
5. Mortar, Grout, and Anchors.
6. Sourcing, supply, fabrication, cutting, finishing, and delivery to the site of stone design elements of the shapes, approved color ranges, and to approved shop drawings.
7. Fabricating, cutting, and finishing each type of stone to dimensions, and shapes of design, to approved color ranges, and to approved shop drawing details.
8. Anchors, including dowels, clamps, rods, clips, ties and bolts, and other fastening devices for stonework as required to securely anchor in place. Where such items are to be built-in or cast-in to the structure of other Sections, coordinate and ensure proper location of same.
9. Drilling, fitting, and cutting of stonework as required for the proper completion of the Work.
10. Accessories and hardware required for complete installation.
11. Protection of stone during transit, storage, erection, and after installation.
12. Setting beds, mortars, grouting/pointing mortars, and related setting accessories for complete installation.
13. Field measurements of adjacent and/or supporting construction and verification of existing conditions.
14. Sealant systems at vertical and horizontal intersections of stonework.
15. Coursings and patterns as indicated and approved by the Landscape Architect in the field.
16. Cleaning of stonework after installation and prior to Substantial Completion.

C. Related Sections:

1. Section 312000 “Earth Moving” for excavation, aggregate base materials, and compaction.
2. Section 033000 "Cast-in-Place Concrete" for concrete footings and related assemblies.
3. Section 042000 “Unit Masonry” for concrete block and concealed flashing.

1.3 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 the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. American Society for Testing and Materials (ASTM):

1. ASTM C 144, Standard Specification for Aggregate for Masonry Mortar.
2. ASTM C 150, "Standard Specification for Portland Cement."
3. ASTM D 2241, Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series).
4. ASTM A 123-02: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM C 97-02: Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
6. ASTM C 119-04: Terminology Relating to Dimension Stone.
7. ASTM C 136: Standard Test Method for Seve Analysis of Fine and Coarse Aggregates.
8. ASTM C 170-90 (1999): Test Method for Compressive Strength of Dimension Stone.
9. ASTM C 270-03: Specification for Mortar for Unit Masonry.
10. ASTM C 615-03: Specification for Granite Dimension Stone.
11. ASTM C 568-03: Specification for Limestone Dimension Stone.
12. ASTM C 1354-96: Test Method for Strength of Individual Stone Anchorages in Dimension Stone.

D. Definitions contained in ASTM C119 apply to this Section.

1.4 SUBMITTALS

A. General: See Division 01 – General Requirements for submittal procedures.

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Submit manufacturer’s descriptive literature and installation instructions for proprietary mortar and grout mixes, mix additives, and accessories.

1. Submit complete data on quarry facilities for stone types specified. Include information of location, production capabilities, and the nature of stone material that can be selected and supplied.
2. For each stone variety proposed for use on Project, include materials properties test data indicating compliance with physical properties required by referenced ASTM standards.

C. Delegated Design Submittal: For walls, steps, and vertical construction elements, include signed and sealed drawings by a Registered Professional Engineer responsible for their preparation. Include compaction, concrete design, footings, reinforcing, attachments, and mortar.

D. Shop Drawings: Provide Shop Drawings that show all details including sizes, materials, patterns, quantities and manner of assembling the various members, properly coordinated with the related work. Shop Drawings shall show true profiles, methods of anchoring hardware, if any, and all other necessary information. Take accurate field measurements before preparation of shop drawings and specifications. Provide shop drawings for each product, accessory, and assembly required. Include information not fully detailed in manufacturer’s standard product

data, including, but not limited to, location of each stone unit in the work, using number designation corresponding to number marked on the back of each stone unit; size and profile of each stone unit; provisions for jointing, anchoring, fastening, and supporting units; and interface with adjacent materials, including, but not limited to, expansion provisions and flashing systems.

1. Include plans, elevations, sections, details, and attachments to other work for all walls.
2. Include dimensions and profiles of stone units.
3. Show locations and details of joints.
4. Show locations and details of anchors.
5. Show locations and details of wall mounted lights and other attachments.

E. Samples for Verification:

1. Submit samples for initial color selection. Submit samples of each specified finish. Submit samples in form of manufacturer's color charts showing full range of colors and finishes available.
2. For each stone type indicated. Include at least three samples 12 x 12-inch in each set for each type of stone, exhibiting extremes of the full range of color and other visual characteristics expected in completed Work. Samples will establish the standard by which stone provided will be judged.
3. In the case of more variegated stones, color photos shall be submitted in addition to the number of samples to show the full range of color and markings to be expected.
4. Mortars: Submit three samples, each 12-inch by 1/4-inch, of each type specified.

F. Qualification Data: Submit qualification data for firms and persons specified in Quality Assurance Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of landscape architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Supplier Qualifications: Stonework supplier shall be by a firm or firms that have successfully supplied natural stonework of each material type and condition, similar to the quality specified, and in the quantity shown for a period of not less than ten years. Stone shall be obtained from quarries or suppliers capable of furnishing quantity, sizes and character of the stone required. Contractor will be held responsible for any delay in the completion of the Work due to failure to supply satisfactory stone in ample quantities and proper sequence.

B. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing stone masonry similar in type and scope to that required for this Project.

C. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

D. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from one quarry with resources to provide materials of consistent quality in appearance and physical properties.

E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

F. Mock Ups: Prior to installation of the work, fabricate and erect mock ups for each type of finish and application required to verify selections made under sample submittals and to demonstrate

aesthetic effects as well as qualities of materials and execution. Build mock ups to comply with the following requirements, using materials indicated for final unit of work.

1. Locate mock ups on site in location and of size indicated or, if not indicated, as directed by the Landscape Architect.
2. Erect mock up using materials, bond, and joint tooling shown or specified. Build mockup of full thickness, indicating the proposed range of color, texture, and workmanship. Include top or cap as shown on drawings. Wall mock ups shall be 10’-0” long by full height. Mock ups of other applications shall be minimum 8’-0” by 8’-0”. The Landscape Architect reserves the right to adjust the size of the sample panel or mock up as need to show full condition.
3. Demonstrate the proposed range of aesthetic effects and workmanship to be expected in the completed work.
4. Obtain the Landscape Architect’s acceptance of mock ups before start of final unit of work. If the original mock up for each system is not approved, the Contractor shall provide additional mock ups, as required, at no cost to the Owner until an approved mock up is obtained.
5. Retain and maintain mock ups during construction in undisturbed condition as a standard for judging completed unit of work.
6. When directed, demolish and remove mock ups from the Project site.
7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
8. Protect accepted mockups from the elements with weather-resistant membrane.
9. Approval of mockups is for color, texture, and blending of stone; relationship of mortar and sealant colors to stone colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups is also for other material and construction qualities Landscape Architect specifically approves in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Landscape Architect specifically approves such deviations in writing.

G. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and handle materials to prevent deterioration or damage.

1. Stone shall be carefully packed and loaded for shipment using reasonable care and customary precautions against damage in transit. Material which may cause staining or discoloration shall not be used for blocking or packing.
2. Handling and Unloading: Handle stone to prevent chipping, breakage, soiling or other damage. Do not use pinch or wrecking bars without protecting edges of stone with wood or other rigid materials. Lift with wide-belt type slings wherever possible; do not use wire rope or ropes containing tar or other substances which might cause staining. If required, use wood rollers and provide cushion at end of wood slides.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. The Contractor shall fully review existing conditions of the site before submitting bid, and shall be fully responsible for carrying out all site work required to execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed.

B. Plans, surveys, measurements and dimensions under which the work is to be performed are believed to be correct to the best of the Landscape Architect's and Owner’s knowledge, but the Contractor shall have examined them during the bidding period, as no allowance will be made for any errors or inaccuracies that may be found therein.

C. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

D. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.
2. Protect ledges, and projections from mortar droppings.
3. Protect surfaces, as well as products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.

E. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. 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 masonry has dried, but not less than 7 days after completing cleaning.

F. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 STONE – GENERAL

A. Provisions for Examinations at the Quarry: The Landscape Architect may choose to select stone at the source. The Contractor shall accompany the Landscape Architect and assist in the tagging process. Provide removable marking paint, coordinate stone selection trips, and arrange for equipment to move stockpiled stone.

B. Visual Criteria for Stone: All examinations, selections, and approvals shall be for the purpose of achieving a final appearance of stone with greatest possible uniformity, or as shown on the drawings, and based on the following:

1. Stone to be of sound stock and uniform texture, and shall be free from holes, seams, chips, cracks, shakes, clay pockets, spalls, stains, starts, and other defects that are not natural to the stone specified and that would impair the strength, durability, or appearance of the Work, as determined by the Landscape Architect.
2. Present inherent variations characteristic of the stone and the quarry from which the stone is obtained for approval.

2.2 STONE SOURCE

A. Varieties and Source: Subject to compliance with requirements, provide stone from source indicated on Material Schedule.

B. Each color of stone shall come from a single quarry, with sufficient reserves to satisfy the requirements of the Project. The stone supplier shall have the capabilities to cut and finish the stone without delaying the Project.

C. Stone Source Examination: Make quarried stone blocks available for examination by Landscape Architect.

2.3 LIMESTONE

A. Quarry Block Limestone: Sound, durable limestone, free from structural defects, uniform in color and texture, and shall be clean of earth, clay, oil or other foreign substances and meeting the following specifications:

1. Classification: Limestone as defined by ASTM C119.
2. Type II (medium density) or Type III (high density). Comply with ASTM C568.
3. Absorption and bulk specific gravity of dimension stone: ASTM C-97, bulk specific gravity: 2.193, Absorption % - 6.13, Density Lbs/ft3 – 136.8
4. Compressive Strength of dimension stone: ASTM C-170, Lbs/in2 – 6560, MPa – 45.3.
5. Modulus of Rupture of dimension stone: ASTM C-99, Lbs/in2 – 824, MPa – 5.67
6. Finish: Reference materials schedule.
7. Color: Reference materials schedule
8. Size: Reference materials schedule
9. Selection: Stone shall be selected for fabrication by the Landscape Architect at the quarry; coordinate scheduling of quarry visit with no less than 96 hour advance notice.

2.4 OTHER STONE

A. Provide sound natural stone as follows:

1. Products: Subject to compliance with requirements, provide one of the following stone varieties that may be incorporated into the Work include, but are not limited to, the following:

    a. As indicated on materials schedule.

2. Maximum Absorption per ASTM C 97: 3 percent.
3. Minimum Compressive Strength per ASTM C 170: 7500 psi.
4. Minimum Flexural Strength per ASTM C 880.
5. Minimum Modulus of Rupture per ASTM C 99.

2.5 MORTAR AND GROUT MATERIALS

A. 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.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207.

D. Mortar Cement: ASTM C 1329.

E. Masonry Cement: ASTM C 91.

F. 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 stone masonry mortar.

G. Colored Cement Product: Packaged blend made from portland cement and lime, masonry cement or mortar 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 or mortar cement by weight.
4. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

H. Aggregate: ASTM C 144 and as follows:

1. White Aggregates: Natural white sand or ground white stone.
2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

I. Latex Additive: Manufacturer's standard acrylic-resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

J. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

K. Grout: High strength non-shrinking grout that is free of metallic aggregate, oxidizing catalysts, and accelerators; factory packaged; requiring only water.

1. Masterflow #173 Grout by Master Builders or 5-Star Grout Corp.

L. Water: Potable.

2.6 METAL ANCHORS

A. Materials:

1. Hot-Dip Galvanized-Steel Wire: ASTM A 82, with ASTM A 153/A 153M, Class B-2.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 316.

B. Pins and Dowels: Stainless Steel 316L, 1/2” diameter.

2.7 STONE TRIM ANCHORS

A. Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or post installed anchor bolts for fastening to substrates or framing as indicated.

B. Materials: Fabricate anchors from stainless steel, ASTM A 240/A 240M, Type 304. Fabricate dowels from stainless steel, ASTM A 276, Type 304.

C. Fasteners for Stone Trim Anchors: Annealed stainless-steel bolts, nuts, and washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

D. Post installed Anchor Bolts for Fastening Stone Trim Anchors: Torque-controlled expansion anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

2.8 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.

1. Mortar for Setting Stone: Type S or M.
2. Mortar for Pointing Stone: Type N.

D. Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.

E. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

F. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

2.9 STONE FABRICATION

A. Fabricate stone to comply with sizes, shapes, and tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.

1. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."

B. Fabricate stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.

C. Cut and drill sinkages and holes in stone for anchors and supports.

D. Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.

1. Clean sawed backs of stone to remove rust stains and iron particles.

E. Thickness of Stone: Provide thickness indicated, plus or minus 1/4 inch.

F. Shape and finish stone for type of pattern indicated.

G. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

1. Finish exposed ends of copings same as front and back faces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Owner and the Landscape Architect, of any conditions detrimental to the proper and timely completion of the work.

1. Verify all measurements and dimensions and coordinate the installation of supporting construction with the stonework.
2. Proceed with installation only after unsatisfactory conditions have been corrected.
3. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear

water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

B. Layout of Work: Accurately lay out stone masonry to patterns and to fit conditions as indicated and encountered on site. Comply with set out control points and coordinate with other work of Project. Provide additional control points and stakeouts as required to effect correct alignments and grade elevations. Advise Owner of any discrepancies or on-site conditions detrimental to critical layouts and obtain approved correction.

3.3 SETTING OF STONE MASONRY, GENERAL

A. Perform necessary field cutting and trimming as stone is set.

1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
2. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

D. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

E. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch at narrowest points or more than 1/2 inch at widest points.

F. Provide sealant joints of widths and at locations indicated.

1. Keep sealant joints free of mortar and other rigid materials.
2. Sealing joints is specified in Division 07 Section "Joint Sealants."

G. Coat limestone with cementitious dampproofing as follows:

1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.
2. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.
3. Allow cementitious dampproofing formulations to cure before setting dampproofed stone. Do not damage or remove dampproofing in the course of handling and setting stone.

H. Provide wall drains at all retaining conditions. Place drainage open graded washed drainage aggregate wrapped with geotextile fabric. Place weep holes where required at 24 inches o.c. Stop drainage piping 6” behind face of wall, using open joints in stone for weeps holes.

3.4 INSTALLATION OF DRY STACK STONE MASONRY

A. Set Stone using dry stack method without mortar. Place stone units on compacted stone base course. Include the following:

1. Geotextile fabric below and behind stones to prevent erosion of backfill material.
2. Backfill behind stones with opened graded washed drainage aggregate.

B. Set stone with tops level and faces vertical.

C. Install spacers between units to prevent rocking.

D. Installation Tolerances; Maximum variation from:

1. True plane of wall: Plus or minus 1/4 to 3/8 inch in 10 feet and 1/2 inch in 20 feet or more.
2. Plumb: Plus or minus 1/4 to 3/8 inch in 10 feet noncumulative; 1/2 inch in 20 feet more.

3.5 POINTING

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers not more than 3/8 inch deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the joint profile indicated.

3.6 ADJUSTING AND CLEANING

A. Remove and replace stone masonry of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Landscape Architect.
2. Defective joints.
3. Stone masonry not matching approved samples and mockups.
4. Stone masonry not complying with other requirements indicated.
5. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

B. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

C. Final Cleaning: Clean stone masonry as recommended by fabricator.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Division 01 General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for metal fabrications as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes:

1. Delegated Design/Engineering.
2. Shop or field fabricated metal components, including but not limited to:

    a. Railing systems.
    b. Shading elements.
    c. Ornamental elements.
    d. Other metal fabricated components shown.

C. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts and fasteners indicated to be cast into concrete or built into unit masonry.
2. Steel weld plates and angles for casting into concrete.

D. Related Requirements:

1. Section 033000 – “Cast-in-Place Concrete” for footings and related embedments.
2. Section099600 – “High Performance Coatings” for priming and painting custom metal design elements.

1.3 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 the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. American Welding Society (AWS):

1. AWS D1.1, "Structural Welding Code - Steel" (copyrighted by AWS, ANSI approved).

D. American Society for Testing and Materials (ASTM):

1. ASTM A 27, "Standard Specification for Steel Castings, Carbon, for General Application."
2. ASTM A 36, "Standard Specification for Structural Steel."

3. ASTM A 47, “Standard Specification for Ferritic Malleable Iron Castings.”
4. ASTM A 48, "Standard Specification for Gray Iron Castings.”
5. ASTM A 53, "Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless.”
6. ASTM A 108, "Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.”
7. ASTM A 123, "Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.”
8. ASTM A 153, "Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.”
9. ASTM A 283, "Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.”
10. ASTM A 500, "Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes."
11. ASTM A 653, "Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.”
12. ASTM A 780, "Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings.”
13. ASTM A 924, "Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.“
14. ASTM A 1008, "Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability."
15. ASTM B 221, "Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.”
16. ASTM B 633, "Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.”
17. ASTM C 1107, "Standard Specification for Packaged Dry, Hydraulic Cement Grout (Non Shrink).”
18. ASTM E 488, "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.”

E. Code of Federal Regulation (CFR):

1. 28 CFR Part 36, "Americans With Disabilities Act" hereinafter referred to as ADA.

F. Federal Specifications (FS):

1. FS TT P 664, "Primer Coating, Synthetic, Rust Inhibiting, Lacquer Resisting."

G. National Association of Architectural Metal Manufacturers (NAAMM):

1. NAAMM - “Metal Finishes Manual for Architectural and Metal Products.”

H. Society for Protective Coatings (SSPC) - Painting Manual.

1.4 COORDINATION

A. Designer Requirements: Engage and pay for the services of an engineer to design the metal fabrications shown and the connections for installing them.

B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

C. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.5 SYSTEM DESCRIPTION

A. Minimum design loads:

1. Pedestrian loading:

a. Uniform load of 100 PSF.
b. Concentrated load of 300 pounds.
c. Maximum deflection under loading: L/240.

2. Maximum deflection for all metal components: 1/8”.
3. Concentrated and uniform loads do not need to be applied simultaneously.
4. Perform design under direct supervision of Professional Structural Engineer licensed in State in which Project is located, with minimum 5 years experience in work of this Section.

1.6 ACTION SUBMITTALS

A. General: See Division 01 – General Requirements for Submittal Procedures.

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Product data shall include, but shall not be limited to, manufacturer's descriptive literature for items not produced in the fabricator's plant.

C. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Fasteners.
3. Shop primers.
4. Shrinkage-resisting grout.

D. Shop Drawings: Provide engineering and fabrication shop drawings signed and sealed by an engineer licensed within the applicable jurisdiction showing all site conditions, field measurements as applicable, fabrication, attachments, reinforcements, footings, and materials required. Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer’s standard product data, including, but not limited to, plans, elevations, and details of sections and connections. Show anchorage and accessory items. Submit templates for anchor and bolt installation.

1. Details shall be at a scale of 1-1/2 inches equals 1 foot, minimum.

E. Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for all metal fabrications shown on Drawings.

1.7 SAMPLES:

A. Submit samples for initial color selection. Submit samples of each specified finish. Submit samples in form of manufacturer’s color charts showing full range of colors and finishes

available. Where finishes involve normal color variations, include samples showing the full, range of variations expected.

B. Submit samples for verification purposes. Submit representative samples of materials and finished products if requested by the Landscape Architect.

1.8 INFORMATIONAL SUBMITTALS

A. Design Data: Submit design calculations for metal fabrications and the connections for attaching them. The design data shall be signed and sealed by the professional engineer.

B. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.

C. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

D. Certificates:

1. Submit designer's certification that:

a. The designer is a structural engineer in the State where the Project is located. Include registration number.
b. The designer is responsible for the metal fabrications and the connections for attaching them.
c. The designer has coordinated the design of the metal fabrications and the connection for attaching them with the design of the structure.
d. The designer has visited the site and that to the best of their information, knowledge, and belief the metal fabrications have been installed in accordance with their design.

E. Welding certificates.

F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

G. Research Reports: For post-installed anchors.

1.9 QUALITY ASSURANCE

A. Fabricator Qualifications: Fabricator shall be a firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in service performance, and with sufficient production capacity to produce required units without delaying the work.

B. Engineer Qualifications: The engineer shall be a professional engineer legally authorized to practice in the jurisdiction where the Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of products similar to this Project in material, design, and extent, and that have a record of successful in service performance.

C. Welder Qualifications: Qualify welding processes and welding operators in accordance with AWS standard qualification procedures. Comply with applicable provisions of AWS D1.1, AWS D1.2, and AWS D1.3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

D. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

1.10 FIELD CONDITIONS

A. Field Measurements: Take field measurements prior to fabrication of the work and preparation of shop drawings, to ensure proper fitting of the work. Show recorded measurements on final shop drawings. Notify the Owner and the Landscape Architect, in writing, of any dimensions found which are not within specified dimensions and tolerances in the Contract Documents, prior to proceeding with the fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.11 DELIVERY, STORAGE AND HANDLING

A. Store steel above ground on platforms, skids, or other supports; separate with wooden separators.

B. Protect steel from corrosion.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 316L.

D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 316L.

E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

F. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

G. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.

1. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

H. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.

I. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

J. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

K. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

L. Steel Plank Decking with Tread:

1. Source: Bar Grating by McNichols Company (www.mcnichols.com) or approved substitute.
2. Width, depth, and thickness: As indicated
3. Finish: Mill.

2.2 FASTENERS

A. General: Provide anchors of type indicated below, fabricated from corrosion resistant materials capable of sustaining, without failure, the load imposed within a safety factor of four, as determined by testing per ASTM E 488, conducted by a qualified independent inspecting and testing agency. Unless otherwise indicated, provide Type 316L stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

D. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

2.3 MISCELLANEOUS MATERIALS

A. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Non-Metallic, Non-Shrinkage Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for exterior applications.

F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete.

G. Boiled Linseed Oil: CPSIA, SCAQMD, and OTC Compliant.

2.4 FABRICATION

A. General: Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions

indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

1. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
2. Shear and punch metals cleanly and accurately. Remove burrs.
3. Remove sharp or rough areas on exposed surfaces. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius
4. 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. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
5. Where welded connections are not possible, or where in the opinion of the Landscape Architect they will not achieve the desired design intent, form exposed connections with hairline joints, flush and smooth, using concealed fasteners. Use exposed fasteners of type shown or, if not shown, Phillips flat head (countersunk) screws or bolts. Locate joints where least conspicuous. Conceal fastenings where possible.
6. 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.
7. Cut, reinforce, drill, and tap metal fabrications to receive finish hardware and similar items.
8. 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.
9. Fabricate joints that shall be exposed to weather in a manner to exclude water, or provide weepholes where water may accumulate.
10. Tack welds prohibited on exposed surfaces.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Landscape Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

A. Coordinate and furnish anchors, setting drawings, diagrams, templates, instructions, and directions for installing anchors, including, but not limited to, concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the Project site.

1. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.3 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: 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.

B. 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.

C. 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.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.4 ADJUSTING

A. Touch Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC PA 1 requirements for touching up field painted surfaces. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touch Up Painting: Cleaning and touch up painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 - Painting.

C. Galvanized Touch Up: For galvanized surfaces, clean welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

3.5 CLEAN UP

A. As installation is completed, the Contractor shall wash thoroughly, using clean water and soap, then rinse with clean water.

B. The Contractor shall not use acid solution, steel wool, or other harsh abrasives.

C. The Contractor shall utilize light sandblasting on exposed steel to remove stains, blemishes, and inconsistencies.

D. If stain remains after washing, the Contractor shall remove the finish, and restore in accordance with NAAMM Metal Finishes Manual.

E. Coat exposed steel with boiled linseed oil as indicated.

F. The Contractor shall remove all debris and excess material immediately from project site.

G. The Contractor shall restore adjacent work by other contractors to its original condition.

3.6 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the metal fabrications shall be without damage at time of Substantial Completion.

END OF SECTION

SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Division 01 - General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for waterproofing of site elements as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes:

1. Surface preparation.
2. Application of single-component cold-applied liquid waterproofing membrane.
3. This section is for landscape related scope of work only. Not for waterproofing of buildings, structures, occupied spaces, etc.

C. Related Requirements:

1. Section 033000 "Cast-In-Place Concrete."
2. Section 042000 "Unit Masonry."
3. Section 334600 "Subdrainage."

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C1250 – Standard Test Method for Nonvolatile Content of Cold Liquid-Applied Elastomeric Waterproofing Membranes.
2. ASTM C836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
3. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
4. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness.
5. ASTM D2369 - Standard Test Method for Volatile Content of Coatings
6. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings:

1. Indicate locations and extent of waterproofing.
2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of fluid applied waterproofing membranes.

B. Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing the product.

C. Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean, dry area in accordance with manufacturer's instructions.

C. Store at temperatures between 40° - 70° F.

D. Protect materials during handling and application to prevent damage or contamination.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.

1. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
2. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

C. Product not intended for uses subject to abuse or permanent exposure to the elements.

1.8 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Installer's Special Warranty: Installer agrees to repair or replace waterproofing that fails in workmanship for warranty period of two years.

1. Warranty includes removing and reinstalling protection board, drainage panels, and adjacent earthwork and planting.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain waterproofing materials from single source and from single manufacturer.

2.2 MATERIALS

A. Waterproofing Membrane: single-component, cold-applied, solvent-free, non-shrink, liquid waterproofing membrane.

1. Performance based specification: Waterproofing membrane shall have the following properties as determined by laboratory testing.

a. Solids content by weight, ASTM C1250: 98%.
b. Tensile Strength, ASTM D412: 100 psi.
c. Elongation at break, ASTM D412: 425%.
d. Water Vapor Transmission, ASTM E96 (Method BW): 0.1 perms.
e. Shore 00 Hardness, ASTM D2240: 57.
f. VOC, ASTM D2369: 36 g/L.

2. Manufacturers:

a. W. R. Meadows, Inc.; Hydralastic 836.
b. Sika; Sikalstic 320, Sikalastic HLM 5000 GC.
c. Tremco; Tremproof PU100.
d. GCP Applied Technologies, SILCOR 1100.
e. Mapei, Planiseal CR1.
f. Approved equal.

2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials recommended in writing by waterproofing manufacturer for intended use and compatible with one another and with waterproofing, including but not limited to:

1. Joint Tape.
2. Reinforcing Fabric.
3. Reinforced Joint Tape for outside corners subject to backfill.
4. Primer.
5. Repair materials.

2.4 PROTECTION COURSE

A. Protection Course, Semirigid Sheets of Fiberglass or Mineral-Reinforced Asphaltic Core: ASTM D6506, pressure laminated between two asphalt-saturated fibrous liners and as follows:

1. Thickness: 1/4 inch, nominal.
2. Adhesive: Rubber-based solvent type recommended in writing by waterproofing manufacturer.

B. Protection Course, Core or Extruded-Polystyrene Board Insulation, Both Sides with Plastic Film: Fan folded, nominal thickness of 1/4 inch, with compressive strength of not less than 8 psi in accordance with ASTM C1621/C1621M and maximum water absorption by volume of 0.6 percent in accordance with ASTM C272/C272M.

2.5 MOLDED-SHEET DRAINAGE PANELS

A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft..

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.

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

3.2 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

3.3 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C1471/C1471M.

B. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

3.4 JOINT, CRACK, AND CORNER TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrate in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C1471/C1471M. Before coating surfaces, remove dust and dirt from joints and cracks in accordance with ASTM D4258.

1. Comply with ASTM C1193 for joint-sealant installation.
2. Identify and install detailing membrane in all cracks and all non-structural joints.

3. Apply a 30 wet mil coat of the fluid applied membrane ensuring that there is a minimum of 3” of membrane extending onto the wall in all directions.
4. Embed the non-woven reinforcing fabric over the entire area of this membrane and work in using trowel.
5. Completely cover the glass mesh with a second coat of the fluid applied membrane at 30 wet mils while the first coat is still wet, again extending 3” onto the wall in all directions.

B. Treatment Of Inside And Outside Corners:

1. Install detailing membrane to create a minimum 3/4” fillet in all inside corners.
2. Apply a 30 wet mil coat of the fluid applied membrane ensuring that there is a minimum of 3” of membrane extending onto the wall in all directions.
3. Embed the non-woven reinforcing fabric over the entire area of this membrane and work in using trowel.
4. Completely cover the mesh with a second coat of fluid applied membrane at 30 wet mils while the first coat is still wet, again extending 3” onto the wall in all directions.
5. On outside corners subject to backfilling, install reinforced joint tape in lieu of fabric joint tape following the same procedure.

3.5 INSTALLATION OF WATERPROOFING

A. Apply waterproofing in accordance with manufacturer's written instructions and to recommendations in ASTM C1471/C1471M.

B. Apply primer over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.

C. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.

1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases and pinholes, with a dry film thickness of 120 mils.
2. Apply waterproofing to prepared wall terminations and vertical surfaces.
3. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft.

D. Reinforced Waterproofing Applications: Mix materials and apply waterproofing by roller, notched squeegee, trowel, or other suitable application method.

1. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases and pinholes, with an average dry film total thickness of 120 mils.
2. Apply reinforced waterproofing to prepared wall terminations and vertical surfaces.
3. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft..

E. Cure waterproofing, taking care to prevent contamination and damage during application and curing.

F. Install protection course with butted joints over waterproofing before starting subsequent construction operations.

1. For horizontal applications, install protection course loose laid over fully cured membrane.

2. For vertical applications, set protection course in nominally cured membrane, which will act as an adhesive. If membrane cures before application of protection course, use adhesive.
3. Molded-sheet drainage panels may be used in place of a separate protection course for vertical applications when approved in writing by waterproofing manufacturer.

3.6 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, in accordance with manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.7 PROTECTION

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION

SECTION 092400 - CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Furnish all labor, material, equipment, supervision, and related services necessary or incidental to the installation of the Work as shown or indicated on the Drawings and/or as specified.

B. Section Includes:

1. Metal lath.
2. Accessories.
3. Base-coat cement plaster.
4. Cement plaster finish coats.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C926 – Standard Specification for Application of Portland Cement-Based Plaster.
2. ASTM C1063 – Standard Specification for Installation of Lathing and Furring.
3. ASTM C897 – Aggregate for Job-Mixed Portland Cement-Based Plasters.
4. ASTM C144 – Aggregate for Masonry Mortar (for finish coats).
5. ASTM E119 – Fire Tests of Building Construction and Materials (as applicable).

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.
2. Portland cement plaster mixes.
3. Premixed or proprietary systems.
4. Lath materials, accessories, control joints, and corner reinforcement.

B. Shop Drawings: Locations and installation of control and expansion joints, including plans, elevations, sections, and attachment details.

C. Samples for Initial Selection: For each type of factory-prepared finish coat and for each color and finish texture specified.

D. Samples for Verification: For each type of factory-prepared finish coat and for each color and finish texture specified, 12 by 12 inches, and prepared on rigid backing.

1.6 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups for each substrate and color and finish texture indicated for cement plastering, including accessories.

a. Size: 100 sq. ft. in surface area.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.8 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum of 10 years of experience with exterior plaster applications.

1.9 FIELD CONDITIONS

A. Comply with ASTM C926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is between 40 deg F and 95 deg F, and will remain so for 24 hours after application.
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

C. Factory-Prepared Finish Coats: Comply with manufacturer's written instructions for environmental conditions for applying finish coats.

PART 2 - PRODUCTS

2.1 METAL LATH

A. Expanded Metal Lath: ASTM C847; cold-rolled carbon steel sheet, hot-dip galvanized with ASTM A653/A653M G90 zinc coating.

1. Self-Furring Diamond-Mesh Lath: V-grooved.

a. Weight: 3.4 lb/sq. yd.

b. Water-Resistive Barrier: Vapor-permeable paper, factory bonded to back of lath; complying with requirements in FS UU-B-790a for Type I, Grade D and with 60-minute water resistance.

1) Provide water-resistive barrier at exterior locations.

2.2 ACCESSORIES

A. General: Comply with requirements in ASTM C1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Foundation Weep Screed: Fabricated from hot-dip-galvanized steel sheet with ASTM A653/A653M G90 zinc coating.
2. Cornerite: Fabricated from metal lath, hot-dip galvanized with ASTM A653/A653M G90 zinc coating.
3. External- (Outside-) Corner Reinforcement: Fabricated from metal lath, hot-dip galvanized with ASTM A653/A653M G90 zinc coating.
4. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.

a. Bullnose cornerbead, radius 1/2-inch minimum, with expanded flanges; use unless otherwise indicated.

5. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
6. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on exposed face of control joint.
7. One-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
8. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch wide; with perforated flanges.

2.3 BASE-COAT CEMENT PLASTER

A. General: Comply with requirements in ASTM C926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:

a. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

2.4 CEMENT PLASTER FINISH COATS

A. Job-Mixed Finish-Coat Mix: Comply with requirements in ASTM C926.

1. Aggregates:

a. Sand: Use over base coats containing sand.

2. Portland Cement Mix: For cementitious material, mix 1 part Portland cement and 1-1/2 to 2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

B. Ready-Mixed Finish-Coat Plaster: Factory-mixed Portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Color: As selected by Landscape Architect from manufacturer's full range.
2. Source Limitations: Obtain ready-mixed finish-coat plaster from single source from single manufacturer.

2.5 PLASTER MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type II L/A (Low Alkali).

1. Color for Finish Coats: Gray.

B. Masonry Cement: ASTM C91/C91M, Type N.

1. Color for Finish Coats: Gray.

C. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color to match approved mockup.

D. Lime: ASTM C206, Type S; or ASTM C207, Type S.

E. Sand Aggregate: ASTM C897.

1. Color for Job-Mixed Finish Coats: In color matching approved mockup.

2.6 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in cement plaster.

C. Bonding Compound: ASTM C932.

D. Fasteners for Attaching Metal Lath to Substrates: ASTM C1063.

E. Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.

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 the Work.

B. Reject plaster materials that are wet or moisture damaged.

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

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare smooth, solid substrates for plaster in accordance with ASTM C926.

3.3 INSTALLATION OF METAL LATH

A. Metal Lath: Install in accordance with ASTM C1063.

1. On Solid Surfaces, Not Otherwise Furred: Install self-furring diamond-mesh lath.

3.4 INSTALLATION OF ACCESSORIES

A. Install in accordance with ASTM C1063 and at locations indicated on Drawings.

B. Reinforcement for External (Outside) Corners:

1. Install lath-type, external-corner reinforcement at exterior locations.

C. Control Joints: Locate as approved by Landscape Architect for visual effect and as follows:

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:

a. Vertical Surfaces: 144 sq. ft.
b. Horizontal and Other Nonvertical Surfaces: 100 sq. ft.

2. At distances between control joints of not greater than 18 ft. o.c.
3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plastered ceiling framing or furring changes direction.
6. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

D. Expansion Joints: Locate where expansion joints occur in supporting construction.

3.5 APPLICATION OF BASE-COAT CEMENT PLASTER

A. General: Comply with ASTM C926.

1. Install so that finished plaster surfaces will not deviate more than plus or minus 1/8 inch in 10 ft.from a true plane when measured by a 10-ft. straightedge placed on surface.
2. Install so finished plaster surfaces will be flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets.

B. Bonding Compound: Apply on unit masonry and concrete substrates for direct application of plaster.

C. Vertical and Horizontal Base Coats:

1. Three-Coat Plasterwork Over Metal Lath: Install base-coat mixes for use over metal lath to produce scratch and brown coats having 3/4-inch total thickness.

3.6 APPLICATION OF CEMENT PLASTER FINISH COATS

A. General: Comply with ASTM C926.

1. Do not deviate more than plus or minus 1/8 inch in 10 ft. from a true plane in finished plaster surfaces when measured by a 10-ft. straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Plaster Finish Coats: Apply to provide smooth trowel finish, or as indicated, and approved on mockup.

3.7 REPAIR

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 CLEANING

A. Remove temporary protection and enclosure of other work after plastering is complete.

B. Promptly remove plaster from surfaces not indicated to be plastered.

C. Repair paving, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on exterior substrates shown.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for shop priming of metal components with primers specified in this Section.

1.3 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Material Performance Criteria:

1. Products: Provide certified test reports when submitting products other than those specified herein the specification. Test reports shall indicate the test method, system and requirements for those products being submitted, and shall meet or exceed the test criteria and performance values of the specified coatings herein.

B. Applicator Qualifications:

1. Preparation and Workmanship: A firm or individual with a minimum of (5) years experienced in applying coatings similar in material design, and extent to those indicated for a particular project, whose work has resulted in applications with a record of successful in-service performance.

C. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Landscape Architect will select one surface to represent surfaces and conditions for application of each coating system.
2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Landscape Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Landscape Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery 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. Product description (generic classification or binder type)
3. Manufacturer’s stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

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

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

C. Do not apply exterior coatings in snow, rain, fog, or mist.

1.9 PRODUCT WARRANTY

A. Provide manufacturer's fifteen (15) year color and gloss, crack, check, peel warranty at the completion of the project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. The Sherwin-Williams Company.

B. Products: Subject to compliance with requirements, provide product indicated for the Exterior High-Performance coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

2.3 METAL COATING SYSTEM

A. Metal: For structural steel columns, joists, miscellaneous and ornamental iron, structural iron, and ferrous metal:

1. Polysiloxane System, Solvent Based:

a. First Coat: Sherwin-Williams Macropoxy 646 Fast Cure Epoxy (7.0-13.5 mils. wet, 5.0-10.0 mils. dry per coat), Semi-Gloss Finish.
b. Second Coat: Sherwin-Williams Sher-loxane 800, (5.0-7.0 mils. wet, 4.0-6.0 mils. dry per coat), Semi-Gloss Finish.

B. Colors: As indicated by manufacturer’s designation.

2.4 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

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 the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and 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.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

1. Clean surfaces with pressurized water.
2. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4.

E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.

1. Clean surfaces with pressurized water.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. Blast clean according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning or SP11 Needle Gun to Bare Metal with a (1) mil profile.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer that is recommended in writing by topcoat manufacturer for coating system indicated.
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 filler that is recommended in writing by topcoat manufacturer for coating system indicated. Sand smooth when dried.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

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

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Landscape Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Stripping and stockpiling rock.
6. Removing above- and below-grade site improvements.
7. Disconnecting, capping or sealing, and removing site utilities.
8. Temporary erosion and sedimentation control.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally 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 larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated according to requirements in Section 015639 "Temporary Tree and Plant Protection.".

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.6 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Topsoil stripping and stockpiling program.

C. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

D. Burning: Burning on site is not allowed.

1.7 QUALITY ASSURANCE

A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.8 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Landscape Architect.

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises.

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

F. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #23 (surface-tolerant, anticorrosive metal primer) or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than five days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

E. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
3. Use only hand methods or air spade for grubbing within protection zones.
4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 48 inches.
2. Do not stockpile topsoil within protection zones.
3. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Burning of waste and debris is prohibited.

C. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.3 DESCRIPTION

A. General Scope: The Work covered under this section shall consist of excavating, placement, compaction, and final shaping of soil materials within the limits of construction.

B. Subgrade Preparation: Also included in this section is the preparation of subgrade, placement, compaction, and final shaping of all embankments, berms, or other earthwork fill sections as shown. All earthwork operations, either fill or excavation, shall conform to the alignments, sections, and elevations as shown on the drawings and as specified herein.

1.4 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for walks, turf and grasses, and plants.
3. Subbase course for concrete walks.
4. Subsurface drainage backfill for walls and trenches.
5. Excavating and backfilling trenches for utilities and pits for buried utility structures.
6. Finish grading of site.

B. Related Requirements:

1. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Section 329115 “Soil Preparation (Performance Specifications) for soil testing and modification requirements
3. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
4. Section 329300 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.5 REFERENCED STANDARDS

A. AASHTO T 180: Moisture Density Relationship of Soils using a 10 lb. Rammer and an 18 in. Drop.

B. American Society for Testing and Materials (ASTM):

1. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2001.
2. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3); 2000a.

3. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.
4. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3); 2002.
5. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 1994(R 2001).
6. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2000.
7. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2001.
8. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2001.
9. ASTM D 3282: Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

C. Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges.

1.6 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the compacted subgrade and paving or construction elements.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the footings or paving that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Landscape Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Landscape Architect. Unauthorized excavation, as well as remedial work directed by Landscape Architect, will be without additional compensation.

G. Finished Grade Elevations: Indicated on drawings.

H. Fill: Soil materials used to raise existing grades.

I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.

J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other fabricated stationary features constructed above or below the ground surface.

K. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

L. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

M. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D698 and ASTM D1557.

C. Required Topsoil Tests for Planting Areas: Provide agronomic soil testing for fertility and textural analysis. Follow recommendations of soil testing agency. Reference Section 329119 - “Soil Preparation (Performance Specifications)” for soil testing and modification requirements.

D. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.8 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.9 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Landscape Architect.

C. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.

D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 311000 "Site Clearing" are in place.

E. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

F. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487, or a combination of these groups; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.

J. Sand: Natural river or bank sand, washed, free of silt, clay, loam, friable or soluble materials, and organic matter; ASTM C33/C33M; fine aggregate.

1. Grade in accordance with ASTM D2487 Group Symbol SW.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

L. Topsoil: Provide fertile, friable, natural loam (as defined by USDA textural classification chart), surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2 inches in any dimension and other extraneous or toxic matter harmful to plant growth. Provide pH range of 6.0 to 7.0. Minimum acceptable organic matter content shall be 5 percent. Obtain topsoil from the site or other local source having similar soil characteristics. Obtain topsoil only from naturally, well drained sites where topsoil occurs in a depth of not less than 6 inches. Do not obtain from bogs or marshes.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability:

a. Class 2; AASHTO M 288.
b. As follows:

1) Grab Tensile Strength: 157 lbf; ASTM D4632.
2) Sewn Seam Strength: 142 lbf; ASTM D4632.
3) Tear Strength: 56 lbf; ASTM D4533.
4) Puncture Strength: 56 lbf; ASTM D4833.

c. Apparent Opening Size: No. 70 sieve, maximum; ASTM D4751.
d. Permittivity: 0.5 per second, minimum; ASTM D4491.
e. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability:

a. Class 2; AASHTO M 288.
b. As follows:

1) Grab Tensile Strength: 247 lbf; ASTM D4632.
2) Sewn Seam Strength: 222 lbf; ASTM D4632.
3) Tear Strength: 90 lbf; ASTM D4533.
4) Puncture Strength: 90 lbf; ASTM D4833.

c. Apparent Opening Size: No. 60 sieve, maximum; ASTM D4751.
d. Permittivity: 0.02 per second, minimum; ASTM D4491.
e. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Landscape Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.3 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.4 EXPLOSIVES

A. Explosives:

1. Do not use explosives.

3.5 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Landscape Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.

a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:

a. 24 inches outside of concrete forms other than at footings.
b. 12 inches outside of concrete forms at footings.
c. 6 inches outside of minimum required dimensions of concrete cast against grade.
d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
e. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms:

1. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

a. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
b. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
c. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

2. Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

a. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.8 SUBGRADE INSPECTION

A. Notify Landscape Architect when excavations have reached required subgrade.

B. If Landscape Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Landscape Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Landscape Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Landscape Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, and waterproofing.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Removing vegetation, topsoil, unsatisfactory soil materials, obstructions, and deleterious materials.
8. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Backfill material shall be placed in 8-inch layers, measured loose, and then shall be thoroughly compacted.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

D. Backfill voids with satisfactory soil while removing shoring and bracing.

E. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

    a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698 and ASTM D1557:

1. Under walkways, scarify and recompact top 12 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
2. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
3. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.

C. Topsoil: Spread topsoil, to a thickness of approximately 6 inches, over graded or disturbed areas. Spread uniformly to grade and rake free of twigs, stones, and other trash. Leave ready for planting and landscaping. Verify depth of soil.

D. Finish Grading: Finish grading shall consist of the preparation, trimming, and shaping to the lines and grades shown on the Drawings, of all areas, outside the paved areas, in such a manner to receive grassing, sod, and/or plantings without additional work.

1. Tolerance: Round tops of banks to circular curves to not less than a 10-foot radius. Neatly and smoothly trim rounded surfaces. Shape the surface of earthwork and trenches to conform to lines, grades, and cross sections as shown on the Drawings, within 1/10 of a foot.
2. Restoration: Where construction operations disturb areas outside the immediate limits of construction, re-grade those areas to the typical cross-section that existed prior to construction.

3.17 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support

subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698.
2. Place and compact impervious fill over drainage backfill in 6-inch-thick compacted layers to final subgrade.

3.18 SUBBASE AND BASE COURSES UNDER WALKS

A. Place base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Shape base course to required crown elevations and cross-slope grades.
3. Place base course 6 inches or less in compacted thickness in a single layer.
4. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698 and ASTM D1557.

3.19 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Landscape Architect.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Landscape Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 320190 - OPERATION AND MAINTENANCE OF PLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Division 01 - General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, operation and maintenance of planting as required for the complete performance of the Work, for trees, shrubs, ground covers, turf, grasses, and meadow areas through date of Final Acceptance of the Work, and as shown on the Drawings and as herein specified. In addition, provide proposal for continuation of maintenance beyond Final Acceptance for one (1) year with detail breakdown on a monthly basis.

B. Section Includes: The work specified in this Section includes, but shall not be limited to, the operation and maintenance of planting, irrigation, and accessories.

C. Description

1. Provide labor, materials, and installation necessary to provide ongoing maintenance through Final Acceptance, and a one (1)-year warranty period from date of Final Acceptance.
2. Related work described elsewhere:

a. Section 328400 "Irrigation" for complete irrigation systems.
b. Section 329115 “Soil Preparation (Performance Specification)” for soil testing and planting soil.
c. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 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 the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. American Association of Nurserymen, Inc. (AAN):

1. ANSI/AAN Z60.2, "Nursery Stock" (copyrighted by AAN, ANSI approved).

D. American Wood Preservers Bureau (AWPB):

1. AWPB LP 22, "Standard for Softwood Lumber and Plywood, Pressure Treated With Water Borne Preservatives for Ground Contact Use."

E. American Society of Testing and Materials (ASTM):

1. ASTM C 33, "Standard Specification for Concrete Aggregates."
2. ASTM D 5268, "Standard Specification for Topsoil Used for Landscaping Purposes."

F. Tree Care Industry Association, Inc (TCIA):

1. ANSI A300 – American National Standard for Tree Care Operations.

1.4 SUBMITTALS

A. General: See Division 01 – General Requirements for Submittal Procedures.

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Product data shall include, but shall not be limited to, manufacturer's specifications for accessories, fertilizers, filter fabric, soil amendments, and prepared soil mixes.

C. Samples: Submit a one (1) pound bag of each type of existing soil, humus, imported topsoil, mulch, drainage stone, planter fill, and lightweight soil mix.

D. Quality Control Submittals:

1. Qualification Data: Submit qualification data for firms and persons specified in Quality Assurance Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of landscape architects and owners, and other information specified.
2. Soil Test Analysis: Provide soil test analysis from a qualified independent inspecting and testing agency. Collect samples from representative areas of the site (minimum of four). Analysis shall include, but shall not be limited to, the following:

    a. Soil pH.
    b. N, P, K, Mg, and Ca levels.
    c. Percent organic matter.
    d. Lead levels.
    e. Petro chemicals.
    f. Textural analysis (percent of sand, silt, and clay).

3. Schedule of maintenance operations and monthly status reports including list of equipment, proposed materials for the job and watering schedule.
4. Licenses, permits and insurance that pertain to maintenance work as required by City, State, or Federal government agencies.
5. Monthly record of all herbicides, insecticides and disease control chemicals used for the project.

E. Project Close-Out Submittal: Include in a single, 3-ring binder a Landscape Maintenance Manual containing an indexed collection of all schedules, records and permits listed above, as well as a documentation of accepted condition of planting and irrigation at Final Acceptance.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Experience: The Landscape Contractor or Maintenance Contractor shall have a full-time employee assigned to the job as foreman for the duration of the contract. The foreman shall have a minimum of four (4) years experience in landscape maintenance

supervision, with experience or training in turf management, entomology, pest control, soils, fertilizers and plant identification.

2. Labor Force: The landscape maintenance labor force shall be thoroughly familiar with and trained in the work to be accomplished and shall perform all tasks in a competent and efficient manner acceptable to Landscape Architect and Owner.

B. Requirements:

1. Supervision: The foreman shall directly supervise the labor force at all times. Immediately notify Landscape Architect Owner of all changes in supervision.
2. Identification: Provide proper identification at all times for landscape maintenance firm's vehicles and labor force. The labor force shall be uniformly dressed in a manner satisfactory to Owner.

1.6 PROJECT/SITE CONDITIONS

A. Site Visit: At the beginning of Maintenance Period, visit and walk the site with Landscape Architect to clarify scope of work and understand existing project and site conditions.

B. Documentation of Conditions: Document general condition of existing trees, shrubs, vines, ground covers and lawn, recording all plant materials that are healthy, thriving, damaged, dead or dying.

1.7 SEQUENCING AND SCHEDULING

A. Perform all maintenance during hours mutually agreed upon between Owner and Contractor.

B. Work force shall be present at the Project Site daily, Monday through Friday, and as often as necessary to perform specified maintenance in accordance with the approved maintenance schedule.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: All materials and equipment shall be provided by Contractor as specified below.

B. Fertilizers:

1. Tightly compressed slow-release and long lasting complete fertilizer tablets bearing manufacturer's label of guaranteed analysis of chemicals present.
2. Balanced, once-a-season application, controlled-release fertilizers with a blend of coated pills which supply controlled-release nitrogen, phosphorus and potassium, and uncoated, rapidly soluble pills containing nitrogen and phosphorus.
3. Fertilize at the rate indicated, and as recommended by soil testing.

C. Herbicides, Insecticides, and Fungicides:

1. Insect/Disease Prevention: Take all measures to prevent introduction of insect or disease-laden materials onto the site.
2. Submit for approval by Owner’s Representative labels for all proposed herbicides, insecticides, and fungicides to be used on-site. Specify what weeds, pests, and fungi they will be used to control and application rates.
3. Best quality materials with original manufacturers’ containers, properly labeled with guaranteed analysis.

4. Use non-staining materials.

D. Replacement Tree Staking and Guying Material: Match originally accepted existing materials on the site.

2.2 EQUIPMENT

A. General: Use only the proper tool for each job. Maintain all tools in sharp and properly functioning condition. Clean and sterilize pruning tools prior to usage.

PART 3 - EXECUTION

3.1 ACCEPTANCE OF INSTALLATION

A. At the completion of all landscape installation, the Contractor shall request in writing an inspection for Substantial Completion in which the Contractor and Owner's Representative shall be present. After this inspection, the Contractor shall prepare a “Punch List”. Upon completion of all punch list items, the Owner's Representative shall re-inspect the project and issue a written statement of Final Acceptance and establish the beginning of the Project warranty period.

B. Date of Review: Notify Owner and landscape Architect at least five (5) working days prior to the anticipated date of review.

C. Landscape work may be inspected for acceptance in a limited number of phases agreeable to the Owner's Representative provided work offered for inspection is completed, including maintenance as required.

D. For work to be inspected for partial or phased acceptance, the contractor shall provide a drawing outlining work completed and supply a written statement-requesting acceptance of the work completed to date.

3.2 PROTECTION:

A. Protect existing vegetation, pavements, and facilities from damage due to maintenance activities; restore damaged items to original condition or replace, at no cost to the Owner.

B. Protect all new planting areas from damage of all kinds from commencement of work until Final Acceptance.

C. Provide temporary protection fences, barriers, and signs as required for protection.

3.3 MAINTENANCE PERIOD

A. Maintenance shall begin immediately with the planting of each plant and continue through Final Acceptance, unless longer maintenance is included in the contract.

1. The Landscape Contractor, in order to protect his guarantee, shall give typewritten to the Owner, a complete maintenance instruction booklet in the care and feeding of the landscape prior to Final Acceptance.
2. Contractor shall take every precaution to protect finished exterior surfaces from damage as result of his maintenance work and shall promptly report and repair any damage to the satisfaction of the Owner’s Representative.

B. Replacements must meet specifications, i.e., quality, size, form, species of plant material and planting procedures, to receive approval of replacement.

C. To ensure warranty standards, the following maintenance procedures shall be executed during construction and for the full project maintenance period.

D. Response Time: When environment dictates, work may require weekend, after hours or holiday schedules. The Contractor agrees to respond to a call per the following schedule:

1. General Maintenance- Three (3) business days.
2. Irrigation Issues- 24 hours or less depending on severity.
3. Safety Issues (obstructions, etc.)- Immediately.

E. Maintenance of Trees, Shrubs, Vines and Groundcovers:

1. Contractor shall be responsible for any and all replacement of any plant materials that are dead, are in an unhealthy or unsightly condition, or that have lost natural shape resulting from dieback, excessive pruning or inadequate or improper maintenance.
2. Replacements must meet specifications, i.e., quality, size, form, species of plant material and planting procedures, to receive approval of replacement.
3. Costs for replacements are assumed part of bid quotations and therefore will not result in an additional cost to the Owner.
4. The Contractor shall be responsible for watering all plantings and shall keep guy wires taut, raise tree rootballs that settle, and furnish chemicals and pesticides as necessary to keep the plantings free of disease and insects until the end of the maintenance period.
5. Insecticide Application: Furnish and apply chemicals and pesticides as necessary to keep the plantings free of disease and insects throughout the maintenance period.
6. Fertilize at the rate indicated.
7. Weed Control: Project Area is to be maintained in a weed-free condition. All planting areas shall be kept clean bi-weekly of all noxious weeds and grasses.
8. Remove and replace trees, shrubs, ground covers, vines, turf areas or other plants found to be dead or in an unhealthy condition. Remove rejected plants and materials promptly. Make replacements during the normal planting schedule. Replace all trees and shrubs where their health is in doubt, unless, in the opinion of Owner's Representative, it is advisable to extend warranty period. Remove all tree wrap paper, dead twigs and branches from tree and plant material at the end of the maintenance period. Keep planting beds free of weeds during maintenance period.
9. Manually remove all foreign growth from planting areas. Manually remove all sucker growth from bases and lower trunks of trees.
10. Pruning:

    a. Trees: The objective in tree pruning shall be to preserve the structural integrity, design purpose and natural beauty of trees. Branch collars shall not be removed. Stubs shall not be allowed to remain. All pruning shall be done in accordance with the guidelines of the Western Chapter of the International Society of Arboriculture.
    b. Shrubs: Pruning shall be done with hand pruners or lopping shears. Hedge shears shall not be allowed. Shrubs shall be selectively pruned to remove old seed heads and stems. Shrubs shall be pruned on a very limited basis, only to maintain natural appearance. Shrubs shall not be pruned into ball or geometric shapes. Shrubs and groundcovers shall be pruned to remove all frost-damaged foliage and branches as soon as new buds appear. Shrubs shall be trimmed to prevent overhang at sidewalks and curbs.

11. Staking and Planting:

a. Staking that has been installed shall be inspected monthly. The goal is to wean trees from stakes. As trees are strong enough to stand on their own, stakes shall be removed.
b. Stakes that are not judged to be ready for removal shall be maintained according to the detail in the Construction Documents. Rubber hose and wire encircling trunks shall be maintained so as not to cause girdling. Stakes and wire shall be maintained to prevent rubbing against trunks or branches. Materials for staking and/or restaking shall match original specification. The need for the stakes and guys to remain beyond the warranty period is to be determined at the end of the warranty period. Approval to remove the stakes and guys at that time will be determined by the contractor's arborist.

F. Maintenance Acceptance.

1. If the Contractor's maintenance is unsatisfactory, the maintenance period shall be extended, at the Contractor's expense, until such time as all corrections are made and the work is inspected and approved by the Owner's Representative.
2. Arrange with the Owner's Representative to walk the site monthly during warranty period to review maintenance standards.
3. The Landscape Contractor shall notify the Owner's Representative five (5)-days prior to end of the maintenance period that a final inspection is requested. The Owner's Representative shall make notations of any items not acceptable or requiring corrections and will notify the Contractor for immediate action. All corrections must be completed before the Contractor is released from the above maintenance requirement.

3.4 REPLACEMENTS

A. Immediately treat or replace all plants that become damaged or injured as a result of Contractor's operations or negligence as directed by Landscape Architect and at no cost to Owner.

B. Replacement plants shall match size, condition, variety, and character of plants to be replaced.

3.5 PROJECT WARRANTY

A. The project warranty period shall begin upon written final acceptance of the project installation by the Owner's Representative.

B. Tree Warranty:

1. The Contractor shall warrant that all trees will be alive and in good health for a period of one (1) year after Final Acceptance except for defects resulting from neglect by the Owner, abuse, or damage by others.
2. The Contractor shall be responsible to monitor the Owner's care and report any maintenance issues before problems occur.
3. The Contractor shall remove and replace dead, unhealthy or girdled trees or those that lose original form and size during the warranty period with material equal to that specified at no additional cost to the Owner. The Contractor shall replace any material that does not meet requirements within ten (10) days.
4. All replacement trees shall be subject to an additional one (1)-year warranty period.

C. Shrubs and Other Plantings Warranty:

1. The Contractor shall warrant all other planting to be alive and in satisfactory condition for a period of one (1) year from date of final acceptance except for defects resulting from neglect by the Owner, abuse, or damage by others.
2. The Contractor shall maintain all plant material in a healthy, sturdy condition during the warranty period.
3. The Contractor shall remove and replace dead or unhealthy shrubs, ground covers, vines and turf areas or those that lose original form and size during the warranty period with material equal to that specified at no additional cost to the Owner. The Contractor shall replace any material that does not meet requirements within ten (10) days.
4. All replacement plants, including shrubs, groundcovers, vines and perennials, shall be subject to an additional one (1)-year warranty period.

3.6 CLEANING

A. Dispose of all pruned materials, vacuum all lawn clippings and leaves, sweep all walkways and rake smooth all mulched areas.

B. Remove from site and legally dispose of evidence of maintenance activities including excess subsoil, unsuitable soil, all containers, trash and debris off of Owner’s property at Contractor's cost.

3.7 CLOSE OUT

A. Landscape Maintenance Record: Submit to Owner a binder with all documentation and records required and utilized during the Maintenance Period.

B. Keys and Identification: Return all keys and identification materials supplied by Owner for the purpose of site access.

END OF SECTION

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for concrete curbs, walks, and paving as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section includes concrete paving including the following:

1. Concrete Pedestrian Paving.

C. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 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 the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. Texas Department of Licensing and Regulation (TDLR):

1. Texas Accessibility Standards.
2. Elimination of Architectural Barriers.

D. American Concrete Institute (ACI):

1. ACI 301, "Specifications for Structural Concrete for Buildings."
2. ACI 303.1 “Cast-IN-Place Architectural Concrete.”
3. ACI 318, "Building Code Requirements for Structural Concrete."

E. American Society for Testing and Materials (ASTM):

1. ASTM C 881, "Standard Specification for Epoxy Resin Base Bonding Systems for Concrete."
2. ASTM C 979, "Standard Specification for Pigments for Integrally Colored Concrete."

3. ASTM C 1028, "Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method."
4. ASTM C 1059, "Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete."
5. ASTM C 1116, "Standard Specification for Fiber Reinforced Concrete and Shotcrete."
6. ASTM D 2047, "Standard Test Method for Static Coefficient of Friction of Polish Coated Floor Surfaces as Measured by the James Machine."
7. ASTM E 329, "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction."

F. Code of Federal Regulation (CFR):

1. 28 CFR Part 36, "Americans With Disabilities Act" hereinafter referred to as ADA.

G. Concrete Reinforcing Steel Institute (CRSI):

1. CRSI MSP, "Manual of Standard Practice."

1.4 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. General: See Division 01 – General Requirements for Submittal Procedures.

B. Product Data: For each type of product.

C. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:

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

1.7 INFORMATIONAL SUBMITTALS

A. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or epoxy adhesive.
8. Joint fillers.

1.8 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests must be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

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

1. Build mockups of full-thickness sections of concrete paving to demonstrate typical joints; surface finish, texture, and color; curing; and standard of workmanship.
2. Build mockups of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Landscape Architect and not less than 96 inches by 96 inches.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Landscape Architect specifically approves such deviations in writing.

D. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

E. Slip Resistance: Static coefficient of friction (COF) shall be as follows, in compliance with the ADA and TAS, as determined by testing per ASTM C1028 or ASTM D2047, as applicable, and per manufacturer’s testing criteria.

1. Level Surfaces: Minimum 0.60.
2. Step Treads: Minimum 0.60.
3. Sloped surfaces and ramps: Minimum 0.80.

F. Concrete Standards: Comply with provisions of ACI 301, ACI 318, and CRSI MSP, except where more stringent requirements are indicated.

G. Single Source Responsibility: Obtain each type or class of cementitious material of the same brand, and each aggregate, from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the Work.

1.9 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

D. Concrete Waste Management:

1. Include concrete waste management procedures for concrete placement, saw cutting, sandblasting, and concrete washouts per local, state, or federal requirements and regulations.
2. The Contractor is responsible for all concrete waste management procedures.
3. Discharge of untreated waste is prohibited. Prior to the first concrete pour, predetermined concrete washout areas must be installed. More than one concrete washout area may be required.
4. If construction of a concrete washout is planned, install per local, state, or federal requirements. If not required by regulations, the following design must be implemented – dig into ground or build above grade, place hay bales or an alternative BMP around the perimeter about 10” x 10”, and overlay plastic sheeting free of tears or holes and secure to hay bales.
5. Vinyl washout containers with filter bags are permitted which provide easier installation and maintenance and are reusable.
6. Concrete washouts should be placed in easily accessible locations with solid (gravel or rock) approaches, a minimum of 50 feet from storm drains, open ditches, and surface waters.
7. Slurry from concrete saw cutting should be continuously vacuumed or recovered for disposal.
8. Grit from sandblasting should be contained. Some procedures include, prohibit sandblasting during high winds, use misting equipment to remove grit from air, and install dust shielding around sandblasting areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

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

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

B. Fiber board, Masonite, or other moisture absorbing materials shall not be used for formwork.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, fabricated from steel wire into flat sheets.

B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

C. Reinforcing Bars: ASTM A615/A615M, Grade 60; deformed.

D. Galvanized Reinforcing Bars: ASTM A767/A767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A615/A615M, Grade 60 deformed bars.

E. Steel Bar Mats: ASTM A184/A184M; with ASTM A615/A615M, Grade 60 deformed bars; assembled with clips.

F. Plain-Steel Wire: ASTM A1064/A1064M.

G. Deformed-Steel Wire: ASTM A1064/A1064M.

H. Joint Dowel Bars: ASTM A615/A615M, Grade 60 plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A767/A767M, Class I coating. Cut bars true to length with ends square and free of burrs.

I. Tie Bars: ASTM A615/A615M, Grade 60; deformed.

J. Hook Bolts: ASTM A307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

K. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

L. Zinc Repair Material: ASTM A780/A780M.

2.4 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150/C150M, Type I/II LA (Low Alkali), gray or white, as indicated.
2. Fly Ash: The use of fly ash is required. Concrete shall be proportioned with a fly ash content equal to 25 percent of the total weight of the fly ash plus cement.

    a. Fly Ash may be ASTM C618, Class F or C. Concrete mixed with Class C Fly Ash shall be subject to the following restrictions:

        1) Coarse Aggregate shall consist of crushed limestone. The use of river gravel aggregate will not be permitted.
        2) Cement shall be Type II LA (Low Alkali) or Type I/II LA (Low Alkali). Alkali content of the cement shall be less than 0.60%. Contractor shall submit evidence of the Alkali content certified by an independent testing laboratory.

    b. Carbon content of fly ash (LOI) shall not exceed 3 percent by volume.

3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IS, Portland blast-furnace slag cement.
5. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 4S, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

F. Abrasive Material for sandblasting: Clean silica sand, aluminum oxide, or equivalent suitable for uniform surface exposure.

G. Water: Potable and complying with ASTM C94/C94M.

2.5 FIBER REINFORCEMENT

A. Color Blended Fiber: 100% Virgin Copolymer/polypropylene fibers engineered and designed for use in decorative concrete paving, complying with ASTM C1116/C1116M, Type III, 1-1/2 to 2-1/4 inches long.

1. Fiber lengths are greater than 2.0 inches.

2. Before mixing, fibers are collated by twisting with an initial bundle aspect ratio less than 20.
3. Pre-mixing, macro monofilament fibers are bundled and have an aspect ratio of 80.
4. Post mixing, fibers are dispersed and have an aspect ratio of 80 or greater.
5. Fibers are made of copolymer virgin materials that are inert.
6. Fibers are sized to be flexible and not stiff to ensure fibers ‘lay down’ and are easy to finish.

B. Fiber Dosage: Add fiber reinforcement at 7.5 lbs/cy.

2.6 CURING AND SEALING MATERIALS

A. Curing Paper: Nonstaining, waterproof paper, consisting of two layers of kraft paper cemented together and reinforced with fiber, and complying with ASTM C171.

B. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

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

F. Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, nondissipating, non-yellowing, manufactured for use with colored concrete.

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

2.7 RELATED MATERIALS

A. Joint Fillers:

1. ASTM D1751, asphalt-saturated cellulosic fiber in preformed strips.
2. Redwood. Clear, straight-grained 90% heartwood, free of knots, splits, or warping; kiln-dried.

B. Slip Dowel Installation System for Expansion Joints: 100% polypropylene sleeve designed specifically for positive load transfer for joints in concrete paving by Sika Corporation.

C. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy-Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types I and II, nonload bearing or Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of indicated designed for specific aggregates and finish requirements.

1. Manufacturer: GCP Applied Technologies, Alpharetta, Georgia.
2. Surface Retarder: Top-Cast, as indicated.

F. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing 3/8-inch sieve and 85 percent retained on a No. 8 sieve.

2.8 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

B. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement.

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

1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

D. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 5 lb/cu. yd.

E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

F. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum W/C Ratio at Point of Placement: 0.40.
3. Slump Limit: 4 inches, plus or minus 1 inch.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances. Notify the Owner of any

conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

1. Beginning of the Work shall indicate acceptance of the areas and conditions as satisfactory by the installer.

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

3.2 PREPARATION

A. Ensure compaction meets requirements indicated, and the recommendations of the Project geotechnical report.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set forms to the required grades and lines, rigidly braced and secured. Provide grade stakes ten Feet (10’-0”) apart, minimum. Provide 2% cross slope, maximum. Pitch walks as indicated on Drawings and make adjustments in slopes at walk intersections to provide drainage. Check completed formwork for grade and alignment. Adhere to all accessibility requirements. Ensure geometry matches design intent shown on drawings with smooth arc, tangents, radii, and perpendicular relationships. Undulating edges will be rejected.

B. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

C. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

D. Ensure formwork, hardware, and mechanical fasteners will not be encased in concrete.

3.4 INSTALLATION OF STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 30 feet maximum unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes.

    a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

    a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.
    b. Saw cut joints within the first six to eighteen hours after placing. Cut into 1/4 depth of slab thickness, accurately constructed true to alignment and location as shown on the Drawings.
    c. Do not delay more than twenty-four hours after concrete pour. Failure can result in rejection and replacement of concrete poured.
    d. Extend all saw cuts to the end of each concrete panel. Do not overlap cuts into adjacent concrete panels.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 SPECIAL FINISHES

A. Rock-Salt Finish: After initial troweling, uniformly spread rock salt over paving surface at the rate of 5 lb/100 sq. ft.

1. Embed rock salt into plastic concrete with magnesium float.
2. Cover paving surface with 1-mil-thick polyethylene sheet and remove sheet when concrete has hardened and seven-day curing period has elapsed.
3. After seven-day curing period, saturate concrete with water and broom-sweep surface to dissolve remaining rock salt, thereby leaving pits and holes.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. All site placed concrete shall be cured as described below. Concrete that is not properly cured shall be considered deficient.

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

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

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

E. Curing Methods: Cure concrete by moisture curing as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-feet-long; unleveled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 2 inches.

9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

B. No birdbaths or other surface irregularities will be permitted. Correct irregularities as directed.

3.11 RINSING TRUCKS

A. Rinsing of transit mix trucks or other concrete mixing devices shall either be off of the Owner's site or onsite in a contained area, which does not allow run-off. If rinsed in a contained area onsite, run-off must be prevented until concrete dries, at which time it must be removed as solid debris for disposal. Remove all debris from site – keep site soil free of all cleaning by products and washout.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test to be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

B. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

C. Test results to be reported in writing to Landscape Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests to contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Landscape Architect but will not be used as sole basis for approval or rejection of concrete.

E. Additional Tests: Testing and inspecting agency will make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Landscape Architect.

F. Concrete paving will be considered defective if it does not pass tests and inspections.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

H. Prepare test and inspection reports.

3.13 REPAIR AND PROTECTION

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

B. Drill test cores, where directed by Landscape Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

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

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

E. Any defective or deficient concrete work, which after corrective patching, rubbing, etc., fails to duplicate the appearance of unpatched work and/or conform to the standards set forth in these specifications shall be removed in its entirety and replaced at no additional cost to the Contract.

END OF SECTION

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.3 SUMMARY

A. Section Includes:

1. Expansion and isolation joints in concrete paving
2. Cold-applied joint sealants.
3. Joint-sealant backer materials.
4. Primers.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Concrete pavement joint sealants.
2. Joint-sealant backer materials.

B. Samples for Verification: Actual sample of finished products for each kind and color of joint sealant required.

1. Size: Joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For Installer.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backer materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.3 COLD-APPLIED JOINT SEALANTS

A. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C920, Type S, Grade P, Class 35, for Use T.

1. Tremco Vulkem 45SSL, or approved equal.

2.4 JOINT-SEALANT BACKER MATERIALS

A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

D. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

E. Bond Breaker Tape: Non-adhesive, non-absorptive, flexible polyethylene tape compatible with joint sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.

C. Install joint-sealant backers to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backer materials.
2. Do not stretch, twist, puncture, or tear joint-sealant backer materials.
3. Remove absorbent joint-sealant backer materials that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants immediately following backer material installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants in accordance with the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Division 01 - General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for unit paving as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes:

1. Concrete pavers set in mortar setting beds.
2. Stone pavers set in mortar setting beds.
3. Cast-in-place concrete edge restraints.

C. Related Requirements:

1. Section 033000 “Cast-In-Place Concrete.”
2. Section 321313 "Concrete Paving" for concrete base under unit pavers.

1.3 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 the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. American National Standards Institute (ANSI):

1. ANSI A118.6 “Specifications for Ceramic Tile Grouts" (copyrighted by TCA, ANSI approved).
2. ANSI A118.7, “Specifications for Polymer Modified Tile Grouts for Tile Installation” (copyrighted by TCA, ANSI approved).
3. ANSI A137.1 – “Standard Specifications for Ceramic Tile.”

D. American Society for Testing and Materials (ASTM):

1. ASTM A 185, “Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement.”
2. ASTM C 33, "Standard Specification for Concrete Aggregates."
3. ASTM C 67, "Standard Test Methods of Sampling and Testing Brick and Structural Clay Tile.”
4. ASTM C97 – “Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.”
5. ASTM C99 – “Standard Test Method for Modulus of Rupture of Dimension Stone.”

6. ASTM C 144, "Standard Specification for Aggregate for Masonry Mortar."
7. ASTM C 150, "Standard Specification for Portland Cement."
8. ASTM C170 – "Standard Test Method for Compressive Strength of Dimension Stone."
9. ASTM C 207, "Standard Specification for Hydrated Lime for Masonry Purposes."
10. ASTM C 270, "Standard Specification for Mortar for Unit Masonry."
11. ASTM C241 – "Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic."
12. ASTM C 615, "Standard Specification for Granite Dimension Stone."
13. ASTM C 648, "Standard Test method for Breaking Strength of Ceramic Tile."
14. ASTM C880 – "Standard Test Method for Flexural Strength of Dimension Stone."
15. ASTM C 902, "Standard Specification for Pedestrian and Light Traffic Paving Brick."
16. ASTM C 936, "Standard Specification for Solid Concrete Interlocking Paving Units."
17. ASTM C 1028, "Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method."
18. ASTM C 1272, "Standard Specification for Heavy Vehicular Paving Brick."
19. ASTM D 312, "Standard Specification for Asphalt Used in Roofing."
20. ASTM D 448, "Standard Classification for Sizes of Aggregate for Road and Bridge Construction."
21. ASTM D 1073, "Standard Specification for Fine Aggregate for Bituminous Paving Mixtures."
22. ASTM D 1557, "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft lbf/ft3 [2700 kN m/m3])."
23. ASTM D 1751, "Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non Extruding and Resilient Bituminous Types)."
24. ASTM D 1752, "Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction."
25. ASTM D 2028, "Standard Specification for Cutback Asphalt (Rapid Curing Type)."
26. ASTM D 2047, "Standard Test Method for Static Coefficient of Friction of Polish Coated Floor Surfaces as Measured by the James Machine."
27. ASTM D 2940, "Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports."
28. ASTM D 3381, "Standard Specification for Viscosity Graded Asphalt Cement for Use in Pavement Construction."

E. Concrete Masonry and Hardscapes Association (CMHA) (formerly Interlocking Concrete Pavement Institute (ICPI)): Technical Specifications.

F. Tile Council of North America (TCNA): "Handbook for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs Installation."

G. Texas Department of Licensing and Regulation (TDLR):

1. Texas Accessibility Standards.
2. Elimination of Architectural Barriers.

H. Code of Federal Regulation (CFR):

1. 28 CFR Part 36, "Americans With Disabilities Act" hereinafter referred to as ADA.

1.4 SYSTEM DESCRIPTION

A. Compatibility: Provide only sealants and joint fillers which are compatible with the joint surfaces and each other, as stated in the manufacturer's published data or as certified by the manufacturer for each application. Confirm the compatibility of sealants to be in contact with each other.

1.5 SUBMITTALS

A. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications.

1. Pavers.
2. Mortar and grout materials.
3. Concrete curbs.

B. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer’s standard product data.

C. Samples:

1. Submit samples for verification purposes. Submit full size units of each type of unit paver indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

a. Provide unit paver samples with joints grouted and cured, indicating full range of colors to be expected in the completed work.
b. Include samples of edge restraints.

D. Quality Control Submittals:

1. Qualification Data: Submit qualification data for firms and persons specified in Quality Assurance Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of landscape architects and owners, and other information specified.
2. Compatibility and Adhesion Test Reports: Submit compatibility and adhesion test reports from latex additive manufacturer indicating that mortar and grout containing latex additives have been tested with pavers for compatibility and adhesion. Include latex additive manufacturer's interpretation of test results relative to mortar and grout performance and recommendations for installation practices needed to obtain adhesion.

E. Maintenance Data: Submit maintenance data for unit paving to include in operation and maintenance manuals specified in Division 01 - General Requirements. Submit name of manufacturer's recommended cleaning agent and application procedure.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of unit paving of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.
2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing unit paving similar in type and scope to that required for this Project.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

C. Slip Resistance: Static coefficient of friction (COF) shall be as follows, in compliance with the ADA, as determined by testing per ASTM C 1028 or ASTM D 2047, as applicable, and per manufacturer's testing criteria.

1. Level Surfaces: Minimum 0.60.
2. Step Treads: Minimum 0.60.
3. Ramp Surfaces: Minimum 0.80.

D. Preconstruction Compatibility and Adhesion Testing: Submit samples of paving materials contacting or affecting mortar and grout that contain latex additives to latex additive manufacturer for compatibility and adhesion testing as indicated below.

1. Use test methods standard with manufacturer to determine if mortar and grout materials will obtain optimum adhesion with, and will be non staining to, installed pavers and other materials constituting the paver installation.
2. Submit sufficient number of pavers and other materials involved in installation to allow comprehensive testing.
3. Schedule sufficient time for testing and analysis of results to prevent delaying the work.
4. Investigate materials failing compatibility or adhesion tests and obtain mortar and grout manufacturer's written recommendations for the use of materials to obtain optimum bond and prevent staining.

E. Mock Ups: Prior to installation of the work, fabricate and erect mock ups for each type of finish and application required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock ups to comply with the following requirements, using materials indicated for final unit of work.

1. Locate mock ups on site in location and of size indicated or, if not indicated, as directed by the Landscape Architect, to be a minimum of 8’-0” x 8’-0”.
2. Demonstrate the proposed range of aesthetic effects and workmanship to be expected in the completed work.
3. Obtain the Landscape Architect’s acceptance of mock ups before start of final unit of work.
4. Retain and maintain mock ups during construction in undisturbed condition as a standard for judging completed unit of work.

    a. When directed, demolish and remove mock ups from the Project site.
    b. Accepted mock ups in undisturbed condition at time of Substantial Completion may become part of completed unit of work.

F. Single Source Responsibility: Obtain each color, type, and variety of unit pavers, joint materials, and setting materials from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project site in supplier’s or manufacturer’s original wrappings and containers, labeled with supplier’s or manufacturer’s name, material or product brand name, and lot number, if any. Wrap pavers in plastic or use other packaging materials that will prevent rust marks from steel strapping.

B. Store materials in their original, undamaged packages and containers, inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
2. Store liquid materials in tightly closed containers protected from freezing.
3. Store asphalt cement and other bituminous materials in tightly closed containers.

C. Store aggregates where grading and other required project elements can be maintained and contamination avoided.

1.8 PROJECT CONDITIONS

A. Cold Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paving work damaged by frost or freezing.

B. Weather Limitations for Mortar and Grout: Comply with the following requirements:

1. Cold Weather Requirements: Protect unit paving work against freezing when atmospheric temperature is 40 °F and falling. Heat materials to provide mortar and grout temperatures between 40 °F and 120 °F. Provide the following protection for completed portions of work for 24 hours after installation when the mean daily air temperature is as indicated:

a. Below 40 °F: Cover with weather resistant membrane.
b. Below 25 °F: Cover with insulating blankets.
c. Below 20 °F: Provide enclosure and temporary heat to maintain temperature above 32 °F.

2. Hot Weather Requirements: Protect unit paving work when temperature and humidity conditions produce excessive evaporation of setting beds and grout. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 °F and above. When ambient temperature exceeds 90 °F with a wind velocity greater than 8 mph, set pavers within 1 minute of spreading setting bed mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 COLORS AND TEXTURE

A. Provide materials and products that result in colors and textures of exposed unit paver surfaces and joints matching the Architect's samples.

B. Provide materials and products that result in colors and textures of exposed unit paver surfaces and joints as selected by the Architect from the manufacturer's full range of colors and textures for materials and products of type indicated.

2.3 CONCRETE PAVERS

A. Concrete Pavers: Solid interlocking paving units complying with ASTM C936 and resistant to freezing and thawing when tested according to ASTM C67, made from normal-weight aggregates.

1. Minimum compressive strength: 8000 psi.
2. Maximum absorption: 5% or less at 50 cycles of freeze thaw testing.
3. Face Size and Shape and Thickness: As indicated.
4. Color: As Indicated by manufacturer’s designations.

2.4 STONE PAVERS

A. Limestone Pavers: Irregular limestone rock made from limestone complying with ASTM C568/C568M.

1. Classification: Type II Medium-Density or Type III High-Density.
2. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C241/C241M or ASTM C1353.
3. Finish: Smooth, or As indicated. Minimum slip coefficient of 0.6 or greater.
4. Match Landscape Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
5. Thickness: Not less than 2 inches unless otherwise indicated.
6. Face Size: As indicated.

2.5 CURBS AND EDGE RESTRAINTS

A. Job-Built Concrete Edge Restraints: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of 4000 psi.

2.6 ACCESSORIES

A. Compressible Foam Filler: Preformed strips complying with ASTM D1056, Grade 2A1.

2.7 MORTAR SETTING-BED MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type II.

B. Sand: ASTM C144, or as required by manufacturer of latex-additive.

C. Latex Additive: Manufacturer’s standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed Portland cement and aggregate mortar bed, and not containing a retarder.

D. Water: Provide potable water.

2.8 MORTAR AND GROUT MIXES

A. General: Comply with referenced standards and with manufacturer's instructions relative to mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting bed and joint materials of uniform quality and with optimum performance characteristics. Discard mortars and grout when they have reached their initial set before being used.

B. Mortar-Bed Bond Coat: Mix neat cement and latex additive to a creamy consistency.

C. Latex Modified Portland Cement Setting Bed Mortar: Proportion and mix portland cement, aggregate, and latex additive for setting bed to comply with directions of latex additive manufacturer and as necessary to produce stiff mixture with a moist surface when bed is ready to receive pavers.

D. Latex Modified Portland Cement Slurry Bond Coat: Proportion and mix portland cement, aggregate, and latex additive for slurry bond coat to comply with directions of latex additive manufacturer.

E. Latex Modified Portland Cement Grout: Add latex additive to dry grout mix in proportion and concentration recommended by latex additive manufacturer.

1. Job Mixed, Pigmented Grout: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment to cement ratio of 1 to 10, by weight. Proportion cement and aggregate to comply with directions of latex additive manufacturer.
2. Job Mixed, Colored Aggregate Grout: Produce color required by combining colored aggregates with portland cement of selected color. Proportion cement and aggregate to comply with directions of latex additive manufacturer.

F. Water: Potable.

PART 3 - EXECUTION

2.3 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Landscape Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

A. Surface Conditions: Examine surfaces indicated to receive paving, with the Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit paving.

1. Where pavers are to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations. Examine areas where waterproofing system is turned up or flashed against vertical surfaces as well as horizontal waterproofing. Do not proceed with installation until protection is in place.

B. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

C. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

D. Subgrades: Proof-roll prepared subgrade according to project requirements to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient

subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

3.3 INSTALLATION, GENERAL

A. Paver Defects: Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Paver Mix: Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cutting: Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Ensure cut pavers are no smaller than 1/3 of a whole unit. Hammer cutting is not acceptable.

1. For concrete pavers, a block splitter may be used.

D. Joint Pattern: As indicated.

E. Tolerances: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) or 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.

F. Expansion and Control Joints: Provide cork joint filler at locations and of widths indicated. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.

G. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

1. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after unit paver installation.
2. For metal edge restraints with top edge exposed, drive stakes at least 1 inch below top edge.
3. Install job-built concrete edge restraints to comply with requirements in Section 033000 "Cast-in-Place Concrete."
4. Where pavers set in mortar bed are indicated as edge restraints for pavers set in aggregate setting bed, install pavers set in mortar and allow mortar to cure before placing aggregate setting bed and remainder of pavers. Cut off mortar bed at a steep angle so it will not interfere with aggregate setting bed.

3.4 MORTAR SETTING-BED APPLICATIONS

A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply mortar-bed bond coat over surface of concrete subbase about 15 minutes before placing mortar bed. Do not exceed 1/16-inch thickness for bond coat. Limit area of bond coat to avoid its drying out before placing setting bed.

C. Apply mortar bed over bond coat; spread and screed mortar bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

D. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.

E. Place pavers before initial set of cement occurs. Immediately before placing pavers on mortar bed, apply uniform 1/16-inch-thick bond coat to mortar bed or to back of each paver with a flat trowel.

F. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

G. Provide nominal joint width indicated with variations not exceeding 1/8-inch.

H. Grouted Joints: Grout paver joints complying with ANSI A108.10.

I. Grout joints as soon as possible after initial set of setting bed.

1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
2. Clean pavers as grouting progresses by dry brushing or rubbing with dry burlap to remove smears before tooling joints.
3. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
4. If tooling squeezes grout from joints, remove excess grout and smears by dry brushing or rubbing with dry burlap and tool joints again to produce a uniform appearance.

J. Cure grout by maintaining in a damp condition for seven days unless otherwise recommended by grout or liquid-latex manufacturer.

3.5 ADJUSTING AND CLEANING

A. Repair: Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

3.6 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the unit paving shall be without damage at time of Substantial Completion.

END OF SECTION

SECTION 321500 - AGGREGATE SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for aggregate surfacing as required for the complete performance of the work, and as shown on the Drawings and as specified herein.

B. Section Includes:

1. Aggregate surfacing.
2. Geotextile Soil barrier.
3. Metal Edging.
4. Herbicide.

C. Related Sections:

1. Section 312000 “Earth Moving”.

1.3 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 the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. American Society for Testing and Materials (ASTM):

1. ASTM C 33, "Standard Specification for Concrete Aggregates."
2. ASTM International (ASTM) D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3) (600 kN-m/m3).
3. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
4. ASTM D 2940, "Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.”

D. AASHTO: American Association of State Highway and Transportation Officials.

E. Standard Specifications: Highway Department, Standard Specifications for Highways and Bridges, latest edition.

F. Texas Department of Licensing and Regulation (TDLR):

1. Texas Accessibility Standards (TAS).

2. Elimination of Architectural Barriers Texas Government Code, Chapter 469.

G. Code of Federal Regulation (CFR):

1. 28 CFR Part 36, "Americans With Disabilities Act" hereinafter referred to as ADA.

1.4 SUBMITTALS

A. Submittals for Review:

1. Samples:

a. 1-pint containers of proposed aggregate illustrating color, size, and gradation.
b. 12-inch x 12-inch geotextile soil barrier samples.

1.5 QUALITY ASSURANCE

A. Furnish aggregate from single source throughout Project.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver and unload at the site in such a manner that no damage occurs to the product.

B. Store products in a manner that will preclude damages, stains. Cover product to protect from erosion.

C. Store products away from potential concentrated runoff areas.

1.7 PROJECT CONDITIONS

A. Follow recommendations of geotextile manufacturer.

B. Do not place geotextile or aggregate on soft, muddy, ponding, or frozen surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate: As indicated in Material Schedule.

2.2 ACCESSORIES

A. Geotextile: Non-woven Geosynthetic fabric manufactured specifically for control of weeds under paving or in landscape areas, and for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2, AASHTO M 288.
2. Apparent Opening Size: No. 40 sieve, maximum; ASTM D4751.
3. Permittivity: 0.5 per second, minimum; ASTM D4491.
4. UV Stability: 50 percent after 500 hours' exposure, ASTM D4355
5. Mirafi 135N manufactured by Solmax, or approved equal.

B. Steel Edging: Standard commercial-steel edging, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

1. Edging Size: 1/4 inch thick by 6 inches deep.
2. Stakes: Tapered steel, a minimum of 15 inches long.
3. Accessories: Standard tapered ends, corners, and splicers.
4. Finish: Manufacturer's standard paint.
5. Paint Color: Black, or as indicated.

C. Herbicide: Non-selective type.

PART 3 - EXECUTION

3.1 PREPARATION

A. Correct irregularities in subgrade gradient and elevation by scarifying and reshaping.

B. Compact subgrade to minimum 95 percent of ASTM D698 standard Proctor maximum dry density at or near optimum moisture content.

C. Apply herbicide in accordance with manufacturer’s instructions. Allow vegetation to die before proceeding.

3.2 INSTALLATION

A. Install steel edging in accordance with manufacturer's written instructions and details.

1. Place edging with top edge flush with or slightly above adjacent grade as indicated on drawings.
2. Ensure edging follows smooth curves and straight lines as shown on plans; use factory-fabricated pre-curved sections as required.
3. Drive steel stakes through pre-punched holes and into subgrade, spaced per manufacturer’s instructions or 24" on center and at each joint or splice.
4. Secure all connections with manufacturer-supplied joiners, stakes, or screws to ensure tight, aligned joints.

B. Place soil barrier over subgrade; install in accordance with manufacturer's instructions.

C. Spread aggregate over subgrade in maximum 2-inch lifts to minimum compacted thickness indicated on Drawings.

D. Level and contour surfaces to elevations and gradients indicated.

E. If necessary, add small quantities of fine aggregate to assist in compaction and leveling.

F. Roller compact to minimum 90 percent relative density.

G. Use mechanical tamping equipment in areas inaccessible to roller compaction equipment.

H. Tolerances: No low points or ponded water will be permitted.

1. Maximum variation from flat surface: 1/4-inch in 10 feet.
2. Maximum variation from thickness: 1/4-inch.
3. Maximum variation from elevation: 1/2 inch.

END OF SECTION

SECTION 321543 - STABILIZED DECOMPOSED GRANITE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Division 01 - General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for decomposed granite as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes:

1. Decomposed granite surfacing.
2. Stabilizer.
3. Geotextile Soil Barrier.
4. Metal Edging.
5. Herbicide.

1.3 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 the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. American Society for Testing and Materials (ASTM):

1. ASTM C 33, "Standard Specification for Concrete Aggregates."
2. ASTM International (ASTM) D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
3. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
4. ASTM D 2940, "Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports."

D. AASHTO: American Association of State Highway and Transportation Officials.

E. Standard Specifications: Highway Department, Standard Specifications for Highways and Bridges, latest edition.

F. Texas Department of Licensing and Regulation (TDLR):

1. Texas Accessibility Standards (TAS).
2. Elimination of Architectural Barriers Texas Government Code, Chapter 469.

G. Code of Federal Regulation (CFR):

1. 28 CFR Part 36, "Americans With Disabilities Act" hereinafter referred to as ADA.

1.4 SCOPE OF WORK

A. Work of this Section includes all labor, materials, equipment, and services necessary to provide and complete the stabilized decomposed granite paving system as shown on the Contract Drawings and/or specified herein, including but not limited to, the following:

1. Compacted stabilized decomposed granite paving mix over compacted aggregate (crushed stone) base coarse and prepared sub-grade.
2. Include accessory metal angle restraint edging.

B. The following items of related work are specified and included in other Sections of the Specifications:

1. Section 312000 – “Earth Moving.”
2. Section 329115 – “Soil Preparation (Performance Specification).”

1.5 SUBMITTALS

A. General: See Division 01 – General Requirements for Submittal Procedures.

B. Qualification Data: Submit qualification data for firms and persons specified in Quality Assurance Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of landscape architects and owners, and other information specified.

C. Product Data: For each type of product indicated as work of this Section, submit manufacturer’s technical product data. Include technical specifications and installation instructions and tested physical and performance properties as applicable to product.

D. Samples: For the following products, in sizes indicated, showing the full range of color, texture, and pattern variations expected. Prepare Samples from the same material proposed to be used for the Work.

1. Samples for Initial Selection:

a. Decomposed granite material component each type and color: One (1) lb. in labeled plastic bag. Sample shall illustrate the full range of colors and textures available.
b. Aggregate Binder component, each type: One (1) lb. in labeled plastic bag.
c. Decomposed granite and aggregate binder mixed in proposed proportions for Project: Two (2) lbs. in labeled plastic bag.
d. Three samples of soil barrier material.

2. Samples for Verification: Submit prior to Field Samples/Mock-ups for Decomposed Granite material selection installation.

a. Decomposed granite material component of each type and color selected by Landscape Architect for use in Initial Field Samples/Mock-ups for Decomposed Granite Material Selection: One (1) lb. in labeled plastic bag. Sample shall illustrate the full range of color and texture.
b. Aggregate Binder component of each type to be used in Field Samples/Mock-ups for Decomposed Granite Material Selection: One (1) lb. in labeled plastic bag.

c. Decomposed granite and aggregate binder mixed in proposed proportions of type to be used in Field Samples/Mock-ups for Decomposed Granite Material Selection and pavement surfacing: Two (2) lbs. in labeled plastic bag.
d. Separation Geotextile Fabric: 12-by-12-inch (300-by-300-mm).
e. Edge Restraint: 12 inch length with one (1) spike and washer.
f. Base Course Aggregate: One (1) lb. in labeled plastic bag.

E. Quality Control Submittals:

1. Material Certificates: For each decomposed granite paving material component, signed by suppliers.
2. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

1.6 MOCK-UPS

A. Field Samples/Mock-Ups: Construct Field Samples/Mock-Ups for decomposed granite pavement systems at earliest possible time and at approved location before proceeding with respective work and after Landscape Architect's approval of Samples For Initial Selection and Samples For Verification. Allow sufficient time in Project Construction Schedule for submittal process, construction of all Field Samples/Mock-Ups, and Landscape Architect's evaluations before system installation.

1. For Decomposed Granite Material Selection: Prepare Initial Field Samples/Mock-ups for each of three (3) decomposed granite material systems selected by Landscape Architect for review and selection of one (1) material system to be used on the Project.
2. Each Initial Field Sample/Mock-up for the selection process shall be constructed at an approved location on-site of the same size, 4 feet by 6 feet minimum. The compacted decomposed granite paving surface shall be presented placed fully compacted as specified on a firm subbase representing the specified base course. Each Field Sample/Mock-up to include flush metal angle restraint edging on at least one side.
3. Selection by Landscape Architect will be based upon a visual evaluation of proposed finish components to include color, texture, material blends, other characteristics as related to on-site conditions, compatibility, and to confirm that system is complimentary with other finish materials on site.
4. For Stabilized Decomposed Granite Pavement Installation: After final selection of decomposed granite material, provide and construct one (1) stabilized decomposed granite paving surfacing Field Sample/Mock-up for each type indicated, 10 feet by 10 feet, complete with base course, metal angle edge restraints, and compacted decomposed granite paving surface as specified in this Section. Include adjustments, if any, as determined and approved by Landscape Architect from selection mockup process.

    a. Coordinate sample work with conditions and material placement of other sample work for steel edging and adjacent conditions.
    b. Mock-up construction for decomposed granite pavement work will be utilized as a visual confirmation of proposed finish components in addition to establishing a standard for judging Project construction.

5. Both of the decomposed granite material selection mock-up and full stabilized decomposed granite pavement installation mock-up of surfacing must be approved by Landscape Architect before actual on-site paving work may proceed. If necessary, remove and reconstruct Field Sample/Mock-up surfacing until approved.
6. Removal of Field Samples/Mock-Ups:

a. Demolish and remove Field Samples/Mock-Ups at a time approved by Landscape Architect and when no longer required to serve for material selection or as a standard of work.
b. Accepted Decomposed Granite Pavement Installation Field Sample/Mock-up may remain and may be incorporated for use in the completed Project if conforming to specified requirements and approved by Landscape Architect.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installation of Stabilized Decomposed Granite Pavement shall be by a firm that can exhibit proof of a minimum of five (5) years prior successful experience with completed decomposed granite pavement in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1. Use numbers of skilled workmen equal to work requirement or occasion. The skilled workmen shall be thoroughly trained and experienced in the necessary crafts and shall be completely familiar with the specific requirements and methods needed for performance of the work in this Section.

B. Pre-installation Conference: Together with Construction Manager conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination". Review methods and procedures related to decomposed granite pavement including, but not limited to, the following:

1. Review condition of sub-grade and other preparatory work including sequencing of other Project work (drainage system, irrigation system, and landscape boulders installation) in areas of decomposed granite paving.
2. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
3. Review and finalize construction schedule and verify availability of materials. Review Installer's personnel, equipment, and facilities needed to perform work of this Section and make progress and avoid delays.

C. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

1.8 DELIVERY, STORAGE, AND HANDLING

A. A. General: Deliver, store, handle and protect aggregate and decomposed granite material with provision for drainage and intrusion of dirt, debris, or other foreign matter.

B. Decomposed granite material and mix components shall be stored under cover to prevent accumulation of moisture until placed.

1.9 PROJECT / SITE CONDITIONS

A. Environmental Requirements:

1. Prevent wind or rain disturbance of setting materials, protect from sheet follow from adjacent areas, and generally maintain optimum installation conditions.
2. Do not install base coarse and decomposed granite paving in conditions of standing water or rainfall. Surface and sub-drainage must be assured at all times.

3. Cold Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen sub-grade or setting beds. Temperature: Do not place stone dust (fines) paving when the ambient temperature is below 40 degrees F., or when there is frost in the base course, or any other time when weather conditions are unsuitable for the type of material being placed. Remove and replace decomposed granite paving system work damaged by frost or freezing.

B. Protection, General:

1. Protect decomposed granite paving system, including metal edgings, from heavy traffic using planks, plywood panels, or other effective materials in all areas that could be or is subject to continued movement of materials and equipment.
2. Protect decomposed granite paving installations from deterioration, discoloration, or other damage during subsequent construction and until final acceptance of Project work.

1.10 SEQUENCING AND SCHEDULING

A. Do not begin installation of the decomposed granite pavement system (both base and paving surface courses) until the completion and approval of the storm drainage system and irrigation system below the stone dust pavement area.

B. Complete stone dust pavement system installation only after the completion of the tree planting soils, landscape boulders installation, and compacted sub-grade within the stone dust pavement areas.

1.11 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the installer agreeing to repair or replace components of Stabilized and StaLok Paving Material that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Premature wear and tear, provided the material is maintained in accordance with manufacturer’s written maintenance instructions.
2. Failure of system to meet performance requirements.

C. Warranty Period: Contractor shall provide warranty for performance of product. Contractor shall warranty installation of product for the time of one year from completion.

D. Contractor shall provide, for a period of sixty days, unconditional maintenance and repairs as required.

PART 2 - PRODUCTS

2.1 BASE COURSE AGGREGATE

A. Materials for base course aggregate shall consist of crushed aggregate of washed, hard, durable crushed rock, gravel, approved blast furnace slag or stone. All materials furnished from off-site sources and shall be well-graded from coarse to fine and free from organic matter or other deleterious materials:

1. Gradation: Base course aggregate (crushed stone) shall conform to the following gradation:

    a. Screen Size Percent Passing by Weight

        1) 2” 100
        2) 3/4” 30 to 65
        3) No. 40 5 to 40
        4) No. 200 0 to 10

2. Soundness: Material will be accepted on the basis of a Magnesium sulfate soundness loss after 4 cycles of 20 percent or less.
3. Plasticity Index: The Plasticity Index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
4. Elongated Particles: Not more than 30 percent by weight of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined herein as one that has its greatest dimension more than 3 times its least dimension. Acceptance for this requirement will be based on visual inspection by the Landscape Architect. Material with a percentage greater than 30 percent will be rejected.

B. It shall be the Contractor’s responsibility to provide a base course material that meets the specification and is within its capabilities to allow performance of fine grading of the base course within the required tolerances. Should the Base Course become unstable at any time prior to the placement of the overlying decomposed granite surfacing course due to the gradation of the base course material furnished, the Contractor shall, at its own expense, correct the unstable condition to the satisfaction of the Landscape Architect.

2.2 DECOMPOSED GRANITE

A. Decomposed Granite or 3/8” or 1/4” crushed aggregate screenings.

B. Stabilized Decomposed Granite Systems: Provide granular pavement stone blended with stone dust and aggregate binder (stabilizer). Decomposed granite material and mixes with approved color range shall be as selected and approved by Landscape Architect using Field Sample/Mock-ups for paving material selection.

1. Decomposed granite pavement shall consist of virgin natural granite stone materials free from soil debris, clay clumps, conglomerate rocks, shale, coal or other lignitic materials. Stone shall be free of organic contaminants

    a. Stone Dust: Provide coarse stone dust consisting of inert materials that are hard, durable stone, free from surface coatings and deleterious materials. Stone dust color shall be approved by the Landscape Architect. Gradation requirements shall be as follows:
    b. Screen Size Percent Passing by Weight

        1) 3/8” 100
        2) No. 4 90 – 100
        3) No. 8 75 – 80
        4) No. 16 55 – 65
        5) No. 30 40 – 50
        6) No. 50 25 – 35
        7) No. 100 15 – 20
        8) No. 200 10 – 15

c. Fines shall be evenly mixed throughout the aggregate.
d. Available Stone Dust Suppliers: Subject to compliance with requirements, suppliers offering products that may be incorporated into the Work include, and are harvested within 500 miles of Project Site.
e. Particles shall be clean, hard, durable fragments of 1/4 inch minus select crushed stone. When produced from gravel, 50 percent, by weight, of the material retained on a No. 4 sieve shall have one fractured face.
f. The portion retained on the No. 4 sieve shall have a maximum percentage wear of 50 at 500 revolutions as determined by AASHTO T96-77.
g. The portion passing a No. 40 sieve shall have a maximum liquid limit of 25 and a maximum plasticity index of 7, as determined by AASHTO T89-91 and AASHTO T90-81, respectively.

2.3 AGGREGATE BINDER

A. Aggregate Binder: The aggregate binder shall be a natural, non-toxic, non-staining, odorless, environmentally safe powder.

B. Aggregate Binder Manufacturer: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. StaLok® Paving Material Waterless Natural Pavement shall be provided by the following manufacturer:

a. Stabilizer Solutions, Inc. 33 South 28th St., Phoenix, AZ 85034; phone (602) 225-5900, (800) 336-2468; fax (602) 225-5902; website: www.stabilizersolutions.com; email info@stabilizersolutions.com.

2. Stabilizer® for Stabilized Aggregate surfaces provided by the following manufacturer:

a. Stabilizer Solutions, Inc. 33 South 28th St., Phoenix, AZ 85034; phone (602) 225-5900, (800) 336-2468; fax (602) 225-5902; website: www.stabilizersolutions.com; email info@stabilizersolutions.com.

2.4 STABILIZED DECOMPOSED GRANITE MIX

A. Mix Design, Proportions: Decomposed granite material shall be measured completely dry, mixed and blended (mixed) using the rate of 15-pounds of stabilizer (aggregate binder) per 1- ton of decomposed granite mix.

B. Mixing: Mixing of decomposed granite with aggregate binder shall be per manufacturer's latest printed instruction.

1. Thoroughly pre-mix aggregate binder (stabilizer) with decomposed granite at a minimum rate of "Mix Design, Proportions" specified by manufacturer.
2. Stabilizer shall be mechanically pre-mixed per manufacturer's recommendations using an approved mechanical blending unit to adequately blend stabilizer with aggregate (Bucket blending is not an approved blending apparatus). Blend stabilizer and aggregate dry.
3. The adding of the decomposed granite and stabilizer should end almost simultaneously when the capacity of the mixer is reached.
4. No segregation of large or fine materials shall be allowed.

2.5 STALOK PAVING MATERIALS BLENDING

A. Blend Stalok paving materials per manufacturer's latest instruction.

B. Waterless Natural Pavement (WNP) blending shall be under the direction of a WNP manufacturer with not less than 10 years experience in the production of WNP product. WNP shall be prepared with mixing plant dedicated to WNP production and equipped with metering controls for accurate proportioning of WNP ingredients. Aggregate must be heated to 200 degrees Fahrenheit by use of drum dryer prior to blending.

C. The mixed WNP shall have a dry static coefficient of friction greater than .60. Water shall bead or form droplets on WNP surface and shed off. WNP shall set up only by compaction and can be stockpiled up to 1 month prior installation.

2.6 ACCESSORY INSTALLATION MATERIALS

A. Geotextile: Non-woven Geosynthetic fabric manufactured specifically for control of weeds under paving or in landscape areas, and for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2, AASHTO M 288.
2. Apparent Opening Size: No. 40 sieve, maximum; ASTM D4751.
3. Permittivity: 0.5 per second, minimum; ASTM D4491.
4. UV Stability: 50 percent after 500 hours' exposure, ASTM D4355
5. Mirafi 135N manufactured by Solmax, or approved equal.

B. Steel Edging: Standard commercial-steel edging, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

1. Edging Size: 1/4 inch thick by 6 inches deep.
2. Stakes: Tapered steel, a minimum of 15 inches long.
3. Accessories: Standard tapered ends, corners, and splicers.
4. Finish: Manufacturer's standard paint.

a. Paint Color: Black, or as indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for subgrade and substrate conditions and for other conditions affecting performance.

1. Sub-grade for decomposed granite pavement system installation is to be provided in accordance with Division 2 “Earthwork”.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Layout and Field Survey Work: For decomposed granite pavement system installation, coordinate with layout requirements specified in Division 2 "Earthwork".

1. Accurately lay out decomposed granite pavement system to fit conditions as indicated, encountered on site, and specified for installation. Comply with set out control points as indicated and coordinate with other work of Project. Provide additional control points and stakeouts as required to effect correct alignments and grade elevations. Advise

Construction Manager of any discrepancies or on-site conditions detrimental to critical layouts and obtain approved correction.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by decomposed granite pavement installation.

C. Proof-roll prepared subgrade surface in presence of Testing Agency for earthwork to check for unstable areas and areas requiring additional compaction. Proceed with installation only after deficient subgrades have been corrected and are ready to receive base course for decomposed granite pavement.

1. Compacted soil subgrade shall be of uniform compaction, to at least 95 percent of ASTM D1557 (Modified Proctor) density. Compaction testing to be provide no less than one test per 2,000 square feet of pavement base layer.

D. Remove loose material from compacted sub-grade surface and trim and shape compacted sub-grade for correct drainage slopes.

3.3 BASE COURSE INSTALLATION

A. Place geotextile fabric over prepared subgrades free of mud, frost, snow, or ice, overlapping ends and edges fabric at least 12 inches.

B. Place aggregate base course material in thickness indicated and as per manufacturer's recommendations. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent (Modified Proctor) of maximum dry density according to ASTM D1557.

C. Pre-soak base material with water prior to installing paving materials as needed to compact base.

3.4 EDGE RESTRAINT INSTALLATION

A. Securely connect metal edging sections in accordance with manufacturer's instructions.

B. Drive specified Anchor Spikes through pre-drilled holes in base of restraint edging at each section end and at 8 inch8 inches on center (maximum).

C. Provide additional anchors at closer spacing as necessary to firmly secure edging for permanent intended use.

3.5 STABILIZED DECOMPOSED GRANITE INSTALLATION

A. Installation:

1. Place decomposed granite paving material proportioned mix in two equal lifts raked smooth as required to obtain a minimum depth indicated after compaction.
2. For each lift, spread mixed decomposed granite while material is moist to extent indicated, uniformly covering the course below to a minimum total depth of two inches (2") with allowance for compaction and to the depth required to provide crown and pitch as indicated on the Contract Drawings.
3. Watering: After spreading, water each lift of decomposed granite paving surface using a garden hose with coarse spray nozzle to achieve full depth moisture penetration and saturation of the spread mixed material and to activate the aggregate binder. Applied water pressure shall not be allowed to disturb the leveled surface and shall be allowed to

evenly pond on the surface (manufacturer's suggested rate is at approximately 20 gpm per 1,000 square feet of decomposed granite surface). Let watered mix stand until surface water is no longer present (suggested 6 to 24 hours) and the mix is moist but not wet. Allow each lift to dry out before placing second lift.

a. During watering operations, test for depth of water penetration by random inspection test core taken at a minimum of one (1) test per each 500 square feet.
b. After inspection, fill test core holes with material removed, smooth, and hand tamp to match adjoining surface grade.

B. Compaction: Compact each lift of decomposed granite paving surface with a minimum of two (2) compaction operations after watering. Follow manufacturer's recommendations for timing of compaction.

1. Compact decomposed granite material until surface elevations are within tolerance specified herein and to a uniform density within approved range of 95 percent at optimum moisture content. Hand tamp near edges of adjoining material to avoid damage to adjoining curbs, lawns, tree and bed planting areas, edge materials, and other work.

a. Initial Compaction Operation: While the decomposed granite mix is still thoroughly moist, roll with a heavy lawn type roller (minimum 225 pounds and maximum 30 inch width), to achieve finish grade and initial compaction. Hand tamp at edges as specified.
b. Subsequent Compaction Operation: Use a heavy (1 ton minimum) small rider equipment type, after having initially used the lawn roller, to obtain the desired final dense, smooth uniform texture.
c. Do not use rammer tamper, vibratory plate compactor, or vibration feature on vibratory rollers.

2. Decomposed granite pavement shall be allowed to settle naturally (as approved) within the eventual root zone (drip-line) of the tree planting material.

3.6 STALOK PAVING MATERIALS INSTALLATION

A. Consult manufacturer if installing on slope.

B. Do not install in rainy conditions.

C. Avoid installing WNP below 30°F. WNP may form clods during transport below 60°F. Large clods may be broken apart with machinery such as front loader, or on their own if left to warm in sun. Small clods will break apart during placement and compaction.

D. Place WNP Material at a minimum 2", maximum 3" compacted depth. Using a Paver Box, Paver, Crawler Paver, Asphalt Paver, Drag Box Paver, Pavement Profiler, Slip Form Paver, Pav-Saver Place Spreader or Equal.

1. Crown WNP. Slope material to edge 1/4" per foot.
2. Pockets of large aggregate may develop, inspect surface and evenly spread any 1/4" or 3/8" loose rock.

E. Compact WNP.

1. Compaction can be achieved by a 5-ton double-drum roller
2. Lightly compact making one pass.
3. Make any grade adjustments and add needed material.

4. Heavily compact material making 8 to 10 passes. Avoid turning on material with roller.
5. Use plate compactor on edges and hard to get areas. If near wall, hand tamp may be necessary.
6. Loose material shall not be present on final surface.
7. No set up or curing time is needed.

3.7 INSTALLATION TOLERANCES

A. Thickness: Compact each course (base and surfacing) to produce the thickness indicated within the following tolerances:

1. Base Course Aggregate: Plus or minus 1/2 inch.
2. Decomposed Granite Surface Course: Plus 1/4 inch, no minus.

B. Surface Smoothness: The final decomposed granite surface level shall not deviate from the design levels by more than plus or minus 1/4 inch. The surface level of the paving immediately adjacent to drainage outlets, gutter, and channels shall not deviate by more than 1/4 inch. The final surface, when measured under a 10 feet long steel or aluminum straightedge, shall not vary by more than 1/4 inch.

1. The decomposed granite surfaces with adjacent metal restraint edging, pavements, and utility structures shall not show any difference in level. All humps or depressions exceeding the specified tolerance shall be corrected at no additional cost the Owner. All finished paving shall be smooth and even with no trip hazards.

3.8 FIELD QUALITY CONTROL AND ADJUSTMENTS

A. Notices: Furnish to Owner and/or Construction Manager at least three working days (72 hours) notice prior to start of each or any phase of stone dust pavement operations.

B. Quality Control Testing During Construction:

1. Owner’s Field Density Testing of Base Course Aggregate Installation: Field density tests to check the degree of compaction of subgrades and base course shall be taken by the Owner’s Testing Laboratory/Agency as specified in Division 2 "Earthwork".

C. Quality Control Testing and Adjustments/Corrections By Contractor:

1. Finished decomposed granite surface shall be smooth, uniform and solid, with no evidence of chipping or cracking. Dried, compacted decomposed granite surface material shall be firm all the way through with no spongy areas. Loose material shall not be present on the surface initially.
2. Loose decomposed granite on the surface, or unconsolidated decomposed granite below the surface, is considered evidence of improper bonding due to poor mixing or insufficient watering. Contractor shall furnish tests for questionable conditions or as directed by Landscape Architect.

    a. Test the loose material for adequate Aggregate Binder by wetting, then tamping, and allowing it to dry. If the decomposed granite material still is unconsolidated, the Aggregate Binder did not get mixed adequately throughout the decomposed granite. If the material now is solid, initial watering was insufficient.
    b. Cracking or sponginess is evidence of excessive Aggregate Binder in the mix.

3. Unconsolidated areas shall be dug out, and shall be replaced with new decomposed granite material with a high proportion of stone dust meeting the grading requirements as

specified and, pre-blended to specified proportions. Patched areas then shall be wetted thoroughly and rolled smooth as specified for installations.

4. Any significant irregularities shall be smoothed out prior to final acceptance of work. Smoothing shall be accomplished by re-wetting/saturating rough areas thoroughly, and then rolling the surface again with a heavy roller (1000 - 1500 lbs powered walk-behind or small rider type).

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove waste material, including unsatisfactory base course aggregate, decomposed granite, gravel, stone dust, trash and debris, and legally dispose of removed material off Owner's property.

3.10 CLEANING AND PROTECTION

A. Protect newly installed decomposed granite areas from traffic and erosion. Maintain surfaces free of trash and debris until Owner’s final acceptance of Project. Replenish pavement surfaces with matching material, repair, and reestablish densities and finish elevations where surfaces become eroded, rutted, or settled or where they lose compaction and depth, until date of Substantial Completion.

END OF SECTION

SECTION 323300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Section Includes:

1. Delegated Design/Engineering of design elements including but not limited to:

a. Steel Bridge.

2. Seating.
3. Bicycle racks.
4. Other site furnishing items indicated.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts cast in concrete footings.
2. Section 055000 “Metal Fabrications” for additional requirements for delegated design and fabrication of custom metal site furnishings.
3. Section 312000 "Earth Moving" for excavation for installing concrete footings.

1.3 COORDINATION

A. Designer Requirements: Engage and pay for the services of an engineer to design the metal fabrications shown and the connections for installing them.

B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

C. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 SYSTEM DESCRIPTION

A. Minimum design loads:

1. Pedestrian loading:

a. Uniform load of 200 PSF.
b. Concentrated load of 300 pounds, or as required for required scope.
c. Maximum deflection under loading: L/240.

2. Maximum deflection for all metal components: 1/8”.
3. Concentrated and uniform loads do not need to be applied simultaneously.
4. Perform design under direct supervision of Professional Structural Engineer licensed in State in which Project is located, with minimum 5 years experience in work of this Section.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product, provide manufacturer’s specifications, descriptive literature, installation instructions, and maintenance information.

B. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear components and 4-inch-square sheet components.

C. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

D. Shop Drawings: Provide engineering and fabrication shop drawings signed and sealed by an engineer licensed within the applicable jurisdiction showing all site conditions, field measurements as applicable, fabrication, attachments, reinforcements, footings, and materials required. Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer’s standard product data, including, but not limited to, plans, elevations, and details of sections and connections. Show anchorage and accessory items. Submit templates for anchor and bolt installation.

1. Details shall be at a scale of 1-1/2 inches equals 1 foot, minimum.
2. Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for all metal fabrications shown on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For site furnishings manufactured with preservative-treated wood.

1. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

B. Design Data: Submit design calculations for metal fabrications and the connections for attaching them. The design data shall be signed and sealed by the professional engineer.

C. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.

D. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

E. Certificates:

1. Submit designer's certification that:

a. The designer is a structural engineer in the State where the Project is located. Include registration number.
b. The designer is responsible for the metal fabrications and the connections for attaching them.
c. The designer has coordinated the design of the metal fabrications and the connection for attaching them with the design of the structure.
d. The designer has visited the site and that to the best of their information, knowledge, and belief the metal fabrications have been installed in accordance with their design.

F. Welding certificates.

G. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

H. Research Reports: For post-installed anchors.

1.8 FIELD CONDITIONS

A. Field Measurements: Take field measurements prior to fabrication of the work and preparation of shop drawings, to ensure proper fitting of the work. Show recorded measurements on final shop drawings. Notify the Owner and the Landscape Architect, in writing, of any dimensions found which are not within specified dimensions and tolerances in the Contract Documents, prior to proceeding with the fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.9 DELIVERY, STORAGE AND HANDLING

A. Store steel above ground on platforms, skids, or other supports; separate with wooden separators.

B. Protect steel from corrosion.

1.10 WARRANTY

A. Manufacturer’s Warranty: Contractor shall arrange manufacturer’s warranty to the effect that manufactured products shall carry a minimum one-year manufactures warranty which shall be transferred to the owner at time of acceptance. The warranty period shall commence based on written documentation to be provided by the Landscape Architect establishing the date of acceptance of the installation. Early delivery shall not limit the installed warranty period.

B. Contractor’s Warranty: Contractor shall warrant workmanship in addition to the manufacturer’s warranty for a period of one year from the date of acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide furnishings as shown and indicated on plans.

B. Alternate manufacturers if requested by contractor for consideration will be required to meet or exceed the selected manufacturer’s finish design including shape and size, color, material, and warranty. Landscape Architect has sole discretion as to the approval of any substitutions.

C. Products are to be new and in first class condition.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:

1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B211.
2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B221.
3. Structural Pipe and Tube: ASTM B429/B429M.
4. Sheet and Plate: ASTM B209.
5. Castings: ASTM B26/B26M.

B. Steel and Iron: Free of surface blemishes and complying with the following:

1. Plates, Shapes, and Bars: ASTM A36/A36M.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A53/A53M, or electric-resistance-welded pipe complying with ASTM A135/A135M.
3. Tubing: Cold-formed steel tubing complying with ASTM A500/A500M.
4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A513/A513M, or steel tubing fabricated from steel complying with ASTM A1011/A1011M and complying with dimensional tolerances in ASTM A500/A500M; zinc coated internally and externally.
5. Sheet: Commercial steel sheet complying with ASTM A1011/A1011M.
6. Perforated Metal: From steel sheet not less than 0.120-inch nominal thickness; manufacturer's standard perforation pattern.
7. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F1267.
8. Malleable-Iron Castings: ASTM A47/A47M, grade as recommended by fabricator for type of use intended.
9. Gray-Iron Castings: ASTM A48/A48M, Class 200.

C. Stainless Steel: Free of surface blemishes and complying with the following:

1. Sheet, Strip, Plate, and Flat Bars: ASTM A240/A240M or ASTM A666.
2. Pipe: Schedule 40 steel pipe complying with ASTM A312/A312M.
3. Tubing: ASTM A554.

D. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.

1. Wood Species: Manufacturer's standard.
2. Finish: Manufacturer's standard stain and transparent wood-preservative treatment and sealer.

E. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.

F. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.

1. Polyethylene: Fabricated from virgin plastic HDPE resin.

G. Anchors, Fasteners, Fittings, and Hardware: Stainless steel, Galvanized steel, or Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials; commercial quality, tamperproof, vandal and theft resistant, concealed, recessed, and capped or plugged.

1. Angle Anchors: For inconspicuously bolting legs of site furnishings to on-grade substrate; one per leg.
2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; two per unit.

H. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M; recommended in writing by manufacturer, for exterior applications.

I. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

J. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:

1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
2. Hot-Dip Galvanizing: According to ASTM A123/A123M, ASTM A153/A153M, or ASTM A924/A924M.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment: Pressure-treat wood according to AWPA U1, Use Category UC3b, and the following:

1. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

2.4 FABRICATION

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

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

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

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

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

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

2.5 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.7 STEEL AND GALVANIZED-STEEL FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

2.8 IRON FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.9 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run directional finishes with long dimension of each piece.
2. Directional Satin Finish: ASTM A480/A480M, No 4.
3. Dull Satin Finish: ASTM A480/A480M, No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

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

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

D. Guard against staining or damaging of existing pavements, planting, and other Project elements where site furnishings are to be installed.

E. Provide concrete pads and footings as needed for installation other than on pavements. Provide attachment to footings or subslabs where unit paving is utilized.

F. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

G. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

H. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 REPAIRS

A. Replace all products, materials, and workmanship found to be defective through the end of the warranty period.

B. Repair any scratches or other damages that can be repaired per the Manufacturer’s recommendation. Landscape Architect shall have the sole discretion to approve the repair or require replacement. Repairs shall appear new prior to damage.

C. Provide Owner with Manufacturer’s touch up paint (1 US quart, minimum) for each painted furnishing. Supply literature necessary for ordering touch-up paint.

3.4 CLEANING

A. Keep all areas of work clean, neat, and orderly at all times.

B. Clean up an remove all stains, packing, and construction debris from Project site and dispose of off of Owner’s property prior to Substantial Completion.

END OF SECTION

SECTION 328400 - IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Irrigation system required for this work includes but is not limited to the furnishing of all labor, tools, materials, appliances, tests, permits, taxes, etc., necessary for the installation of a landscape irrigation system as herein specified and shown on the drawings, and the removal of all debris from the site.

1. Locate, purchase, deliver and install piping, conduit, sleeves, 120 volt and low voltage electrical and water connections, valves, backflow preventer devices, controllers, rain sensors, spray and bubbler heads, drip irrigation lines, and associated accessories for a fully operational automatic irrigation system.
2. Trenching and water settling of backfill material.
3. Testing and startup of the irrigation system.
4. Prepare an as built record set of drawings.
5. Training of the Owner’s maintenance personnel in the operational requirements of the Irrigation system.
6. Clean up and disposal of all excess and surplus material.
7. Maintenance of the irrigation system during the proscribed maintenance period.

B. The system shall efficiently and evenly irrigate all areas and be complete in every respect and shall be left ready for operation to the satisfaction of the Owner's Representative.

C. Coordinate with other trades, as needed to complete work, including but not limited to Water Meter, Point of Connection (POC) and Backflow Preventer Device (BFPD) location and electrical hookups.

1.3 CONTRACT DOCUMENTS

A. Contract Documents shall consist of specifications and its general conditions and the drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any part shall be as binding as if called for in all parts.

1.4 RELATED DOCUMENTS AND REFERENCES

A. Drawings and general provisions of contract, including general and supplementary conditions and Division I specifications, apply to work of this section.

B. Related Specification Sections

1. Section - Planting
2. Section - Planting Soil
3. Section – Lawn
4. Sections - Mechanical/Plumbing

5. Section – Tree and Plant Protection
6. Sections - Electrical

C. References:

1. American Society of Testing Materials (ASTM): cited section numbers.
2. National Sanitation Foundation (NSF): rating system.
3. Irrigation Association: Turf & Landscape Irrigation Best Management Practices

1.5 VERIFICATION

A. Irrigation piping and related equipment are drawn diagrammatically. Scaled dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions and immediately notify the Owner's Representative of discrepancies between the drawings or specifications and the actual conditions. Although sizes and locations of plants and or irrigation equipment are drawn to scale wherever possible, it is not within the scope of the drawings to show all necessary offsets, obstructions, or site conditions. The Contractor shall be responsible to install the work in such a manner that it will be in conformance to site conditions, complete, and in good working order.

B. Piping and equipment is to be located within the designated planting areas wherever possible unless specifically defined or dimensioned otherwise.

1.6 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Owner's Representative in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or between any referenced standards and codes and the specifications, the more restrictive standard shall apply or Owner's Representative shall determine which shall govern.

1.7 PROTECTION OF WORK, PROPERTY AND PERSON

A. The Contractor shall adequately protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to the Contractor's actions.

1.8 CHANGES IN THE WORK

A. The Owner's Representative may order changes in the work, and the contract sum being adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.

B. All changes in the work, notifications and Contractor's request for information (RFI) shall conform to the contract general condition requirements.

1.9 CORRECTION OF WORK

A. The Contractor shall re-execute any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Owner's Representative, at the soonest as possible time that can be coordinated with other work, and seasonal weather demands, but not more than 90 (ninety) days after notification.

1.10 DEFINITIONS

A. Owner's Representative: The person appointed by the Owner to represent their interest in the review and approval of the work and to serve as the contracting authority with the Contractor. The Owner's Representative may appoint other persons to review and approve any aspects of the work.

B. Substantial Completion Acceptance: The date at the end of the Planting, Planting Soil, and Irrigation installation where the Owner's Representative accepts that all work in these sections is complete and the Warranty period has begun. This date may be different that the date of substantial completion for the other sections of the project.

C. Final Acceptance: The date when the Owner's Representative accepts that the plants and work in this section meet all the requirements of specification. It is intended that the materials and workmanship warranty for Planting, Planting Soil, and Irrigation work run concurrently.

1.11 SUBMITTALS

A. See the contract General Conditions for policy and procedures related to submittals.

1.12 PRODUCT DATA

A. Submit a minimum of (3) complete lists of all irrigation equipment to be used, manufacturer's brochures, maintenance manuals, warrantees and operating instructions, within 15 days after the notice to proceed.

1. This submission may be done digitally and all documents shall be submitted in one PDF document.
2. The submittals shall be packaged and presented in an organized manner, in the quantity described in Division 1 of the specifications. Provide a table of contents of all submitted items.
3. Clearly identify on each submitted sheet by underlining or highlighting (on each copy) the specific product being submitted for approval. Failure to clearly identify the specific product being submitted will result in a rejection for the entire submittal. No substitutions of material or procedures shall be made concerning these documents without the written consent of an accepted equivalent by the Owner's Representative.
4. Equipment or materials installed or furnished without prior approval of the Owner's Representative, may be rejected by the Owner's Representative and the Contractor shall be required to remove such materials from the site at their own expense.
5. Approval of substitution of material and/or products, other than those specified shall not relieve the Contractor from complying with the requirements of the contract documents and specifications. The Contractor shall be responsible, at their own expense, for all changes that may result from the approved substitutions, which affect the installation or operations other items of their own work and/or the work of other Contractors.

B. Samples: Samples of the equipment may be required at the request of the Owner's Representative if the equipment is other than that specified.

C. Other Submittals: Submit for approval:

1. Documentation of the installer’s qualifications.
2. As built record set of drawings.
3. Testing data from all required pressure testing.
4. Backflow prevention device certification: Certification from the manufacturer or their representative that the back flow prevention device has been installed correctly according to the manufactures requirements.
5. Booster pump certification: Certification from the manufacturer or their representative that the booster pump has been installed correctly according to the manufacturer’s requirements.
6. Irrigation controller certification: Certification from the manufacturer or an authorized distributor that the Controller has been installed correctly according to the manufactures requirements.

1.13 OBSERVATION OF THE WORK

A. The Owner’s Representative may inspect the work at any time. They may remove samples of materials for conformity to specifications. Rejected materials shall be immediately removed from the site and replaced at the Contractor's expense. The cost of testing materials not meeting specifications shall be paid by the Contractor.

B. The Owner’s Representative shall be informed of the progress of the work so the work may be observed at the following key times in the construction process. The Owner’s Representative shall be afforded sufficient time to schedule visit to the site. Failure of the Owner’s Representative to make field observations shall not relieve the Contractor from meeting all the requirements of this specification.

1. Trenching, directional boring, and sleeving review.
2. Hydrostatic pressure testing.
3. Adjustment and coverage test.
4. Pre-maintenance observation.
5. Final acceptance / system malfunction corrections.

1.14 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction meeting with the Owner’s Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

1.15 QUALITY ASSURANCE

A. It is the intention of this specification to accomplish the work of installing an automatic irrigation system, which will operate in an efficient and satisfactory manner. The irrigation system shall be installed and made operational according to the workmanlike standards established for landscape installation and sprinkler irrigation operation as set forth by the most recent Best Management Practices (BMP) of the Irrigation Association.

B. The specification can only indicate the intent of the work to be performed rather than a detailed description of the performance of the work. It shall be the responsibility of the Contractor to install said materials and equipment in such a manner that they shall operate efficiently and evenly and support optimum plant growth and health.

C. The Owner’s Representative shall be the sole judge of the true intent of the drawings and specifications and of the quality of all materials furnished in performance of the contract.

D. The Contractor shall keep one copy of all drawings and specifications on the work site, in good order. The Contractor shall make these documents available to the Owner's Representative when requested.

E. In the event of any discrepancies between the drawings and the specification, the final decision as to which shall be followed, shall be made by the Owner's Representative.

F. In the event the installation is contradictory to the direction of the Owner's Representative, the installation shall be rectified by the Contractor at no additional cost to the Owner. The Contractor shall immediately bring any such discrepancies to the attention of the Owner's Representative.

G. It shall be distinctly understood that no oral statement of any person shall be allowed in any manner to modify any of the contract provisions. Changes shall be made only on written authorization of the Owner's Representative.

H. Installer Qualifications: The installer shall be a firm having at least 5 years of successful experience of a scope similar to that required for the work.

1. Installer Field Supervision: The installer shall maintain on site an experienced full-time supervisor who can communicate in English with the Owner's Representative.
2. Submit the installer's qualifications for approval.

1.16 IRRIGATION SYSTEM WARRANTY:

A. The Contractor shall Warrantee all workmanship and materials for a period of one (1) year following the acceptance of the work.

1. Any parts of the irrigation work that fails or is defective shall be replaced or reconstructed at no expense to the Owner including but not limited to: restoring grades that have settled in trenches and excavations related to the work. Reconstruction shall include any plantings, soil, mulch or other parts of the constructed landscape that may be damaged during the repair or that results from soil settlement.

B. The date of acceptance of the work and start of the Guarantee period shall be determined by the Owner's Representative, upon the finding that the entire irrigation system is installed as designed and specified, and found to be operating correctly, supplying water evenly to all planting and/or lawn areas.

C. The system controller shall be warranted by the equipment manufacturer against equipment malfunction and defects for a period of 5 years, following the acceptance of the work.

D. Neither the final acceptance nor any provision in the contract documents shall relieve the Contractor of responsibility for faulty materials or workmanship. The Contractor shall remedy any defects within a period of 7 days (s) from the date of notification of a defect.

1.17 SITE CONDITIONS

A. It is the responsibility of the Contractor to be aware of all surface and sub-surface conditions, and to notify the Owner's Representative, in writing, of any circumstances that would negatively impact the installation of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

1.18 DELIVERY, STORAGE, AND HANDLING

A. All materials and equipment shall be stored properly and protected as required by the Contractor. The Contractor shall be entirely responsible for damages or loss by weather or other cause to work under the contract. Materials shall be furnished in ample quantities and at such times as to ensure uninterrupted progress of the work.

B. Deliver the products to the job site in their original unopened container with labels intact and legible at time of use.

C. Store in accordance with the manufacturers' recommendations.

1.19 PROTECTION

A. The Contractor shall continuously maintain adequate protection of all their work from damage, destruction, or loss, and shall protect the owner's property from damage arising in connection with this contract. Contractor shall make good any such damage, destruction, loss or injury. Contractor shall adequately protect adjacent property as provided by law and the contract documents.

B. The Contractor shall maintain sufficient safeguards, such as railings, temporary walks, lights, etc., against the occurrence of accidents, injuries or damage to any person or property resulting from their work, and shall alone be responsible for the same if such occurs.

C. All existing paving, structures, equipment or plant material shall be protected at all times, including the irrigation system related to plants, from damage by workers and equipment. The Contractor shall follow all protection requirements including plant protection provision of the general contract documents. All damages shall be repaired or replaced at the Contractor's expense. Repairs and or replacement shall be to the satisfaction of the Owner's Representative, including the selection of a Contractor to undertake the repair or maintenance. Repairs shall be at no cost to the owner.

1. For trees damaged to the point where they will not be expected to survive or which are severely disfigured and that are too large to replace, the cost of damages shall be as determined by the Owner's arborist using accepted tree value evaluation methods.

D. The Contractor shall refrain from trenching within the drip line of any existing tree to remain. The Owner’s Representative may require the Contractor to relocate proposed irrigation work, bore lines beneath roots or use air spade technology to dig trenches through and under the root system to avoid damage to existing tree root areas.

1.20 EXCAVATING AROUND UTILITIES

A. Contractor shall carefully examine the civil, record, and survey drawings to become familiar with the existing underground conditions before digging.

1. Do not begin any excavation until all underground utilities have been located and marked.

B. Determine location of underground utilities and perform work in a manner that will avoid possible damage. Hand excavate, as required. Maintain stakes and or markings set by others until parties concerned mutually agree to their removal.

C. Notification of Local Utility Locator Service, is required for all excavation around utilities. The Contractor is responsible for knowing the location and avoiding utilities that are not covered by the Local Utility Locator Service.

1.21 POINT OF CONNECTION

A. The point of connection of the irrigation system to its electrical power sources shall be provided by the General Contractor's licensed electrical Contractor per governing codes at the location shown on the drawings. The irrigation Contractor will connect the power to provided junction box or grounded plug receptacle.

B. The point of connection of the irrigation system to its potable and or non-potable water sources, including the main shutoff valve and backflow preventer shall be provided by the General Contractor's licensed plumbing Contractor per governing codes at the location shown on the drawings. The minimum size and water pressure of the pressurized line will be as noted on the irrigation drawing.

1.22 TEMPORARY UTILITIES

A. All temporary piping, wiring, meters, panels and other related appurtenances required between source of supply and point of use shall be provided by the Contractor and coordinated with the Owner's Representative. Existing utilities may be used with the written permission of the owner.

1.23 CUTTING, PATCHING, TRENCHING AND DIGGING

A. The Contractor shall do all cutting, fitting, trenching or patching of their work that may be required to make its several parts come together as shown upon, or implied by, the drawings and specifications for the completed project.

B. Digging and trenching operations shall be suspended when the soil moisture is above field capacity.

1.24 USE OF PREMISES

A. The Contractor shall confine their apparatus; the storage of materials, and the operations of their workers to limits indicated by the law, ordinances, or permits and shall not unreasonably encumber the premises with their materials.

B. Contractor parking, and material and equipment storage shall in areas approved by the Owner's Representative.

1.25 AS BUILT RECORD SET OF DRAWINGS

A. Immediately upon the installation of any buried pipe or equipment, the Contractor shall indicate on the progress record drawings the locations of said pipe or equipment. The progress record drawings shall be made available at any time for review by the Owner's Representative.

B. Before final acceptance of work, the Contractor shall provide an as built record set of drawings showing the irrigation system work as built. The drawings shall be transmitted to the Owner's Representative in paper format and as a pdf file of each document on compact disk or flash drive. The drawings shall include all information shown on the original contract document and revised to reflect all changes in the work. The drawings shall include the following additional information

1. All valves shall be numbered by station and corresponding numbers shall be shown on the as built record set of drawings.
2. All main line pipe or irrigation equipment including sleeves, valves, controllers, irrigation wire runs which deviate from the mainline location, backflow preventers, remote control valves, grounding rods, shut-off valves, rain sensors, wire splice locations, and quick coupling valves shall be located by two (2) measured dimensions, to the nearest one-half foot. Dimensions shall be given from permanent objects such as buildings, sidewalks,

curbs, walls, structures and driveways. All changes in direction and depth of main line pipe shall be noted exactly as installed. Dimensions for pipes shall be shown at no greater than a 50 ft. maximum interval.

3. As built record set of drawings shall be signed and dated by the Contractor attesting to and certifying the accuracy of the as built record set of drawings. As built record set of drawings shall have "As Built Record Set of Drawings", company name, address, phone number and the name of the person who created the drawing and the contact name (if different).

C. The Owner shall make the original contract drawing files available to the Contractor.

1.26 CONTROLLER CHARTS:

A. Provide one controller chart for each automatic controller installed.

1. On the inside surface of the cover of each automatic controller, prepare and mount a color-coded chart showing the valves, main line, and systems serviced by that particular controller. All valves shall be numbered to match the operation schedule and the drawings. Only those areas controlled by that controller shall be shown. This chart shall be a plot plan, entire or partial, showing building, walks, roads and walls. The plan, reduced as necessary and legible in all details, shall be made to a size that will fit into the controller cover. This print shall be approved by the Owner's Representative and shall be protected in laminated in a plastic cover and be secured to the inside back of the controller cabinet door.
2. The controller chart shall be completed and approved prior to acceptance of the work.

1.27 TESTING

A. Provide all required system testing with written reports as described in part 3.

1.28 OPERATION AND MAINTENANCE MANUALS AND GUARANTEES

A. Prepare and deliver to the Owner's Representative within ten calendar days prior to completion of construction, two 3-ring hard cover binders containing the following information:

1. Index sheet stating Contractor's address and telephone number, list of equipment with name and addresses of local manufacturers' representatives.
2. Catalog and parts sheets on all material and equipment.
3. Guarantee statement. The start of the guarantee period shall be the date the irrigation system is accepted by the Owner.
4. Complete operating and maintenance instruction for all major equipment.
5. Irrigation product manufacturers warrantees.

B. In addition to the above-mentioned maintenance manuals, provide the Owner's maintenance personnel with instructions for maintaining major equipment and show evidence in writing to the Owner's Representative at the conclusion of the project that this has been rendered.

PART 2 - PRODUCTS

2.1 MATERIALS GENERAL

A. All materials shall be of standard, approved and first grade quality and shall be new and in perfect condition when installed and accepted.

B. See the parts schedule on the drawings for specific components and manufacturers.

C. Approval of any items or substitutions indicates only that the product(s) apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted. The Contractor shall be responsible for the performance of substituted items. If the substitution proves to be unsatisfactory or not compatible with other parts of the system, the Contractor shall replace said items with the originally specified items, including all necessary work and modifications to replace the items, at no cost to the owner.

2.2 RECLAIMED WATER SYSTEM DESIGNATION

A. Where irrigation systems use reclaimed water, all products including valve boxes, lateral and main line pipe, etc. where applicable and/or required by local code shall have the reclaimed water purple color designation.

2.3 PIPING MATERIAL

A. Individual types of pipe and fittings supplied are to be of compatible manufacturer unless otherwise approved. Pipe sizes shown are nominal inside diameter unless otherwise noted.

B. Plastic pipe:

1. All pipe shall be free of blisters, internal striations, cracks, or any other defects or imperfections. The pipe shall be continuously and permanently marked with the following information: manufacturer's name or trade mark, size, class and type of pipe pressure rating, quality control identifications, date of extrusion, and National Sanitation Foundation (NSF) rating.
2. Pressure main line for piping upstream of remote control valves and quick coupling valves:

    a. Pipe smaller than 2 inch diameter shall be plastic pipe for use with solvent weld or threaded fittings. Shall be manufactured rigid virgin polyvinyl chloride (PVC) 1220, Type 1, Grade 2 conforming to ASTM D 1785, designated as Schedule 40.
    b. Pipe 2 - 3 inch diameter shall be manufactured rigid virgin polyvinyl chloride (PVC), Type 1, Grade 2 conforming to ASTM D 1785, designated as bell gasket Class 315.
    c. Pipe larger than 3 inch diameter shall be manufactured rigid virgin polyvinyl chloride (PVC), Type 1, Grade 2 conforming to ASTM D 1785, designated as bell gasket Class 200 PVC.

3. Non-pressure lateral line for piping downstream of remote control valves: plastic pipe for use with solvent weld or threaded fittings. Shall be manufactured rigid virgin polyvinyl chloride PVC 1220 (type 1, grade 2) conforming to ASTM d 1785, designated as Class 200, 3/4″ minimum size.

C. Galvanized pipe shall be used for above ground connections to, backflow prevention device assemblies, hose bibs, and booster pumps and as shown on the plans and details.

1. Pipe shall be hot dip galvanized continuous welded, seamless, Schedule 40 conforming to applicable current ASTM standards.

2.4 FITTINGS AND CONNECTIONS:

A. Polyvinyl chloride pipe fittings and connections: Type II, Grade 1, Schedule 40, high impact molded fittings, manufactured from virgin compounds as specified for piping tapered socket or molded thread type, suitable for either solvent weld or screwed connections. Machine threaded fittings and plastic saddle and flange fittings are not acceptable. Furnish fittings permanently

marked with following information: nominal pipe size, type and schedule of material, and National Sanitation Foundation (NSF) seal of approval. PVC fittings shall conform to ASTM D2464 and D2466.

B. Brass pipe fittings, unions and connections: standard 125 pound class 85% red brass fittings and connections, IPS threaded.

C. PVC Schedule 80 threaded risers and nipples: Type I, grade 1, Schedule 80, high impact molded, manufactured from virgin compounds as specified for piping and conforming to ASTM D-2464. Threaded ends shall be molded threads only. Machined threads are not acceptable.

D. Galvanized pipe fittings shall be galvanized malleable iron ground joint Schedule 40 conforming to applicable current ASTM standards.

2.5 SOLVENT CEMENTS AND THREAD LUBRICANT

A. Solvent cements shall comply with ASTM D2564. Socket joints shall be made per recommended procedures for joining PVC plastic pipe and fittings with PVC solvent cement and primer by the pipe and fitting manufacturer and procedures outlined in the appendix of ASTM D2564.

B. Thread lubricant shall be Teflon ribbon-type, or approved equal, suitable for threaded installations as per manufacturer's recommendations.

C. Pipe Joint Compound (Pipe dope) shall be used on all galvanized threaded connections. Pipe Joint Compound is a white colored, non-separating thread sealant compound designed to seal threaded connections against leakage due to internal pressure. It shall contain PTFE (Polytetrafluoroethylene) to permit a tighter assembly with lower torque, secure permanent sealing of all threaded connections and allow for easy disassembly without stripping or damaging threads.

2.6 BACKFLOW PREVENTION DEVICES

A. The backflow prevention device shall be certified to NSF/ANSI 372 shall be ASSE Listed 1013, rated to 180 degree F, and supplied with full port ball valves.

B. The main body and access covers shall be low lead bronze (ASTM B 584)

C. The seat ring and all internal polymers shall be NSF Listed Noryl and the seat disc elastomers shall be silicone.

D. Backflow Preventer shall be as indicated on the drawings.

2.7 PRESSURE REGULATOR

A. Pressure regulator shall certified to NSF/ANSI 372, consisting of low lead bronze body bell housing, a separate access cap shall be threaded to the body and shall not require the use of ferrous screws.

B. The main valve body shall be cast bronze (ASTM B 584).

C. The access covers shall be bronze (ASTM B 584 or Brass ASTM B 16)

D. The assembly shall be of the balanced piston design and shall reduce the pressure in both flow and no flow conditions.

E. Pressure regulator shall be as indicated on the drawings.

2.8 WYE STRAINER

A. Strainer shall conform to MIL –S-16293, and be ANSI 3rd party certified to comply with the states lead plumbing law 0.25% maximum weighted average lead content.

B. The main body shall be low lead bronze (ASTM B 584)

C. The access covers shall be yellow brass or cast bronze (ASTM B 16 or ASTM B 584)

D. Strainer screen shall be 300 series stainless steel available in 20, 40, 60, 80, or 100 mesh.

E. Wye strainer shall be as indicated on the plans.

2.9 BACKFLOW PREVENTER CAGE

A. A heavy-duty steel mesh cage with rust proof finish. The caging shall be sized to allow space for the entire piping assembly associated with the Backflow Preventer unit, and all associated equipment.

B. The cage shall include the manufacturers' standard tamper proof locking mechanism.

C. Provide a concrete base as detailed on the drawings.

D. Backflow Preventer Cage type, manufacturer and color shall be as indicated on the plans.

2.10 BOOSTER PUMP

A. Booster pump shall be housed in a sturdy, locking, weather-resistant case, furnished for maximum exterior protection.

B. Booster pump shall be as indicated on the drawings.

2.11 BALL VALVES

A. Ball valves for 3/4 inch through 2-1/2 inch shall be of PVC, block, tru-union design with EDPDM seals and o-ring.

B. Ball valves for 3 inch and larger shall be gate design and shall be iron body, brass or bronze mounted AWWA gate valves, and shall have a clear waterway equal to the full nominal diameter of the valve, and shall be rubber gasket, flanged or mechanical joint only, and shall be able to withstand a continuous working pressure of 150 PSI. Valve shall be equipped with a square-operating nut.

C. All ball valves located in a valve manifold shall be the same size as the main line (1-1/2 inch size minimum). Provide pipe-reducing adapters down stream of valves, as required. All ball valves in line shall be the same size as the pipe.

D. Ball valves shall be as indicated on the drawings.

2.12 CHECK VALVES

A. Swing check valves 2 inch and smaller shall be 200 lbs., W.O.G., bronze construction with replaceable composition, neoprene or rubber disc and shall meet or exceed federal specification WW-V- 5ld, class a, type iv.

B. Anti-drain valves shall be of heavy-duty virgin PVC construction with female iron pipe thread inlet and outlet. Internal parts shall be stainless steel and neoprene. Anti-drain valves shall be field adjustable against draw out from 5 to 40 feet of head.

C. Check valves shall be as indicated on the drawings.

2.13 REMOTE CONTROL VALVES

A. Remote control valves shall be electrically operated, single seat, normally closed configuration, equipped with flow control adjustment and capability for manual operation.

B. Valves shall be actuated by a normally closed low wattage solenoid using 24 volts, 50/60 cycle solenoid power requirement. Solenoid shall be epoxy encased. A union shall be installed on the discharge end.

C. Remote control valves shall be wired to controller in same numerical sequence as indicated on drawings.

D. Remote control valves shall be as indicated on the drawings.

2.14 MASTER CONTROL VALVES

A. Master Control Valve shall be compatible with the irrigation controller.

B. Master control valves shall be as indicated on the drawings.

2.15 FLOW SENSOR

A. Flow sensor shall be compatible with the irrigation controller.

B. Flow sensor shall be as indicated on the drawings.

2.16 HYDROMETER

A. Hydrometer shall be compatible with the irrigation controller.

B. Hydrometer shall be as indicated on the drawings.

2.17 QUICK COUPLER VALVES

A. Quick coupler valves shall be a one or two piece, heavy-duty brass construction with a working pressure of 150 PSI with a built in flow control and a self-closing valve.

B. Quick coupler shall be equipped with locking red brass cap covered with durable yellow thermo-plastic rubber cover. Key size shall be compatible with quick coupler and of same manufacturer.

C. Quick coupler valves shall be as indicated on the drawings.

2.18 SPRINKLER HEADS

A. All sprinkler heads shall have check valves installed.

B. All sprinkler heads shall be as indicated on the drawings.

C. Riser nipples for all sprinkler heads shall be the same size as the riser opening in the sprinkler body and fabricated as shown on the drawings.

2.19 AUTOMATIC CONTROLLER

A. Controller shall be housed in a sturdy, locking, weather-resistant case, furnished for maximum exterior protection.

B. Controller shall be equipped with evapo-transpiration (ET) sensor, which adjusts the controller programming based on local climatic conditions. The sensor shall also have a rain sensing shut-off switch, wind sensing shut off switch, and freeze sensing shut-off of switch.

1. If a moisture sensor is used in lieu of an evapo-transpiration sensor an additional sensor, which has a rain-sensing shut-off switch, wind sensing shut-off switch, and freeze sensing shut-off switch shall be provided.

C. Automatic controller shall be as indicated on the drawings.

2.20 CONTROLLER DECODERS

A. All decoders shall be per the controller manufacturer’s specifications.

B. Decoder model number shall be as shown on the drawings.

2.21 ELECTRICAL CONTROL WIRING

A. Low voltage

1. The electrical control wire shall be direct burial type UF, no. 14 AWG, solid, single conductor, copper wire UL approved or larger, if required to operate system as designed.
2. For 2-Wire controllers all irrigation wire for the controller, flow sensor, master valve, hydrometer, remote control valves and moisture sensors shall be per the controller manufacturer’s specifications and recommendations.
3. Color code wires to each valve. Common wire shall be white.
4. If multiple controllers are being utilized, and wire paths of different controllers cross each other, both common and control wires from each controller to be of different colors.
5. Control wire splices: Splices are when required shall be placed in splice boxes.
6. Wire connections shall be per the controller manufacturer’s specifications and recommendations.

B. High voltage

1. Shall be of type as required by local codes and ordinances.
2. Shall be of proper size to accommodate needs of equipment it is to serve.

2.22 VALVE BOXES AND MATERIALS

A. Valve boxes: valve boxes shall be constructed of ABS (acrylonitrile butadiene styrene) plastic, green in color, with rigid base and sides and shall be supplied with bolt lock cover secured with stainless steel bolts. Cover shall be identified as shown on drawings. Provide box extensions as required.

1. Master valves, flow sensors, remote control irrigation valves, gate valves, and ball valves 3 inch or less in size shall use a 14 inch x 19 inch x 12 inch rectangular box.
2. Quick coupler valves, wire splices, and grounding rods shall use a 10 inch circular box.

2.23 CONCRETE THRUST BLOCKS

A. Concrete thrust blocks shall be sized per the pipe manufactures requirement or as indicated on the drawings.

2.24 VALVE IDENTIFICATION TAGS

A. Valve Identification Tags shall be 2.25 inch x 2.65 inch polyurethane. Color: potable water; yellow / Non-potable water; purple. Tags shall be permanently attached to each remote control valve with tamper proof seals as indicated on the drawings.

2.25 EQUIPMENT TO BE FURNISHED TO OWNER

A. Two (2) sets of keys for each automatic controller.

B. Two (2) 48 inch tee wrenches for operating the gate valves.

C. Three (3) sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied on this project.

D. Five (5) Extra sprinkler heads, nozzles, shrub adapters, nozzle filter screens, for each type used on the project.

E. Two (2) quick coupler keys to match manufacturer type of quick coupler.

2.26 INCIDENTAL MATERIALS AND EQUIPMENT

A. Furnish all materials and equipment not specified above, but which are necessary for completion of the work as intended.

2.27 MAIN LINE LOCATOR TAPE

A. 3 - inch wide plastic detectable locator tape.

2.28 MAIN LINE AND LATERAL LINE BEDDING SAND

A. Sand shall consist of natural or manufactured granular material, free of organic material, mica, loam, clay or other substances not suitable for the intended purpose.

B. Sand shall be masonry sand ASTM C 144 or coarse concrete sand, ASTM C 33.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Code requirements shall be those of state and municipal codes and regulations locally governing this work, providing that any requirements of the drawings and specifications, not conflicting therewith, but exceeding the code requirements, shall govern unless written permission to the contrary is granted by the Owner’s Representative.

B. Extreme care shall be exercised at all times by the Contractor in excavating and working in the project area due to existing utilities and irrigation systems to remain. Contractor shall be fully responsible for expenses incurred in the repair of damages caused by their operation.

1. The Contractor is responsible for identifying and maintaining existing irrigation main lines that supply water to areas on the site as noted on the drawings and outside of the proposed limit of work. The Contractor shall relocate or replace existing irrigation main line piping as required to provide a continuous supply of water to all areas of existing irrigation on site.

a. Providing continuous water supply shall include hand watering and or the use of watering trucks to provide adequate water.

C. Plan locations of backflow preventers, valves, controllers, irrigation lines, sleeves, spray heads and other equipment are diagrammatic and indicate the spacing and relative locations of all installations. Final site conditions and existing and proposed plantings shall determine final locations and adjusted as necessary and as directed to meet existing and proposed conditions and obtain complete water coverage. Minor changes in locations of the above from locations shown shall be made as necessary to avoid existing and proposed trees, piping, utilities, structures, etc. at the Contractor's expense or when directed by the Owner’s Representative.

1. The Contractor shall be held responsible for relocation of any items without first obtaining the Owner’s Representative's approval. The Contractor shall remove and relocate such items at their expense if so directed by the Owner’s Representative.

D. Prior to any work the Contractor shall stake out locations of all pipe, valves, equipment and irrigation heads and emitters using an approved staking method and maintain the staking of the approved layout in accordance with the drawings and any required modifications. Verify all horizontal and vertical site dimensions prior to staking of heads. Do not exceed spacing shown on drawings for any given area. If such modified spacing demand additional or less material than shown on the drawings, notify the Owner’s Representative before beginning any work in the adjacent area.

E. Stub out main line at all end runs and as shown on drawings. Stub out wires for future connection where indicated on plan and as directed.

F. Point of connection shall be approximately as shown on drawings. Connect new underground piping and valves and provide all flanges, adapters or other necessary fittings for connection.

G. Permission to shut off any existing in-use water line must be obtained 48 hours in advance, in writing from the Owner. The Contractor shall receive instructions from the Owner’s Representative as to the exact length of time of each shut-off.

H. No fittings shall be installed on pipe underneath pavement or walls.

I. Prior to starting any work, Contractor shall obtain a reading of existing static water pressure (no flow condition) at the designated point of connection and immediately submit written verification of pressure with date and time of recording to Owner’s Representative.

3.2 TRENCHING, DIRECTIONAL BORING AND SLEEVING

A. Perform all trenching, directional boring, sleeving and excavations as required for the installation of the work included under this section, including shoring of earth banks to prevent cave-ins.

B. The Contractor may directional bore lines where it is practical or where required on the plans.

1. Extend the bore 1’ past the edge of pavement unless noted differently on the plans
2. Cap ends of each bore and locate ends at finished grade using metal stakes.
3. All boring and sleeving shall have detectable locator tape placed at the ends of the pipe.

C. Make trenches for mains, laterals and control wiring straight and true to grade and free of protruding stones, roots or other material that would prevent proper bedding of pipe or wire.

D. Excavate trenches wide enough to allow a minimum of 4 - inch between parallel pipelines and 8 inch from lines of other trades. Maintain 3 - inch vertical clearance between irrigation lines. Minimum transverse angle is 45 degrees. All pipes shall be able to be serviced or replaced without disturbing the other pipes.

E. Trenches for pipelines shall be made of sufficient depth to provide the minimum cover from finished grade as follows:

1. Pressure main line: 18 inches below finish grade and 24-30 inches below paved areas in Schedule 40 PVC sleeves.
2. Reclaimed water constant pressure main lines shall cross at least twelve (12) inches below potable water lines.

    a. If a constant pressure reclaimed water main line must be installed above a potable water line or less than twelve (12) inches below a potable water line, then reclaimed water line shall be installed within an approved protective sleeve. The sleeve shall extend ten (10) feet from each side of the center of the potable line, for a total of twenty (20) feet. The sleeve shall be color-coded (purple) for use with reclaimed water.

3. Lateral lines: 12 inches below finish grade and 18 inches below paved areas in Schedule 40 PVC sleeves.
4. Control wiring: to the side of pressure main line and 24 inches below paved areas in Schedule 40 PVC sleeves.

F. On new on-site systems (post-meter), the required horizontal separation between potable water lines, reclaimed water constant pressure main lines and sewer lines shall be a minimum of four (4) feet apart as directed by the project engineer and/ or regulatory agency. Measurements shall be between facing surfaces, not pipe centerlines.

G. When trenching through areas of imported or modified soil, deposit imported or modified soils on one side of trench and subsoil on opposite side.

H. Backfill the trench per the requirements in paragraphs “Backfilling and Compacting” below.

3.3 PIPE INSTALLATION

A. General Pipe Installation

1. Exercise caution in handling, loading and storing, of plastic pipe and fittings to avoid damage.

    a. The pipe and fittings shall be stored under cover until using, and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lay flat so as not to be subjected to undue bending or concentrated external load at any point.

b. All pipe that has been dented or damaged shall be discarded unless such dent or damaged section is cut out and pipe rejoined with a coupling.

2. Trench depth shall be as specified above from the finish grade to the top of the pipe.
3. Install a detectable pipe locator tape 6 to 8 inches above all main line pipes.

B. Polyvinyl Chloride Pipe (PVC) Installation

1. Under no circumstance is pipe to rest on concrete, rock, wood blocks, construction debris or similar items.
2. No water shall be permitted in the pipe until a period of at least 24 hours has elapsed for solvent weld setting and curing.
3. Install assemblies and pipe to conform to respective details and where shown diagrammatically on drawings, using first class workmanship and best standard practices as approved. All fittings that are necessary for proper connections such as swing joints, offsets, and reducing bushings that are not shown on details shall be installed as necessary and directed as part of the work.
4. Dielectric bushings shall be used in any connections of dissimilar metals.
5. Gasketed plastic pipe: pipe-to-pipe joints or pipe to fittings shall be made in accordance with manufacturer's specifications.
6. Solvent weld or threaded plastic pipe:

a. Installation of all pipe and fittings shall be in strict accordance with manufacturer's specifications.
b. Pipe shall be cut using approved PVC pipe cutters only. Sawed joints are disallowed. All field cuts shall be beveled to remove burrs and excess before gluing.
c. Welded joints shall be given a minimum of 15 minutes to set before moving or handling. Excess solvent on the exterior of the joint shall be wiped clean immediately after assembly.
d. Plastic to metal connections shall be made with plastic adapters and if necessary, short (not close) brass threaded-nipples. Connection shall be made with two (2) wraps of Teflon tape and hand tightened plus one turn with a strap wrench.
e. Snake pipe horizontally in trench to allow one (1) foot of expansion and contraction per 100 feet of straight run.
f. Threaded pipe joints shall be made using Teflon tape. Solvent shall not be used with threaded joints. Pipe shall be protected from tool damage during assembly. All damaged pipe shall be removed and replaced. Take up threaded joints with light wrench pressure.
g. No close nipples or risers are allowed. Cross connections in piping is disallowed.
h. Center load pipe at 10 feet on center intervals with small amount of backfill to prevent arching and slipping under pressure. Other than this preliminary backfill all pipe joints, fittings and connections are to remain uncovered until successful completion of hydrostatic testing and written approval of the testing report.
i. Concrete thrust blocks shall be constructed behind all pipe fittings 1-1/2 inch diameter and larger at all changes of direction of 45 degrees or more.

C. Galvanized Pipe Installation

1. All joints shall be threaded with pipe joint compound used on all threads.
2. Dielectric bushings shall be used in any connections of dissimilar metals.

3.4 TRENCHING, DIRECTIONAL BORING, AND SLEEVING REVIEW:

A. Upon completion and installation of all trenching, directional boring, and sleeving, all installed irrigation control wiring, lines and fittings shall be visually observed by the Owner's

Representative unless otherwise authorized. Do not cover any wires, lines or fittings until they have been tested and observed by the Owner's Representative.

3.5 FLUSHING

A. Openings in piping system during installation are to be capped or plugged to prevent dirt and debris from entering pipe and equipment. Remove plugs when necessary to flush or complete system.

B. After completion and prior to the installation of any terminal fittings, the entire pipeline system shall be thoroughly flushed to remove dirt, debris or other material.

3.6 HYDROSTATIC PRESSURE TESTING

A. After flushing, and the installation of valves the following tests shall be conducted in the sequence listed below. The Contractor shall furnish all equipment; materials and labor necessary to perform the tests and all tests shall be conducted in the presence of the Owner's Representative.

B. Water pressure tests shall be performed on all pressure main lines before any couplings, fittings, valves and the like are concealed.

C. Immediately prior to testing, all irrigation lines shall be purged of all entrapped air or debris by adjusting control valves and installing temporary caps forcing water and debris to be discharged from a single outlet.

D. Test all pressure main line at 150 PSI. For a minimum of four (4) hours with an allowable loss of 5 PSI. Pressure and gauges shall be read in PSI, and calibrated such that accurate determination of potential pressure loss can be ascertained.

E. Re-test as required until the system meets the requirements. Any leaks, which occur during test period, will be repaired immediately following the test. All pipe shall be re-tested until final written acceptance.

F. The Contractor is responsible for proving documentation stating the weather conditions, date, the start time and initial water pressure readings, the finish time and final water pressure readings and the type of equipment used to perform the test. The documentation must be signed by a witness acceptable to the Owner, verifying all of the above-mentioned conditions.

G. Submit a written report of the pressure testing results with the other above required information to the Owner's Representative for approval.

3.7 BACKFLOW PREVENTER TESTING

A. The backflow preventer shall be tested according to procedures and results per the requirements of the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California or American Water Works Association whichever is more stringent.

B. Testing shall be performed by a Backflow Prevention Assembly Tester with a current certification from the American Backflow Preventer Association.

3.8 BACKFILLING AND COMPACTING

A. Irrigation trenches shall be carefully backfilled with material approved for backfilling and free of rocks and debris one (1) inch in diameter and larger. When back filling trenches in areas of imported or modified planting soil, replace any excavated subsoil at the bottom and the imported soil or modified planting soil at the top of the trench.

B. Backfill shall be compacted with approved equipment to the following densities

1. Backfill under pavement and within 2 feet of the edge of pavement: Compact to 95% or greater of maximum dry density standard proctor.
2. Backfill of subsoil under imported planting mixes or modified existing planting soil: Between 85 and 90% of maximum dry density standard proctor.
3. Backfill of imported planting mixes or modified existing planting soil: Compact to the requirements of the adjacent planting mix or planting soil as specified in section “Planting Soil”.

C. Finish grade of all trenches shall conform to adjacent grades without dips or other irregularities. Dispose of excess soil or debris off site at Contractor's expense.

D. Any settling of backfill material during the maintenance or warranty period shall be repaired at the Contractor’s expense, including any replacement or repair of soil, lawn, and plant material or paving surface.

3.9 RESURFACING PAVING OVER TRENCHES

A. Restore all surfaces and repair existing underground installations damaged or cut as a result of the excavation to their original condition, satisfactory to the Owner’s Representative.

B. Trenches through paved areas shall be resurfaced with same materials quality and thickness as existing material. Paving restoration shall be performed by the project paving Sub-contractor or an approved Contractor skilled in paving work.

C. The cost of all paving restoration work shall be the responsibility of the irrigation Contractor unless the trenching thru the paving was, by previous agreement, part of the general project related construction.

3.10 INSTALLATION OF EQUIPMENT

A. General:

1. All equipment shall be installed to meet all installation requirements of the product manufacturer. In the event that the manufactures requirements cannot be implemented due to particular condition at the site or with other parts of the design, obtain the Owner’s Representative’s written authorization and approval for any modifications.
2. Install all equipment at the approximately at the location(s) and as designated and detailed on the drawings. Verify all locations with the Owner’s Representative.
3. Install all valves within a valve box of sufficient size to accommodate the installation and servicing of the equipment. Group valves together where practical and locate in shrub planting areas.
4. All sprinkler irrigation systems that are using water from potable water systems shall require backflow prevention. All backflow prevention devices shall meet and be installed in accordance with requirements set forth by local codes and the health department.

B. Pressure regulator:

1. Set regulator for required PSI per manufacturer's specifications.

C. Check Valve:

1. Install check valves approximately at the locations necessary to prevent low head run off.

D. Remote control valves:

1. Install one remote control valve per valve box.
2. Remote control valve manifolds and quick coupler valves shall be separate allowing use of a quick coupler with all remote control valves shut off.
3. Install boxes no farther than 12 inches from edge of paving and perpendicular to edge of paving and parallel to each other. Allow 12 inches clearance between adjacent valve boxes.

E. Quick coupler valve:

1. Install each quick coupler valve in its own valve box.
2. Install thrust blocks on quick couplers.
3. Place no closer than 12 inches to adjacent paving.
4. Install 18 inches off set from main line.

F. Sprinkler heads:

1. All main lines and lateral lines, including risers, shall be flushed and pressure tested before installing sprinkler heads.
2. Install specified sprinkler heads as shown in details at locations shown on the drawings. Adjust layout for full coverage, spacing of heads shall not exceed the maximum spacing recommended by the manufacturer.
3. All sprinkler heads shall be set perpendicular to finish grade unless otherwise designated on the drawings or details.

G. Irrigation controllers:

1. Remote control valves shall be connected to controller in numerical sequence as shown on the drawings.
2. Controller shall be tested with complete electrical connections. The Contractor shall be responsible for temporary power to the controller for operation and testing purposes.
3. Connections to control wiring shall be made within the pedestal of the controller. All wire shall follow the pressure main insofar as possible.
4. Electrical wiring shall be in a rigid gray PVC plastic conduit from controller to electrical outlet. The electrical Contractor shall be responsible for installing all wiring to the controller, in order to complete this installation. A disconnect switch shall be included.

H. Wiring:

1. Low Voltage

    a. Control wiring between controller and electrical valves shall be installed in the same trench as the main line where practical. The wire shall be bundled and secured to the lower quadrant of the trench at 10 foot intervals with plastic electrical tape.
    b. When the control wiring cannot be installed in the same main line trench it shall be installed a minimum of 18 inches below finish grade and a bright colored plastic ribbon with suitable markings shall be installed in the trench 6 inches below grade directly over the wire.

c. An expansion loop shall be provided every 500 feet in a box and inside each valve box. Expansion loop shall be formed by wrapping wire at least eight (8) times around a ¾ inch pipe and withdrawing pipe.
d. Provide one control wire to service each valve in system.
e. Provide common wire(s) per controller requirements.
f. Run two (2) spare #14-1 wires from controller along entire main line to last electric remote control valve on each and every leg of main line. Label spare wires at controller and wire stub to be located in a box.
g. All control wire splices not occurring at control valve shall be installed in a separate splice valve box.
h. Wire markers (sealed, 1 inch to 3 inch square) are to identify control wires at valves and at terminal strips of controller. At the terminal strip mark each wire clearly indicting valve circuit number.

2. High Voltage

a. All electrical work shall conform to local codes, ordinances and any authorities having jurisdiction. All high voltage electrical work to be performed by licensed electrician.
b. The Contractor shall provide 120-volt power connection to the automatic controller unless noted otherwise on drawings.

I. Valve boxes:

1. Install one valve box for each type of valve installed as per the details.
2. Gravel sump shall be installed after compaction of all trenches. Final portion of gravel shall be placed inside valve box after valve is backfilled and compacted.
3. Permanently label valve number and or controller letter on top of valve box lid using a method approved by the Owners Representative.

J. Tracer wire:

1. Tracer wire shall be installed with non-metallic plastic irrigation main lines where controller wires are not buried in the same trench as the main line.
2. The tracer wire shall be placed on the bottom of the trench under the vertical projection of the pipe with spliced joints soldered and covered with insulation type tape.
3. Tracer wire shall be of a color not used for valve wiring. Terminate wire in a valve box. Provide enough length of wire to make a loop and attach wire marker with the designation "tracer wire".

K. Drip Installation:

1. Install drip tubing 3”-4” below finish soil grade (not including mulch), or as indicated.
2. Clamp fittings with Oetiker clamps or approved equal when operating pressure exceeds specific drip tubing fitting requirements.
3. When installing drip tubing, install soil staples as listed below:

a. Sandy Soil - One staple every three (3’) feet and two (2) staples on each change of direction (tee, elbow, or cross).
b. Loam Soil - One staple every four (4’) feet and two (2) staples on each change of direction (tee, elbow, or cross).
c. Clay Soil - One staple every five (5’) feet and two (2) staples on each change of direction (tee, elbow, or cross).

4. Cap or plug all openings as soon as lines have been installed to prevent the intrusion of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.
5. Thoroughly flush all water lines before installing valves and other hydrants.

3.11 ADJUSTMENT AND COVERAGE TEST

A. Adjustment:

1. The Contractor shall flush and adjust all sprinkler heads, valves and all other equipment to ascertain that they function according to the manufacturer's data.
2. Adjust all sprinkler heads not to overspray onto walks, roadways and buildings when under maximum operating pressure and during times of normal prevailing winds.

B. Coverage test:

1. The Contractor shall perform the coverage test in the presence of the Owner's Representative after all sprinkler heads have been installed, flushed and adjusted. Each section is tested to demonstrate uniform and adequate coverage of the planting areas serviced.
2. Any systems that require adjustments for full and even coverage shall be done by the Contractor prior to final acceptance at the direction of the Owner's Representative at no additional cost. Adjustments may also include realignment of pipes, addition of extra heads, and changes in nozzle type or size.
3. The Contractor at no additional cost shall immediately correct all unauthorized changes or improper installation practices.
4. The entire irrigation system shall be operating properly with written approval of the installation by the Owner's representative prior to beginning any planting operations.

3.12 REPAIR OF PLANTING SOIL

A. Any areas of planting soil including imported or existing soils or modified planting soil which become compacted or disturbed or degraded as a result of the installation of the irrigation system shall be restored to the specified quality and compaction prior to beginning planting operations at no additional expense to the Owner. Restoration methods and depth of compaction remediation shall be approved by the Owner's Representative.

3.13 CLEAN-UP

A. During installation, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.

1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Once installation is complete, wash all soil from pavements and other structures.

1. Make all repairs to grades ruts, and damage to the work or other work at the site.
2. Remove and dispose of all excess soil, packaging, and other material brought to the site by the Contractor.

3.14 PROTECTION

A. The Contractor shall protect installed irrigation work from damage due to operations by other Contractors or trespassers.

1. Maintain protection during installation until Acceptance. Treat, repair or replace damaged work immediately. The Owner's Representative shall determine when such treatment, replacement or repair is satisfactory.

3.15 PRE-MAINTENANCE OBSERVATION:

A. Once the entire system shall be completely installed and operational and all planting is installed, the Owner's Representative shall observe the system and prepare a written punch list indicating all items to be corrected and the beginning date of the maintenance period.

B. This is not final acceptance and does not relieve the Contractor from any of the responsibilities in the contract documents.

3.16 GENERAL MAINTENANCE AND THE MAINTENANCE PERIOD

A. General maintenance shall begin immediately after installation of irrigation system. The general maintenance and the maintenance period shall include the following:

1. On a weekly basis the Contractor shall keep the irrigation system in good running order and make observations on the entire system for proper operation and coverage. Repair and cleaning shall be done to keep the system in full operation.
2. Records of all timing changes to control valves from initial installation to time of final acceptance shall be kept and turned over to the Owner's Representative at the time of final acceptance.
3. During the last week of the maintenance period, provide equipment familiarization and instruction on the total operations of the system to the personnel who will assume responsibility for running the irrigation system.
4. At the end of the maintenance period, turn over all operations logs, manuals, instructions, schedules, keys and any other equipment necessary for operation of the irrigation system to the Owner's Representative who will assume responsibility for the operations and maintenance of the irrigation system.

B. The maintenance period for the irrigation system shall coincide with the maintenance period for the Planting. (See specification section "Planting").

3.17 SUBSTANTIAL COMPLETION ACCEPTANCE

A. Upon written notice from the Contractor, the Owners Representative shall review the work and make a determination if the work is substantially complete.

B. The date of substantial completion of the irrigation shall be the date when the Owner's Representative accepts that all work in Planting, Planting Soil, and Irrigation installation sections is complete.

3.18 FINAL ACCEPTANCE / SYSTEM MALFUNCTION CORRECTIONS

A. At the end of the Plant Warrantee and Maintenance period, (See specification section "Planting") the Owner's Representative shall inspect the irrigation work and establish that all provisions of the irrigation system are complete and the system is working correctly.

1. Restore any soil settlement over trenches and other parts of the irrigation system.
2. Replace, repair or reset any malfunctioning parts of the irrigation system.

B. The Contractor shall show all corrections made from punch list. Any items deemed not acceptable shall be reworked and the maintenance period will be extended.

C. The Contractor shall show evidence that the Owner's Representative has received all charts, records, drawings, and extra equipment as required before final acceptance.

D. Failure to pass review: If the work fails to pass final review, any subsequent observations must be rescheduled as per above. The cost to the Owner for additional observations will be charged to the Contractor at the prevailing hourly rate of the reviewer.

END OF SECTION

SECTION 329115 - SOIL PREPARATION (PERFORMANCE SPECIFICATION)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Section includes preconstruction soil testing and planting soils specified according to performance requirements of the mixes.

1. Procurement of soils and amendments from a pre-qualified vendor with more than five (5) years of experience in providing specialized soils for commercial projects.
2. Cleaning and blending of soils components in approved ratios.
3. Preparation of soil mixes for turfgrasses, native grasses, ornamental shrubs and groundcovers, and tree pit backfill.
4. Preparation of biofiltration media.

B. Related Requirements:

1. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
2. Section 329300 "Plants" for placing planting soil for plantings.

C. Reference Standards

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristic of Soil Using Modified Effort.
2. Laboratory Compaction Characteristics And Moisture-Density Relationship Of Subgrade, Embankment Soils, And Backfill Material; TxDOT Designation: Tex-114-E, Effective Date: February 2011
3. EPA: Environmental Protection Agency:

    a. Method 8015.
    b. Method 8020.

4. USDA: United States Department of Agriculture:

    a. Texture Triangle Classification.
    b. Handbook No. 60.

5. American Society of Agronomy.
6. Soil Science Society of America.
7. Association of Official Agricultural Chemists.
8. U.S. Composting Council Test Method for the Examination of Composting and Compost (TMECC).

1.3 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.

C. Biofiltration Media: Soil used in water quality facilities which are not required of this project to meet the specifications or any certification processes of the local municipality to obtain credit.

D. CEC: Cation exchange capacity.

E. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

F. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

G. Imported Soil: Soil that is transported to Project site for use as Planting Soil mixed with amendments.

H. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.

I. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

J. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

K. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

L. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

M. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.

N. SSSA: Soil Science Society of America.

O. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

P. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, or to elevate the bottom of planting soil layer to provide finished grades as indicated, typified by less than 1 percent organic matter and few soil organisms.

Q. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

R. USCC: U.S. Composting Council.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. All product data sheets, conformance certificates, and photographs of physical samples for each product shall be submitted and delivered to Landscape Architect within a single PDF document no fewer than six (6) months prior to scheduled installation of materials. Individual submittals for single, or partial groups of, products will not be reviewed and immediately rejected.

1. Include recommendations for application and use.
2. Include test data substantiating that products comply with requirements.
3. Include sieve analyses for aggregate materials.
4. Material Certificates: For each type of imported soil, soil amendment, and fertilizer before delivery to the site, according to the following:

a. Manufacturer's qualified testing agency's certified analysis of standard products.
b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil and imported soil.

1. Notify Landscape Architect seven days in advance of the dates and times when laboratory samples will be taken.

B. Basic Soil Test Reports (imported soils): Laboratory soil test report for proposed soil indicating specified available nutrient (macro, secondary and micro) analysis and physical characteristics (sand, silt, clay, organic matter, fine gravel and sand fractions content) with a test report date no more than three months from date of submittal.

1. Nutrient Analysis (available to plants).
2. Physical Characteristics Analysis, indicating gravel, sand, silt, and clay content.

C. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

D. Prior to initiating all work, provide the Landscape Architect with samples of each imported soil mix or amendment, clearly labeled in a reusable plastic container with sealable lid or plastic bag with zip closure. These materials are to be delivered to the Landscape Architect’s office in a single cardboard box.

1.6 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Landscape Architect, soil scientist (CPSS) certified by SSSA, or state-certified, -licensed, or -registered soil scientist under the direction of the testing agency.

1. Number and Location of Samples: Minimum of five representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.7 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

B. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":

a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
b. Hydrometer Method: Report percentages of sand, silt, and clay.

2. Bulk Density: Analysis according to core method and clod method of SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
4. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
5. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85 percent compaction according to ASTM D698 (Standard Proctor).

C. Chemical Testing:

1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.

D. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT SERA-6, including the following:

1. Percentage of organic matter.
2. CEC, calcium percent of CEC, and magnesium percent of CEC.
3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Zinc ppm.
11. Zinc availability ppm.
12. Copper ppm.
13. Sodium ppm and sodium absorption ratio.
14. Soluble-salts ppm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil.
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.8 DELIVERY, STORAGE, AND HANDLING

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

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 GENERAL

A. In general, soil materials shall be free of debris, roots, wood, scrap material, vegetative matter, refuse, soft unsound particles, frozen, deleterious or objectionable materials.

2.2 MATERIALS

A. Regional Materials: soil amendments and fertilizers shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

2.3 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

A. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; and/or stockpiled on-site; modified to produce viable planting soil. Using preconstruction soil analyses and materials specified in other articles of this Section, amend existing, on-site surface soil to become planting soil complying with the following requirements:

1. Particle Size Distribution by USDA Textures: Classified as sandy loam soil according to USDA textures.
2. Percentage of Organic Matter: Minimum 5 percent by volume.
3. Soil Reaction: pH of 7 to 8.

B. Subsoil Planting-Soil Type: Imported. Where existing soil has been removed, settled or compacted to more than 85% Standard Proctor: Manufactured soil consisting of manufacturer's basic topsoil, blended in a manufacturing facility with sand, stabilized organic soil amendments, and other materials as specified in other articles of this Section to produce viable planting soil.

1. Basic Properties: Manufactured soil shall not contain the following:

    a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
    b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 5 percent by dry weight of the imported soil.
    c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.

2. Soil Reaction: pH of 7 to 8. Topsoil that does not meet this pH range shall be amended by the addition of pH adjusters, as approved by the Landscape Architect.
3. Gradation: Loam - Sandy Loam as classified by the USDA Soil Texture Triangle classification method.
4. Laboratory analysis results documenting that the mixture meets the following particle size distribution and textural analysis:

    a. Sand content of 50 – 70% (0.05 - 2.0 mm).
    b. Clay content of 10 – 15% (≤0.002 mm).
    c. Silt + clay content ≤ 40% (<0.05 mm).

5. Percent Organic Matter (by Weight) of 1.0 – 3.0%, per ASTM D2974 Method C.

C. Ornamental Planting Soil:

1. General: Imported soil fertile, friable, loamy soil and free of clods, stones, stumps, roots, trash, debris, and other materials deleterious to plant growth larger than one (1) inch in the greatest dimension.
2. The pH range shall be 7.0 to 8.0. Topsoil that does not meet this pH range shall be amended by the addition of pH adjusters, as approved by the Landscape Architect.
3. Disease-causing Organisms: Free of infestation of nematodes or other undesirable disease-causing organisms such as insects and plant pathogens.
4. Gradation: Sandy Loam - Loamy Fine Sand as classified by the USDA Soil Texture Triangle classification method.
5. Laboratory analysis results documenting that the mixture meets the following particle size distribution and textural analysis:

    a. Sand content of 70 – 75% (0.05 - 2.0 mm)
    b. Clay content of 10 – 20% (≤0.002 mm)
    c. Silt + clay content ≤ 35% (<0.05 mm)

6. Percent Organic Matter (by weight) of 5.0 – 6.0%, per ASTM D2974 Method C.

D. Turfgrass Soil:

1. General: Imported soil fertile, friable, loamy soil and free of clods, stones, stumps, roots, trash, debris, and other materials deleterious to plant growth larger than one (1) inch in the greatest dimension.
2. The pH range shall be 7.0 to 8.0. Topsoil that does not meet this pH range shall be amended by the addition of pH adjusters, as approved by the Landscape Architect.
3. Disease-causing Organisms: Free of infestation of nematodes or other undesirable disease-causing organisms such as insects and plant pathogens.
4. Gradation: Sandy Loam - Loamy Fine Sand as classified by the USDA Soil Texture Triangle classification method.
5. Laboratory analysis results documenting that the mixture meets the following particle size distribution and textural analysis:

    a. Sand content of 75 – 80% (0.05 - 2.0 mm)
    b. Clay content of 5 – 10% (≤0.002 mm)
    c. Silt + clay content ≤ 25% (<0.05 mm)

6. Percent Organic Matter (by weight) of 3.0 – 5.0%, per ASTM D2974 Method C.

E. Tree Pit Backfill:

1. General: Imported, high-quality compost blended with existing soils excavated from tree pits at a ratio of one (1) part compost with four (4) parts existing soil. The soil blend shall be free of clods, stones, stumps, roots, trash, debris, and other materials deleterious to plant growth larger than one (1-1/2) inch in the greatest dimension.
2. Final tree backfill soil blend is intended to result in a mixture with an Organic Matter content (by weight) of 4.0 – 6.0%, per ASTM D2974 Method C and Silt + clay content ≤25% (<0.05 mm).

F. General Fill for Berm Base: Berm earthwork to be imported or existing, salvaged soils.

1. Soil to be free of clods, stones, stumps, roots, trash, debris, and other materials deleterious to plant growth larger than four (4) inches in the greatest dimension.

2. Berm fill to be fine-grained material (maximum 70 percent clay) and not with clean sands or large amounts of gravel.

2.4 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.

E. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.

2.5 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. Compost shall be a stable, humus-like material produced from the aerobic decomposition and curing of organic vegetative residues derived from feedstock consisting of woody stems, leaves, grass cuttings, and livestock manure (up to 12 percent of the compost mix by volume). The compost shall be a dark brown to black color and be capable of supporting plant growth with appropriate management practices with no visible free water or dust, with no unpleasant odor. Compost shall contain no more than one (1) percent foreign materials by weight, and be capable of passing through a one-half inch screen.
2. Chemical Properties - compost shall conform to the following values:

    a. The ratio of carbon to nitrogen (C:N) shall range between 10:1 to 25:1.
    b. Organic matter content of compost shall be at least 40 percent (dry weight). One hundred percent of the material shall pass a 1/2-inch (or smaller) screen. Debris such as metal, glass, plastic, wood (other than residual chips), asphalt or masonry such as metal, glass, plastic, wood (other than residual chips), asphalt or masonry shall not be visible and shall not exceed one percent dry weight.
    c. The compost shall be screened to 1/2-inch maximum particle size and shall contain no more that 3 percent material finer than 1.0mm (No. 18 sieve) as determined by sieve analysis.
    d. Additional tests defined in Part I as Chemical Properties shall be performed and the results shall be utilized to evaluate amendments to the planting soil mixes that may be required.
    e. Solvita test: The compost must achieve a maturity index of six (6) or higher.
    f. Cucumber seed test: Emergence of 90 percent or greater (1:2 ratio of compost:vermiculite).
    g. Soluble Salt Concentration (1:1): Must be below 1.0 mmho/cm (mS/cm or 640,000 parts per million, 640 scale).

        1) Feedstock: Limited to leaves.
        2) Reaction: pH of 5.5 to 7.

B. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

2.6 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

D. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 8 inches. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Mixing: Spread unamended soil to total depth of 4 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.

D. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 PROTECTION

A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Landscape Architect and replace contaminated planting soil with new planting soil.

3.4 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, materials, appliances, tools, equipment, facilities, transportation, and related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for planting as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes:

1. Plant materials.
2. Fertilizers.
3. Weed-control barriers.
4. Mulches.
5. Herbicides and pesticides.
6. Tree-stabilization materials.
7. Landscape edgings.

C. Related Requirements:

1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
2. Section 320190 “Operation and Maintenance of Planting” for detailed maintenance requirements and warranty.
3. Section 328400 "Irrigation" for complete irrigation systems.
4. Section 329115 “Soil Preparation (Performance Specification)” for soil preparation of planting, lawn, and seeding areas.

1.3 REFERENCES

A. The following specifications and standards of the organizations and documents listed in this paragraph form a part of the specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specification conflict with this specification section the requirements of this specification shall prevail. In the event that the requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail or as determined by the Owners’ Representative. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. AmericanHort (formerly American Nursery and Landscape Association (ANLA)):

1. ANSI Z60.2 - 2025, “American Standard for Nursery Stock” (copyrighted by AAN, ANSI approved).

D. American National Standards Institute:

1. ANSI A300, “Standard Practices for Tree, Shrub, and Other Wood Plant Maintenance.”

E. American Wood Preservers Bureau (AWPB):

1. AWPB LP 22, “Standard for Softwood Lumber and Plywood, Pressure Treated with Water Borne Preservatives for Ground Contact Use.”

F. American Society for Testing and Materials (ASTM):

1. ASTM C 33, "Standard Specification for Concrete Aggregates."
2. ASTM D 3385-09 “Infiltration Testing.”
3. ASTM D 5268, "Standard Specification for Topsoil Used for Landscaping Purposes."

G. Florida Department of Agriculture, Tallahassee, Florida:

1. “Florida Grades and Standards for Nursery Stock.”

H. Texas Nursery & Landscape Association:

1. “Grades and Standards.”

I. Interpretation of plant names and descriptions shall reference the following documents. Where the names or plant descriptions disagree between the several documents, the most current document shall prevail.

1. USDA - The Germplasm Resources Information Network (GRIN)
2. Manual of Woody Landscape Plants; Michael Dirr; Stipes Publishing, Champaign, Illinois.
3. The New Sunset Western Garden Book, Oxmoor House.

J. Pruning practices shall conform to recommendations “Structural Pruning: A Guide For The Green Industry”; published by Urban Tree Foundation, Visalia, California.

K. Glossary of Arboricultural Terms, International Society of Arboriculture, Champaign, IL.

1.4 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.5 VERIFICATION

A. All scaled dimensions on the drawings are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Owner’s Representative of any discrepancies between the information on the drawings and the actual conditions, refraining from doing any work in said areas until given approval to do so by the Owner’s Representative.

B. In the case of a discrepancy in the plant quantities between the plan drawings and the plant call outs, list or plant schedule, the number of plants or square footage of the planting bed actually drawn on the plan drawings shall be deemed correct and prevail.

1.6 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Owner's Representative in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or between any referenced standards and codes and the specifications, the more restrictive standard shall apply or Owner's Representative shall determine which shall govern.

1.7 PROTECTION OF WORK, PROPERTY, AND PERSON

A. The Contractor, at their own cost, shall remove and replace any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Owner's Representative, at the soonest as possible time that can be coordinated with other work and seasonal weather demands.

1.8 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

D. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

E. Finish Grade: Elevation of finished surface of planting soil.

F. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

G. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

H. Planting Area: Areas to be planted.

I. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" for drawing designations for planting soils.

J. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

K. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

L. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

M. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

N. Weeds: Any plant life not specified, scheduled, or identified to be protected in place.

1.9 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.10 ACTION SUBMITTALS

A. General: See Division 01 – General Requirements for Submittal Procedures.

B. Product Data: Submit product data for each product showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Product data shall include, but shall not be limited to, manufacturer’s specifications for:

1. Plant materials.
2. Fertilizers.
3. Weed-control barriers.
4. Mulches.
5. Herbicides and pesticides.
6. Tree-stabilization materials.
7. Landscape edgings.

C. Samples for Verification: Actual sample of finished products for each of the following:

1. Planting Soil Mix: 1-quart volume of planting soils required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of soils. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
2. Organic Mulch: 1-quart volume of each organic mulch required; typical of the lot of material to be furnished, in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Provide an accurate representation of color, texture, and organic makeup.

3. Nutshell Mulch: 1-quart volume of mulch required; typical of the lot of material to be furnished, in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Provide an accurate representation of color, texture, and organic makeup.
4. Mineral Mulch: 2 lb of each mineral mulch required; typical of the lot of material to be furnished, in sealed plastic bags labeled with source of mulch. Provide accurate indication of color, texture, and makeup.
5. Weed-Control Barrier: 12 by 12 inches.
6. Proprietary Root-Ball-Stabilization Device: One unit.
7. Slow-Release, Tree-Watering Device: One unit of each size required.
8. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.
9. Root Barrier: Width of panel by 12 inches.

D. Plant Material Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 10 plants are required, include a minimum of five photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, quantity, and name of the growing nursery.

1.11 INFORMATIONAL SUBMITTALS

A. Field Quality Control Reports: Percolation drainage tests for tree pits. Excavate and fill holes with water as directed in Drainage Testing Paragraph in Part 3 – Execution. Fill holes with soil immediately after testing. Do not leave open pits. Include the following:

1. Tree identification number matching the plans.
2. Date of test.
3. Time when water was added to tree pit to start percolation test.
4. Time with photo documentation showing increments of testing with water level in tree pit.
5. Identification of tester.

B. Qualification Statements: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

C. Project Schedule: Submit chart identifying proposed Project schedule and Project progress.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with manufacturer's certified analysis of standard products.

E. Pesticides and Herbicides: Product label and manufacturer's written application instructions specific to Project.

F. Project Record Documents: Maintain Project Record Drawings and Specifications in good order and marked to record changes in the Work.

G. Warranty period site visit record: Contractor is required to visit the site periodically, minimum one (1) visit per month, and submit a written record of the visit, including any problems, potential problems, and recommendations for corrective action to the Owner’s Representative.

1.12 SELECTION OF PLANT MATERIALS AND OBSERVATION OF THE WORK

A. The Landscape Architect may observe the work at any time. They may remove samples of materials for conformity to specifications. Rejected materials shall be immediately removed from the site and replaced at the Contractor's expense. The cost of testing materials not meeting specifications shall be paid by the Contractor.

B. The Landscape Architect shall be informed of the progress of the Work so the Work may be observed at the following key times in the construction process. The Landscape Architect shall be afforded sufficient time to schedule visit to the site. Failure of the Landscape Architect to make field observations shall not relieve the Contractor from meeting all the requirements of this specification. Notifications shall include, but shall not be limited to the following:

1. Site conditions prior to the start of planting: review the soil and drainage conditions.
2. Completion of the plant layout staking: Review of the plant layout.
3. Plant quality: Review of plant quality at the time of delivery and prior to installation. Review tree quality prior to unloading where possible, but in all cases prior to planting.
4. Completion of the planting: Review the completed planting.

C. The Landscape Architect shall review all plants subject to approval of size, health, quality, character, etc. Review or approval of any plant during the process of selection, delivery, installation, and establishment period shall not prevent that plant from later rejection in the event that the plant quality changes or previously existing defects become apparent that were not observed.

D. Plant Selection: The Landscape Architect reserves the right to and shall select and observe all trees and representative plants at the nursery prior to delivery and to reject plants that do not meet specifications as set forth in this specification.

1. The Landscape Architect may make invasive observation of the plant’s root system in the area of the root collar and the top of the root ball in general in order to determine that the plant meets the quality requirements for depth of the root collar and presence of roots above the root collar. Such observations will not harm the plant.
2. The Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of Work. Remove rejected trees or shrubs immediately from Project site.

E. The Contractor shall bear all cost related to plant corrections.

F. All plants that are rejected shall be immediately removed from the site and acceptable replacement plants provided at no cost to the Owner. Rejected plant material shall be removed and replaced within fifteen (15) days.

G. Submit to the Owner’s Representative, for approval, plant sources including the names and locations of nurseries proposed as sources of acceptable plants, and a list of the plants they will provide. The plant list shall include the botanical and common name and the size at the time of selection. Observe all nursery materials to determine that the materials meet the requirements of this section.

H. Trees shall be purchased from the growing nursery. Re-wholesale plant suppliers shall not be used as sources unless the Contractor can certify that the required trees are not directly available from a growing nursery. When Re-wholesale suppliers are utilized, the Contractor shall submit the name and location of the growing nursery from where the trees were obtained

by the re-wholesale seller. The re-wholesale nursery shall be responsible for any required plant quality certifications.

I. The Contractor shall require the grower or re-wholesale supplier to permit the Owner's Representative to observe the root system of all plants at the nursery or job site prior to planting including random removal of soil or substrate around the base of the plant. Observation may be as frequent and as extensive as needed to verify that the plants meet the requirements of the specifications and conform to requirements.

J. Each tree shall have a numbered seal applied by the Contractor. The seal shall be placed on a lateral branch on the north side of the tree. The seal shall be a tamper proof plastic seal bearing the Contractors name and a unique seven-digit number embossed on the seal.

1. Do not place seals on branches that are so large that there is not sufficient room for the branch growth over the period of the warranty.

K. The Landscape Architect may choose to attach their seal to each plant, or a representative sample. Viewing and/or sealing of plants by the Owner's Representative at the nursery does not preclude the Landscape Architect's right to reject material while on site. The Contractor is responsible for paying any up charge for the Owner's Representative to attach their seal to specific plants.

1.13 PLANT SUBSTITUTIONS

A. Submit all requests for substitutions of plant species or sizes not available, to the Landscape Architect for approval, prior to purchasing the proposed substitution. Request for substitution shall be accompanied with a list of nurseries contacted in the search for the required plant and a record of other attempts to locate the required material. Requests shall also include sources of plants found that may be of a smaller or larger size, or a different shape or habit than specified, or plants of the same genus and species but different cultivar origin, or which may otherwise not meet the requirements of the specifications, but which may be available for substitution.

1.14 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.15 MEASUREMENT, GRADING, & QUANTITIES

A. Time: The specified sizes and grades shall be at the time of delivery to site. Any assessment or measurement before this time can only be based on the plant characteristics at that time and not any future or predicted growth potential of the plant.

B. Size: The measurements specified or referenced shall be the minimum sizes acceptable after any necessary pruning and with branches, trunks or canes in their normal position. Plants that meet measurements specified but do not possess a normal balance between height and spread shall be rejected. Plants larger than specified may be used if approved by the Landscape Architect. Use of such plants shall not increase the Contract price. If larger plants are approved, increase the root ball size in proportion to the size of the plant.

C. Quantity: If there is a discrepancy between the number of plants drawn and the number of plants listed or noted, then the number of plants drawn, or square footage of the planting bed drawn shall take precedence. Verification of all quantities is the sole responsibility of the Contractor. For planting areas shown as filled areas, Contractor shall fill areas with specified plants per spacing provided.

1.16 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Member in good standing of either the National Association of Landscape Professionals or AmericanHort.
2. Experience: Five years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
3. Installer's Field Supervision: Maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certification: Installer's field supervisor certified in one of the following categories from the National Association of Landscape Professionals:

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Horticultural Technician.

5. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Measurements: Measure in accordance with ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

1.17 DELIVERY, STORAGE, AND HANDLING

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

B. Bulk Materials:

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

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Packing and Shipping: Transport plant materials covered or in closed vehicles to protect them from exposure to heat, cold, and wind. Spray evergreens and trees in full leaf with anti-desiccant as recommended by the manufacturer, before shipping. Take precautions to protect

plant materials from desiccation and from damage to bark and branches. Do not allow root balls to crack. Lift balled and burlapped plants from the ball with straps, do not lift trees by the trunks. Schedule shipments to coincide with planting seasons. Thoroughly remove anti desiccant from plant materials after installations. Cracked, soft, or “mushroomed” rootballs will be unacceptable and rejected.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.18 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. It is the responsibility of the Contractor to be aware of all surface and sub-surface conditions, and to notify the Owner’s Representative, in writing, of any circumstances that would negatively impact the health of plantings. Do not proceed with work until unsatisfactory conditions have been corrected.

1. Should subsurface drainage or soil conditions be encountered which would be detrimental to growth or survival of plant material, the Contractor shall notify the Owner’s Representative in writing, stating the conditions and submit a proposal covering cost of corrections. If the Contractor fails to notify the Owner’s Representative of such conditions, they shall remain responsible for plant material under the warranty clause of the specifications.

C. It is the responsibility of the Contractor to be familiar with the local growing conditions, and if any specified plants will be in conflict with these conditions. Report any potential conflicts, in writing, to the Owner’s Representative.

D. This specification requires that all Planting Soil and Irrigation (if applicable) work be completed and accepted prior to the installation of any plants.

1. Planting operations shall not begin until such time that the irrigation system is completely operational for the area(s) to be planted, and the irrigation system for that area has been preliminarily observed and approved by the Owner’s Representative.

E. Actual planting shall be performed during those periods when weather and soil conditions are suitable in accordance with locally accepted horticultural practices.

1. Do not install plants into saturated or frozen soils. Do not install plants during inclement weather, such as rain or snow or during extremely hot, cold, or windy conditions.

F. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.19 PLANTING AROUND UTILITIES

A. Contractor shall carefully examine the civil, record, and survey drawings to become familiar with the existing underground conditions before digging.

B. Determine location of underground utilities and perform work in a manner that will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until parties concerned mutually agree upon removal.

C. Notification of Local Utility Locator Service is required for all planting areas: The Contractor is responsible for knowing the location and avoiding utilities that are not covered by the Local Utility Locator Service.

1.20 MAINTENANCE

A. Maintenance Service: Maintain the work of this Section until the date of Substantial Completion. In addition, the contractor shall provide maintenance starting at the date Substantial Completion through Project Closeout for the scope of work and perform the following operations at least once a week:

1. Remove and replace dead plant material. Prune plants to remove dead wood.
2. Maintain mulch areas at a 3-inch depth. Remove weeds and grass from shrub and groundcover areas and from tree watering saucers.
3. Maintain tree staking and reset if required to maintain proper grade or vertical position.
4. Provide insect and disease control to maintain health of plants.
5. Provide irrigation at the minimum rate of 1 inch per week.

    a. If the irrigation system is operating, program and monitor the system to provide adequate water for plants.
    b. If the irrigation system is not operating, hand water plants. Deep water trees each week.

6. See Section 320190 “Operation and Maintenance of Planting” for detailed maintenance requirements.
7. If continuing maintenance is not included in this contract, periodically inspect the site during warranty period (not less than once per month) and notify the Owner in writing if proper maintenance is not being performed.

1.21 WARRANTY

A. Special Warranty: Installer agrees to remove and replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period. The Owner’s Representative shall make the final determination if plantings and accessories are defective.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
b. Structural failures, including plantings falling or blowing over.
c. Faulty performance of tree stabilization, edgings, and tree grates.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods: From date of Final Acceptance.

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
c. Annuals: Three months.

3. When the Work is accepted in parts, the warranty shall begin when Final Acceptance of all parts of the Work has been provided. This will ensure warranty period for all plantings shall terminate at one time.
4. All plants shall be warrantied to meet all the requirements for plant quality at installation in this specification. Defective plants shall be defined as plants not meeting these requirements. The Owner's representative shall make the final determination that plants are defective.
5. Include the following remedial actions as a minimum:

a. Immediately remove dead or dying plants and replace unless required to plant in the succeeding planting season. Remove and replace dead or dying plants within fifteen (15) days.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. Provide extended warranty for period equal to original warranty period, for replaced plant material.

B. End of Warranty Final Acceptance:

1. At the end of the warranty period, the Owner's Representative shall observe all warranted Work. The Contractor shall schedule and notify the Owner at least ten (10) days prior to the anticipated date for final inspection.
2. End of Warranty Final Acceptance will be given only when all the requirements of the Work under this specification and in specification sections related to Planting and Irrigation have been met.

PART 2 - PRODUCTS

2.1 GENERAL

A. All plants and raw materials shall be grown, manufactured, extracted, and harvested within 250 miles of Project site.

2.2 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the manufacturers listed within this Section under each individual product description, as specified, or as indicated on Material Schedule.

B. Acceptable Products: Subject to compliance with requirements, provide one of the products listed within this Section under each individual product description, as specified, or as indicated on Material Schedule.

2.3 PLANT MATERIALS

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.2; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of die-back, disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; with tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); with crossing trunks; with cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.2 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare in accordance with ANSI Z60.2.

D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for plant.

E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to ensure symmetry in planting.

F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but are not yet in bloom.

G. Trees in tree grates: To ensure accessibility requirements are met, any trees to be planted in tree grates shall have a clear trunk of eighty-inches (80”) above the finish grade of the pedestrian surface. Select trees with approximate ninety-two-inch (92”) clear trunk. Pruning trees after installation to accommodate the height of the clear trunk requirement is not acceptable.

2.4 PLANT QUALITY

A. Plant quality above the soil line:

1. Plants shall be healthy with the color, shape, size and distribution of trunk, stems, branches, buds and leaves normal to the plant type specified. Tree quality above the soil line shall comply with the project Crown Acceptance details (or Florida Grades and Standards, tree grade Florida Fancy or Florida #1) and the following:

a. Crown: The form and density of the crown shall be typical for a young specimen of the species or cultivar pruned to a central and dominant leader.
b. Leaves: The size, color, and appearance of leaves shall be typical for the time of year and stage of growth of the species or cultivar. Trees shall not show signs of

prolonged moisture stress or over watering as indicated by wilted, shriveled, or dead leaves.

c. Branches: Shoot growth (length and diameter) throughout the crown should be appropriate for the age and size of the species or cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.

1) Main branches shall be distributed along the central leader not clustered together. They shall form a balanced crown appropriate for the cultivar/species.
2) Branch diameter shall be no larger than two-thirds (one-half is preferred) the diameter of the central leader measured 1 inch above the branch union.
3) The attachment of the largest branches (scaffold branches) shall be free of included bark.

d. Trunk: The tree trunk shall be relatively straight, vertical, and free of wounds that penetrate to the wood (properly made pruning cuts, closed or not, are acceptable and are not considered wounds), sunburned areas, conks (fungal fruiting bodies), wood cracks, sap leakage, signs of boring insects, galls, cankers, girdling ties, or lesions (mechanical injury).

e. Temporary branches, unless otherwise specified, can be present along the lower trunk below the lowest main (scaffold) branch, particularly for trees less than 1 inch in caliper. These branches should be no greater than 3/8-inch diameter. Clear trunk should be no more than 40% of the total height of the tree.

2. Trees shall have one central leader. If the leader was headed, a new leader (with a live terminal bud) at least one-half the diameter of the pruning cut shall be present.

a. All trees are assumed to have one central leader trees unless a different form is specified in the plant list or drawings.

3. All graft unions, where applicable, shall be completely closed without visible sign of graft rejection. All grafts shall be visible above the soil line.
4. Trunk caliper and taper shall be sufficient so that the lower five feet of the trunk remains vertical without a stake. Auxiliary stake may be used to maintain a straight leader in the upper half of the tree.

B. Plant quality at or below the soil line:

1. Plant roots shall be normal to the plant type specified. Root observations shall take place without impacting tree health. Root quality at or below the soil line shall comply with the project Root Acceptance details and the following:

a. The roots shall be reasonably free of scrapes, broken or split wood.
b. The root system shall be reasonably free of injury from biotic (e.g., insects and pathogens) and abiotic (e.g., herbicide toxicity and salt injury) agents. Wounds resulting from root pruning used to produce a high-quality root system are not considered injuries.
c. A minimum of three structural roots reasonably distributed around the trunk (not clustered on one side) shall be found in each plant. Root distribution shall be uniform throughout the root ball, and growth shall be appropriate for the species.

1) Plants with structural roots on only one side of the trunk (J roots) shall be rejected.

d. The root collar shall be within the upper 2 inches of the substrate/soil. Two structural roots shall reach the side of the root ball near the top surface of the root ball. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removes all stem girdling roots above the structural roots across the top of the root ball.
e. The root system shall be reasonably free of stem girdling roots over the root collar or kinked roots from nursery production practices.

1) Plant Grower Certification: The final plant grower shall be responsible to have determined that the plants have been root pruned at each step in the plant production process to remove stem girdling roots and kinked roots, or that the previous production system used practices that produce a root system throughout the root ball that meets these specifications. Regardless of the work of previous growers, the plant's root system shall be modified at the final production stage, if needed, to produce the required plant root quality. The final grower shall certify in writing that all plants are reasonably free of stem girdling and kinked roots as defined in this specification, and that the tree has been grown and harvested to produce a plant that meets these specifications.

2. At time of observations and delivery, the root ball shall be moist throughout. Roots shall not show signs of excess soil moisture conditions as indicated by stunted, discolored, distorted, or dead roots.

2.5 ROOT BALL TYPES

A. General: The following root ball types are permitted. Specific root ball types shall be required where indicated on the plant list or in this specification. Any type of root ball that is not specifically defined in this specification shall not be permitted.

B. Balled And Burlapped Plants

1. All Balled and Burlapped Plants shall be field grown, and the root ball packaged in a burlap and twine and/or burlap and wire basket package.
2. Plants shall be harvested with the following modifications to standard nursery practices.

a. Prior to digging any tree that fails to meet the requirement for maximum soil and roots above the root collar, carefully removed the soil from the top of the root ball of each plant, using hand tools, water or an air spade, to locate the root collar and attain the soil depth over the structural roots requirements. Remove all stem girdling roots above the root collar. Care must be exercised not to damage the surface of the root collar and the top of the structural roots.
b. Trees shall be dug for a minimum of 4 weeks and a maximum of 52 weeks prior to shipping. Trees dug 4 to 52 weeks prior to shipping are defined as hardened-off. Digging is defined as cutting all roots and lifting the tree out of the ground and either moving it to a new location in the nursery or placing it back into the same hole. Tress that are stored out of the ground shall be placed in a holding area protected from extremes of wind and sun with the root ball protected by covering with mulch or straw and irrigated sufficiently to keep moisture in the root ball above wilt point and below saturation
c. If wire baskets are used to support the root ball, a "low profile" basket shall be used. A low profile basket is defined as having the top of the highest loops on the basket no less than 4 inches and no greater than 8 inches below the shoulder of the root ball package.

1) At nurseries where sandy soils prevent the use of “low profile baskets”, baskets that support the entire root ball, including the top, are allowable. Remove wire basket for planting if possible. If not possible due to loose root ball soils, remove a minimum of the top 1/2 of the wire basket.

d. Twine and burlap used for wrapping the root ball package shall be natural, biodegradable material. If the burlap decomposes after digging the tree then the root ball shall be re-wrapped prior to shipping if roots have not yet grown to keep root ball intact during shipping.

C. Spade Harvested and Transplanted:

1. Spade Harvested and Transplanted Plants shall meet all the requirements for field grown trees. Root ball diameters shall be of similar size as the ANSI Z60.1 requirements for Balled and Burlapped plants.
2. Trees shall be harvested prior to leafing out (bud break) in the spring or during the fall planting period except for plants know to be considered as fall planting hazards. Plants that are fall planting hazards shall only be harvested prior to leafing out in the spring.
3. Trees shall be moved and planted within 48 hours of the initial harvesting and shall remain in the spade machine until planted.

D. Container (Including Above-Ground Fabric Containers and Boxes) Plants

1. Container plants may be permitted only when indicated on the drawing, in this specification, or approved by the Owner’s Representative.
2. Provide plants shall be established and well rooted in removable containers.
3. Container class size shall conform to ANSI Z60.1 for container plants for each size and type of plant.

2.6 SOURCE QUALITY CONTROL

A. Tree Procurement:

1. Within 60 days of award of Contract, notify Landscape Architect in writing of the availability or lack thereof of the specified plant material.
2. Procure trees and arrange for contract growing as required to ensure that plant material is available in the quantities and sizes specified, and of the quality specified, at time of installation.
3. Verify plant branching requirements with Landscape Architect prior to contract growing.
4. Landscape Architect will review advanced procured trees prior to initial purchase and at end of the first growing season.
5. Prior to delivery of advanced procured plant material to site, coordinate and schedule a final review of the plant material at the place of growth.
6. Review and acceptance of the advance-procured plant material at the place of growth does not cancel the right of the Landscape Architect to reject plant material at the site, if damage or unacceptable conditions are found that were not detected at the place of growth.

B. Plant Material Review and Tagging:

1. All Trees will be reviewed, photographed, and tagged using irremovable tags by the Landscape Architect at the nursery, or other place of growth prior to delivery of trees to site.
2. At the Landscape Architect‘s discretion, shrubs may or may not be reviewed, photographed, and tagged by the Landscape Architect at the nursery or other place of

growth. If shrubs are not reviewed at the nursery, Contractor shall provide photographs of shrubs as a Submittal as outlined herein.

3. Tagging of plant material at the nursery or place of growth does not affect the right of the Landscape Architect to reject plant material at the site, if damage or unacceptable conditions are found that were not detected at the nursery, place of growth, or in the submitted photographs.

2.7 SOILS

A. General: Reference Section 329113 “Soil Preparation” for details related to soils including agronomic soil testing, amendments, and compaction.

1. Required depth of acceptable planting soils shall be as follows:

a. Turf Areas: 6 inches.
b. Shrub, Groundcover, and Flower Beds: 12 inches.
c. Hardscape Enclosed Planter Areas: 4 feet.
d. Tree Wells/Grates: 4 feet.

B. Existing Site Soils:

1. Existing site soils shall be uncompacted, fertile, friable, natural loam free of subsoil, clay lumps, brush, weeds, litter, roots, stumps, stones larger than 2 inches in any dimension, and any other extraneous or toxic matter harmful to humans or plant life.
2. Soils limed and compacted for soil stabilization purposes are unacceptable and shall be removed from planting areas.
3. Acceptable pH range shall be 6.0 to 7.0.
4. Amend soils, as recommended by Soil Testing Laboratory after soil test analysis, to maintain proper soil pH and nutrient levels. The Contractor shall provide soil test analysis to the Landscape Architect prior to beginning work. Minimum acceptable organic matter content shall be 5 percent.

C. Planting Soils:

1. Planting soil as used in this specification means the amended soil at the planting site or imported and modified as defined in specification Section “Soil Preparation.” If there is no Planting Soil specification, the term Planting Soil shall mean the soil at the planting site within the planting hole.

D. Imported Topsoil: Comply with ASTM D 5268. Provide fertile, friable, natural loam surface soil free of subsoil, clay lumps, brush, weeds, litter, roots, stumps, stones larger than 2 inches in any dimension, and any other extraneous or toxic matter harmful to humans or plant life. Provide pH range of 6.0 to 7.0. The Contractor shall provide sample and soil test analysis to the Landscape Architect prior to delivery of topsoil to site. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at the Project site. Minimum acceptable organic matter content shall be 5 percent.

2.8 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

E. Manufacturer:

1. Grace Sierra Co.
2. Vigoro Industries, Inc.
3. Woodace
4. Approved Equal.

F. Types:

1. Trees: Davey Arbor Green Pro. Apply at manufacturer's maximum recommended rates.
2. Shrub, groundcover, annuals, and perennials: MicroLife all organic fertilizer as supplied by San Jacinto Environmental (713) 957-0909. Apply at manufacturer's maximum recommended rates.
3. Tree Planting: Agriform 21 gram fertilizer tablets, 20 10 5 N P K analysis.
4. Tree Planting: Woodace 17 gram tablets; 14-3-3 N-P-K analysis.
5. Shrub Planting: Agriform 16 7 12 (+iron) slow release fertilizer.
6. Shrub Planting: Woodace 17 gram tablets; 14-3-3 N-P-K analysis.
7. Palm Planting: Woodace Palm Supreme; 12-4-12 N-P-K analysis.
8. Groundcover and Flowers: Woodace 17 gram tablets; 9-9-4 N-P-K analysis.

2.9 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers inert to biological degradation and naturally resistant to chemicals, alkalis, and acids, formed into a stable network so that fibers retain their relative position.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd..

2.10 MULCHES

A. Mulch shall be "Walk on" grade, coarse, ground, from tree and woody brush sources. The size range shall be a minimum (less than 25% or less of volume) fine particles 3/8 inch or less in size, and a maximum size of individual pieces (largest 20% or less of volume) shall be approximately 1 to 1-1/2 inch in diameter and maximum length approximately 3 to 6". Pieces larger than 8 inch long that are visible on the surface of the mulch after installation shall be removed.

1. It is understood that mulch quality will vary significantly from supplier to supplier and region to region. The above requirements may be modified to conform to the source material from locally reliable suppliers as approved by the Owner's Representative.

B. Submit supplier’s product specification data sheet and a 1-quart sample for approval.

C. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:

1. Type: Native Shredded hardwood; double-ground.
2. Size Range: Three inch minus.
3. Color: Natural.

D. Nutshell Mulch: Free from deleterious materials and suitable as a soil cover in rooftop planter areas, consisting of:

1. Type: Ground Pecan Shell.
2. Size Range: 1-inch maximum, 1/4-inch minimum.
3. Color: Natural.

E. Mineral Mulch: Hard, durable stone, washed free of loam, sand, clay and other foreign substances, of the following:

1. Type: Per plans and material schedule.
2. Size Range: Per plans and material schedule.
3. Color: Per plans and material schedule.

2.11 HERBICIDES AND PESTICIDES

A. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

B. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

C. Pesticides: Registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended in writing by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

2.12 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:

1. Staking-and-Guying Devices: Stake or anchor and adjustable tie systems to secure each new planting by plant stems; size and detail as indicated on construction documents.
2. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
3. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.
4. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
5. Guys and Tie Wires: ASTM A641/A641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
6. Tree-Tie Webbing: flat woven polypropylene material, 3/4 inch wide, and 900 lb. break strength. Color to be Green.
7. Guy Cables: Five-strand, 3/16-inch-diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
8. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

9. Proprietary Staking-and-Guying Devices: Proprietary stake or anchor and adjustable tie systems to secure each new planting by plant stem; sized as indicated and according to manufacturer's written recommendations.

    a. Deep Root Partners, L.P. – Arbor Tie.
    b. Berkshire Products, Inc. – “Earthwings Cable Kit.”
    c. Platipus Tree Anchoring System, Raleigh, NC; (866) 792-8478.
    d. Duckbill – “Anchors.”
    e. Arborbrace – “Tree Guying System.”
    f. Or approved equal.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.
3. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball and that do not encircle the trunk; sized in accordance with manufacturer's written instructions unless otherwise indicated.

    a. ArborStakes below grade biodegradable rootball anchor stakes.
    b. GreenBlue Urban – “ArborGuy.”
    c. Berkshire Products, Inc. – “Earthwings Root Ball Anchors.”
    d. Platipus Deadman System RF3RDMP.
    e. Or approved equal.

2.13 EROSION CONTROL MATERIALS

A. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Log: Fully biodegradable jute or fiber-packed erosion control log between 6 inches and 10 inches in diameter. Include 2 inch square by 18 inch long untreated pine stakes at 48 inches on-center to secure in place. Drive stakes through log and into grade.

2.14 LANDSCAPE EDGINGS

A. Steel Edging: Standard commercial-steel edging, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

1. Edging Size: 1/4 inch thick by 6 inches deep.
2. Stakes: Tapered steel, a minimum of 15 inches long.
3. Accessories: Standard tapered ends, corners, and splicers.
4. Finish: Manufacturer's standard paint.

    a. Paint Color: Black, or as indicated.

2.15 MISCELLANEOUS PRODUCTS

A. Root Barrier: Black, molded, modular panels 24 inches high (deep), or as indicated or required, 85 mils thick, and with vertical root deflecting ribs protruding 3/4 inch out from panel surface; manufactured with minimum 50 percent recycled polyethylene plastic with UV inhibitors.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. DeepRoot Green Infrastructure, LLC.
    b. GreenBlue Urban.

B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix in accordance with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Owner and the Landscape Architect in writing, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
3. Suspend planting operations during periods of excessive soil moisture until moisture content reaches acceptable levels to attain required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove soil and contamination as directed by Architect and replace with new planting soil.

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

1. Beginning of the Work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 SOIL PROTECTION DURING PLANT DELIVERY AND INSTALLATION

A. Protect soil from compaction during the delivery of plants to the planting locations, digging of planting holes and installing plants.

1. Where possible deliver and plant trees that require the use of heavy mechanized equipment prior to final soil preparation and tilling. Where possible, restrict the driving lanes to one area instead of driving over and compacting a large area of soil.

B. Till to a depth of 6 inches, all soil that has been driven over prior and during the installation of plants.

3.3 SOIL MOISTURE

A. Volumetric soil moisture level, in both the planting soil and the root balls of all plants, prior to, during and after planting shall be above permanent wilting point and below field capacity for each type of soil texture within the following ranges.

B.

Soil Type	Permanent Wilting Point	Field Capacity
Sand, Loamy Sand, Sandy Loam	5% – 8%	12% - 18%
Loam, Sandy Clay, Sandy Clay Loam	14% - 25%	27% - 36%
Clay Loam, Silt Loam	11% - 22%	31% - 36%
Silty Clay, Silty Clay Loam	22% - 27%	38% - 41%

1. Volumetric soil moisture shall be measured with a digital moisture meter. The meter shall be the Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equal.

C. The Contractor shall confirm the soil moisture levels with a moisture meter. If the soil moisture is too high, suspend planting operations until the soil moisture drops below field capacity.

3.4 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations. Determine location of utilities and flag locations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

3.5 EXCAVATION AND PERCOLATION TESTING

A. Excavation: See Section 312000 “Earth Moving”. Remove unacceptable existing site soils and dispose of off site. Amend existing site soils, as necessary, to achieve specified qualities prior to beginning of planting operations and retest to ensure proper soil analysis. Scarify the bottoms and sides of plant pits dug by auger, mechanical spade, or backhoe. In hardpan soils drill 6 inch diameter holes into free draining strata or to a depth of 10 feet, whichever is less, and backfill with drainage gravel. Provide specified drain pipe as required to provide positive drainage in planting beds and pits. See Drainage Testing Paragraph below.

B. Percolation Testing:

1. Wait a minimum of 24 hours after rain and dig test pit 12 inches square or 12-1/2 inches in diameter to a depth of bottom of tree pit in representative locations on site. Remove loose soil. If standing water is visible, notify the Landscape Architect.
2. Quickly fill the bottom with 6 inches of water (approximately 3 1/4 gallons of water).
3. Record length of time from filling until disappearance of water. Divide number of minutes by six to give average time of 1 inch fall.
4. Compare 1 inch percolation time with table below:

    a. 1 Inch in 0 to 3 Minutes: Rapid percolation.
    b. 1 Inch in 3 to 5 Minutes: Medium percolation.
    c. 1 Inch in 5 to 30 Minutes: Slow percolation (semi impervious soil).
    d. 1 Inch in Over 30 Minutes: Impervious soil.

5. If the tests indicate semi impervious soil or impervious soil or if standing water is initially found in the pit, notify the Landscape Architect before beginning work.
6. If the Contractor does not make proper tests and does not file complete reports of semi impervious and impervious soils or plants in areas shown to have poor drainage, without written release from the Owner, he shall be responsible for any warranted replacements due to substrate water damage.

3.6 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil in accordance with Section 329113 "Soil Preparation."

B. Loosen subgrade of planting areas to a minimum of eight-inches (8”). Remove stones larger than 1-inch in any dimension and sticks, roots, construction debris, trash, and other extraneous matter and legally dispose of them off Owner’s property.

1. Apply fertilizer directly to subgrade before loosening.
2. Thoroughly blend planting soil before spreading.
3. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
4. Mix lime with dry soil before mixing fertilizer.

C. Placing Planting Soil: Place and mix one-half the thickness of planting soil in-place over exposed loosened subgrade. Mix into top two (2) inches of subgrade. Spread remainder of planting soil.

D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

E. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.7 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter for balled and burlapped and container-grown stock.

3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of root ball, measured from the root flare to the bottom of root ball.
5. If area under the plant was initially dug too deep, add soil to raise it to correct level and thoroughly tamp the added soil to prevent settling.
6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
7. Maintain supervision of excavations during working hours.
8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated. Amend excavated soil per recommendations of agronomic soil testing prior to use.

C. Obstructions: Notify Owner’s Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to depth of 10 ft., whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.8 PLANTING, GENERAL

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. The root system of each plant, regardless of root ball package type, shall be observed by the Contractor, at the time of planting to confirm that the roots meet the requirements for plant root quality described herein. The Contractor shall undertake at the time of planting, all modifications to the root system required by the Owner’s Representative to meet these quality standards.

1. Modifications, at the time of planting, to meet the specifications for the depth of the root collar and removal of stem girdling roots and circling roots may make the plant unstable or stress the plant to the point that the Owner’s Representative may choose to reject the plant rather than permitting the modification.
2. Any modifications required by the Owner’s Representative to make the root system conform to the plant quality standards outlined herein, or other requirements related to the permitted root ball package, shall not be considered as grounds to modify or void the plant warranty.
3. The resulting root ball may need additional staking and water after planting. The Owner’s Representative may reject the plant if the root modification process makes the tree

unstable or if the tree is not healthy at the end of the warranty period. Such plants shall still be covered under the warranty.

D. Container and Boxed Root Ball Shaving: The outer surfaces of all plants in containers and boxes, including the top, sides and bottom of the root ball shall be shaved to remove all circling, descending, and matted roots. Shaving shall be performed using saws, knives, sharp shovels or other suitable equipment that is capable of making clean cuts on the roots. Shaving shall remove a minimum of one inch of root mat or up to 2 inches as required to remove all root segments that are not growing reasonably radial to the trunk.

E. Exposed Stem Tissue after Modification: The required root ball modifications may result in stem tissue that has not formed trunk bark being exposed above the soil line. If such condition occurs, wrap the exposed portion of the stem in a protective wrapping with a white filter fabric. Secure the fabric with biodegradable masking tape. Do not use string, twine, green nursery ties or any other material that may girdle the trunk if not removed.

F. Excavation of the Planting Space: Using hand tools or tracked mini-excavator, excavate the planting hole into the Planting Soil to the depth of the root ball measured after any root ball modification to correct root problems, and wide enough for working room around the root ball or to the size indicated on the drawing or as noted below.

1. For trees and shrubs planted in soil areas that are not tilled or otherwise modified to a depth of at least 12 inches over a distance of more than 10 feet radius from each tree, or 5 feet radius from each shrub, the soil around the root ball shall be loosened as defined below or as indicated on the drawings.

    a. The area of loosening shall be a minimum of 3 times the diameter of the root ball at the surface sloping to 2 times the diameter of the root ball at the depth of the root ball.
    b. Loosening is defined as digging into the soil and turning the soil to reduce the compaction. The soil does not have to be removed from the hole, just dug, lifted and turned. Lifting and turning may be accomplished with a tracked mini excavator, or hand shovels.

2. If an auger is used to dig the initial planting hole, the soil around the auger hole shall be loosened as defined above for trees and shrubs planted in soil areas that are not tilled or otherwise modified.
3. The measuring point for root ball depth shall be the average height of the outer edge of the root ball after any required root ball modification.
4. If motorized equipment is used to deliver plants to the planting area over exposed planting beds, or used to loosen the soil or dig the planting holes, all soil that has been driven over shall be tilled to a depth of 6 inches.

G. For trees to be planted in prepared Planting Soil that is deeper than the root ball depth, compact the soil under the root ball using a mechanical tamper to assure a firm bedding for the root ball. If there is more than 12 inches of planting soil under the root ball excavate and tamp the planting soil in lifts not to exceed 12 inches.

H. Set top outer edge of the root ball four inches (4”) above the average elevation of the proposed finish per details. Set the plant plumb and upright in the center of the planting hole. The tree graft, if applicable, shall be visible above the grade. Do not place soil on top of the root ball.

I. The Owner’s Representative may request that plants orientation be rotated when planted based on the form of the plant.

J. Backfill the space around the root ball with the same planting soil or existing soil that was excavated for the planting space. See Specification Section Planting Soil, for requirements to modify the soil within the planting bed.

K. Brace root ball by tamping Planting Soil around the lower portion of the root ball. Place additional Planting Soil around base and sides of ball in six-inch (6") lifts. Lightly tamp each lift using foot pressure or hand tools to settle backfill, support the tree and eliminate voids. Do not over compact the backfill or use mechanical or pneumatic tamping equipment. Over compaction shall be defined as greater than 85% of maximum dry density, standard proctor or greater than 250 psi as measured by a cone penetrometer when the volumetric soil moisture is lower than field capacity.

1. When the planting hole has been backfilled to three quarters of its depth, water shall be poured around the root ball and allowed to soak into the soil to settle the soil. Do not flood the planting space. If the soil is above field capacity, allow the soil to drain to below field capacity before finishing the planting. Air pockets shall be eliminated and backfill continued until the planting soil is brought to grade level.

L. Build a 5 inch high, level berm of Planting Soil around the outside of the root ball to retain water. Tamp the berm to reduce leaking and erosion of the saucer.

M. Thoroughly water the Planting Soil and root ball immediately after planting.

N. Remove all nursery plant identification tags and ribbons as per Owner’s Representative instructions. The Owner’s Representative’s seals are to remain on plants until the end of the warranty period.

O. Remove corrugated cardboard trunk protection after planting.

P. Follow additional requirements for the permitted root ball packages.

3.9 BALLED AND BURLAPPED STOCK

A. Set each plant plumb and in center of planting pit or trench with root flare 4 inches above adjacent finish grades.

B. Backfill: Planting soil. For trees, use excavated soil mixed with Planting soil for backfill.

C. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Do not fold burlap or wire baskets down onto the Planting Soil. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

D. If the plant is shipped with a wire basket that does not meet the requirements of a “Low Rise” basket, remove the top 6 - 8 inches of the basket wires just before the final backfilling of the tree.

E. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

F. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

1. Quantity: As indicated per manufacturer's latest printed instruction.

G. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.10 CONTAINER GROWN STOCK

A. Set each plant plumb and in center of planting pit or trench with root flare 4 inches for trees above adjacent finish grades.

B. This specification assumes that most container plants have significant stem girdling and circling roots, and that the root collar is too low in the root ball.

C. Carefully remove root ball from container without damaging root ball or plant.

D. Perform root ball shaving as defined in Installation of Plants above.

E. Remove all roots and substrate above the root collar and the main structural roots according to root correction details so root system conforms to root observations detail.

F. Remove all substrate at the bottom of the root ball that does not contain roots.

G. Using a hose, power washer or air excavation device, wash out the substrate from around the trunk and top of the remaining root ball and find and remove all stem girdling roots within the root ball above the top of the structural roots.

H. Backfill: Planting soil. For trees, use excavated soil mixed with Planting Soil for backfill.

I. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

J. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

1. Quantity: As indicated per manufacturer's latest printed instruction.

K. Continue backfilling process. Water again after placing and tamping final layer of soil.

L. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball. Also refer to planting details.

3.11 SPADE HARVETED AND TRANSPLANTED PLANTS

A. Trees shall be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.

C. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

D. Cut exposed roots cleanly during transplanting operations.

E. Plant trees following procedures in "Tree, Shrub, and Vine Planting" Article.

F. Where possible, orient the tree in the same direction as in its original location.

G. After installing the tree, loosen the soil along the seam between the root ball and the surrounding soil out to a radius from the root ball edge equal to the diameter of the root ball to a depth of 8 - 10 inches by hand digging to disturb the soil interface.

H. Fill any gaps below this level with loose soil.

3.12 GROUND COVER, PERENNIAL, AND ANNUAL PLANTS

A. Assure that soil moisture is within the required levels prior to planting. Irrigation, if required, shall be applied at least 12 hours prior to planting to avoid planting in muddy soils.

B. Assure that soil grades in the beds are smooth and as shown on the plans.

C. Plants shall be planted in even, triangularly spaced rows, at the intervals called out for on the drawings, unless otherwise noted. The first row of Annual flower plants shall be 6 inches from the bed edge unless otherwise directed.

D. Schedule the planting to occur prior to application of the mulch. If the bed is already mulched, pull the mulch from around the hole and plant into the soil. Do not plant the root system in the mulch. Pull mulch back so it is not on the root ball surface.

E. Dig planting holes sufficiently large enough to insert the root system without deforming the roots. Set the top of the root system at the grade of the soil.

F. Use Planting Soil for backfill. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Press soil to bring the root system in contact with the soil.

G. Spread any excess soil around in the spaces between plants.

H. Apply mulch to the bed being sure not to cover the tops of the plants with or the tops of the root ball with mulch.

I. Water each planting area thoroughly as soon as the planting is completed. Apply additional water to keep the soil moisture at the required levels. Do not over water.

J. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.13 TREE, SHRUB, AND VINE PRUNING

A. Prune plants as directed by the Owner’s Representative. Pruning trees shall be limited to addressing structural defects. Follow recommendations in “Structural Pruning: A Guide For The Green Industry” published by Urban Tree Foundation, Visalia CA.

B. Remove only dead, dying, or broken branches. Do not prune for shape.

C. Do not cut central leaders.

D. Pruning shall be done with clean, sharp tools.

E. Do not apply pruning paint or sealants to wounds, unless noted otherwise.

3.14 INSTALLATION OF TREE-STABILIZATION MATERIALS

A. Do not stake or guy trees unless specifically required by the Contract Documents, or in the event that the Contractor feels that staking is the only alternative way to keep particular trees plumb.

1. The Owner’s Representative shall have the authority to require that trees are staked or to reject staking as an alternative way to stabilize the tree.
2. Trees that required heavily modified root balls to meet the root quality standards may become unstable. The Owner’s Representative may choose to reject these trees rather than utilize staking to temporarily support the tree.

B. Trees that are guyed shall have their guys and stakes removed after one full growing season or at other times as required by the Owner’s Representative.

C. Tree guying shall utilize the tree staking and guying materials specified. Guying to be tied in such a manner as to create a minimum 12-inch loop to prevent girdling. Refer to manufacturer's recommendations and the planting details for installation.

1. Plants shall stand plumb after staking or guying.
2. Stakes shall be driven to sufficient depth to hold the tree rigid.

D. For trees planted in planting mix over waterproofed membrane, use dead men buried 24 inches to the top of the dead man, in the soil. Tie the guy to the dead man with a double wrap of line around the dead man followed by a double half hitch. When guys are removed, leave the dead men in place and cut the guy tape 12 inches above the ground, leaving the tape end covered in mulch.

E. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees per plans and details. Set vertical stakes and space to avoid penetrating root balls or root masses.
2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
3. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

F. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated.

1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.

a. Securely attach guys to stakes 30 inches long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide turnbuckle for each guy wire and tighten securely.

b. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
c. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
d. Support trees with guy cable, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
e. Attach flags to each guy wire, 30 inches above finish grade.
f. Paint turnbuckles with luminescent white paint.

2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

G. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.

1. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.

a. Install stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation. Saw stakes off at horizontal stake.
b. Install screws through horizontal hold-down and penetrating at least 1 inch into stakes. Predrill holes if necessary to prevent splitting wood.
c. Install second set of stakes on other side of root trunk for larger trees.

2. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.15 STRAIGHTENING PLANTS

A. Maintain all plants in a plumb position throughout the warranty period. Straighten all trees that move out of plumb including those not staked. Plants to be straightened shall be excavated and the root ball moved to a plumb position, and then re-backfilled.

B. Do not straighten plants by pulling the trunk with guys.

3.16 INSTALLATION OF FERTILIZER AND OTHER CHEMICAL ADDITIVES

A. Do not apply any soluble fertilizer to plantings during the first year after transplanting unless soil test determines that fertilizer or other chemical additives is required. Apply chemical additives only upon the approval of the Owner’s Representative.

B. Controlled release fertilizers shall be applied according to the manufacturer’s instructions and standard horticultural practices.

3.17 MULCHING OF PLANTS

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 12 inches and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

C. Apply 4 inches of mulch before settlement, covering the entire planting bed area. Install no more than 1 inch of mulch over the top of the root balls of all plants. Taper to 2 inches when abutting pavement.

1. Trees in Turf Areas: Apply organic mulch ring of 4-inch average thickness, with 60-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 4-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.
3. Mineral Mulch in Planting Areas: Apply 3-inch average thickness of mineral mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

D. Lift all leaves, low hanging stems and other green portions of small plants out of the mulch if covered.

3.18 PLANTING BED FINISHING

A. After planting, smooth out all grades between plants before mulching.

B. Separate the edges of planting beds and lawn areas with a smooth, formed edge cut into the turf with the bed mulch level slightly lower, 1 and 2 inches, than the adjacent turf sod or as directed by the Owner’s Representative. Bed edge lines shall be a depicted on the drawings.

3.19 WATERING

A. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants from the point of installation until the date of Substantial Completion Acceptance. The Contractor shall adjust the automatic irrigation system, if available, and apply additional or adjust for less water using hoses as required.

B. Hand water root balls of all plants to assure that the root balls have moisture above wilt point and below field capacity. Test the moisture content in each root ball and the soil outside the root ball to determine the water content.

C. The Contractor shall install 25 gallon watering bag for each tree to be maintained and used for tree watering during the warranty period if not watered by automatic irrigation system.

1. The watering bags shall remain the property of the Owner at the completion of the work.

3.20 INSTALLATION OF ROOT BARRIER

A. Install root barrier where trees are planted within 60 inches of paving or other hardscape elements, such as walls, curbs, and walkways, unless otherwise indicated on Drawings.

B. Align root barrier with bottom edge angled at 20 degrees away from the paving or other hardscape element, and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of 60 inches in each direction from the tree trunk, for a total distance of 10 feet per tree. If trees are spaced closer, use a single continuous piece of root barrier.

1. Position top of root barrier 1-inch below finished grade.
2. Overlap root barrier a minimum of 12 inches at joints.
3. Do not distort or bend root barrier during construction activities.
4. Do not install root barrier surrounding the root ball of tree.

3.21 INSTALLATION OF EDGING

A. Wood Edging: Install edging where indicated. Mitre cut joints and connections at a 45-degree angle. Fasten each cut joint or connection with two galvanized nails. Anchor with wood stakes spaced up to 36 inches apart, driven at least 1 inch below top elevation of edging. Use two galvanized nails per stake to fasten edging, of length as needed to penetrate both edging and stake and provide 1/2-inch clinch at point. Predrill stakes if needed to avoid splitting. Replace stakes that crack or split during installation process.

B. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.

C. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch-deep, shovel-cut edge as indicated on Drawings.

3.22 INSTALLATION OF SLOW-RELEASE WATERING DEVICE

A. Provide one device for each tree.

B. Place device on top of the mulch at base of tree stem and fill with water according to manufacturer's written instructions.

3.23 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.24 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.25 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same specie, size, shape, caliper, and character as those being replaced.

3.26 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property. Remove trash and debris from the site no less than once a week.

C. The Contractor shall protect planting and related work and other site work from damage due to planting operations, operations by other Contractors or trespassers. Maintain protection during installation until Substantial Completion Acceptance. Treat, repair or replace damaged work immediately.

D. Damage done by the Contractor, or any of their sub-contractors to existing or installed plants, or any other parts of the work or existing features to remain, including roots, trunk or branches of large existing trees, soil, paving, utilities, lighting, irrigation, other finished work, and surfaces including those on adjacent property, shall be cleaned, repaired or replaced by the Contractor at no expense to the Owner. The Owner’s Representative shall determine when such cleaning, replacement or repair is satisfactory.

E. Make all repairs to grades, ruts, and damage to the Work.

F. Once installation is complete, wash all soil from pavements and other structures. Ensure that mulch is confined to planting beds and that all tags and flagging tape are removed from the site.

The Owner’s Representative’s seals are to remain on the trees and removed at the end of the warranty period.

G. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, wire, burlap, and other debris from plant material, planting areas, and Project site.

H. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.27 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner’s property.

3.28 PLANT MAINTENANCE PRIOR TO SUBSTANTIAL COMPLETION ACCEPTANCE

A. During the project work period and prior to Substantial Completion Acceptance, the Contractor shall maintain all plants.

B. Maintenance during the period prior to Substantial Completion Acceptance shall consist of pruning, watering, cultivating, weeding, mulching, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, repairing and replacing of damaged tree wrap material, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings reasonably free of damaging insects and disease, and in healthy condition. The threshold for applying insecticides and herbicide shall follow established Integrated Pest Management (IPM) procedures. Mulch areas shall be kept reasonably free of weeds, grass.

3.29 MAINTENANCE DURING THE WARRANTY PERIOD BY OTHERS

A. After Substantial Completion Acceptance, the Contractor shall make sufficient site visits to observe the Owner’s maintenance and become aware of problems with the maintenance in time to request changes, until the date of End of Warranty Final Acceptance.

1. Notify the Owner’s Representative in writing if maintenance, including watering, is not sufficient to maintain plants in a healthy condition. Such notification must be made in a timely period so that the Owner’s Representative may take corrective action.

    a. Notification must define the maintenance needs and describe any corrective action required.

2. In the event that the Contractor fails to visit the site and or notify, in writing, the Owner’s Representative of maintenance needs, lack of maintenance shall not be used as grounds for voiding or modifying the provisions of the warranty.

3.30 END OF WARRANTY FINAL ACCEPTANCE / MAINTENANCE OBSERVATION

A. At the end of the Warranty and Maintenance period the Owner’s Representative shall observe the work and establish that all provisions of the contract are complete and the work is satisfactory.

1. If the work is satisfactory, the maintenance period will end on the date of the final observation.

2. If the work is deemed unsatisfactory, the maintenance period will continue at no additional expense to the Owner until the work has been completed, observed, and approved by the Owner's Representative.

B. Failure To Pass Observation: If the work fails to pass final observation, any subsequent observations must be rescheduled as per above. The cost to the Owner for additional observations will be charged to the Contractor at the prevailing hourly rate of the Owners Representative.

END OF SECTION

SECTION 334600 - SUBDRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for surface drainage and subdrainage as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes:

1. Delegated Design/Engineering and shop drawings of drainage shown that is not covered by civil engineering drawings.
2. Landscape surface drains, grates, and catch basins.
3. Perforated-wall pipe and fittings.
4. Drainage conduits.
5. Drainage panels.
6. Geotextile filter fabrics.

C. Related Requirements:

1. Reference civil engineering plans and specifications for general requirements for excavation, piping, fittings, backfill, and compaction of underground utilities.
2. Meet all requirements by authorities having jurisdiction.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Drainage piping and conduits, including rated capacities.
2. Drainage panels, including rated capacities.
3. Geotextile filter fabrics.

B. Shop Drawings:

1. Catch basins and subdrainage. Include plans, inverts, elevations, sections, details, frames, covers, and grates. Include connection details to storm conveyance systems and/or stormwater detention structures.

PART 2 - PRODUCTS

2.1 LANDSCAPE SURFACE DRAINS, GRATES, AND CATCH BASINS

A. Catch Basins: NDS Square catch basin, size for grate indicated.

B. Grates for Lawn Areas: NDS Square Flat HDPE ADA compliant grate, color green, or as indicated.

C. Grates for Planting Areas: NDS Square Atrium HDPE grate, color black, or as indicated.

D. Grates for Paving Areas: Zurn polished bronze ADA compliant grate, or as indicated.

E. Other drains as indicated by manufacturer’s designation.

F. All grates and drains within paving shall be ADA compliant.

2.2 PERFORATED-WALL PIPES AND FITTINGS

A. Singlewall high density corrugated polyethylene drain pipe (HDPE) with black filter sock, ASTM F667.

B. Perforated PE Pipe and Fittings:

1. NPS 6 and Smaller: ASTM F405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
2. Couplings: Manufacturer's standard, band type.

C. Perforated PVC Sewer Pipe and Fittings: ASTM D2729, bell-and-spigot ends, for loose joints.

2.3 DRAINAGE CONDUITS

A. Mesh Fabric Drainage Conduits: Prefabricated geocomposite with plastic-filament drainage core wrapped in geotextile filter fabric. Include fittings for bends and connection to drainage piping.

1. Nominal Size: 6 inches high by approximately 0.9 inch thick.

a. Minimum In-Plane Flow: 2.4 gpm at hydraulic gradient of 1.0 when tested in accordance with ASTM D4716.

2. Geotextile Filter Fabric: Nonwoven geotextile made of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. when tested in accordance with ASTM D4491.

2.4 DRAINAGE PANELS

A. Molded-Sheet Drainage Panels: Prefabricated geocomposite, 36 to 60 inches wide with drainage core faced with geotextile filter fabric.

1. Drainage Core: Three-dimensional, nonbiodegradable, molded PP.

a. Minimum Compressive Strength: 10,000 lbf/sq. ft. when tested in accordance with ASTM D1621.
b. Minimum In-Plane Flow Rate: 2.8 gpm/ft. of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psig when tested in accordance with ASTM D4716.

2. Filter Fabric, Nonwoven: Needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined in accordance with AASHTO M 288:

a. Survivability: Class 2.

b. Apparent Opening Size: No. 40 sieve, maximum.
c. Permittivity: 0.2 per second, minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.

C. Verify that drainage panels installed as part of foundation wall waterproofing is properly positioned to drain into subdrainage system.

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

3.2 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.3 FOUNDATION DRAINAGE INSTALLATION

A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.

F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

G. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

I. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.

J. Install drainage panels on foundation walls as follows:

1. Coordinate placement with other drainage materials.

2. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 "Piping Installation" Article.
3. Separate 4 inches of fabric at beginning of roll and cut away 4 inches of core. Wrap fabric around end of remaining core.
4. Attach panels to wall beginning at subdrainage pipe. Place and secure molded-sheet drainage panels, with geotextile facing away from wall.

K. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.4 UNDERSLAB DRAINAGE INSTALLATION

A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.

F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

H. Install horizontal drainage panels as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at inside edge of footing.
3. Place drainage panel over drainage pipe with core side up. Peel back fabric and wrap fabric around pipe. Locate top of core at bottom elevation of floor slab.
4. Butt additional panels against other installed panels. If panels have plastic flanges, overlap installed panel with flange.

3.5 RETAINING-WALL DRAINAGE INSTALLATION

A. Place supporting layer of drainage course over compacted subgrade to compacted depth of not less than 4 inches.

B. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

C. Install drainage piping as indicated in Part 3 "Piping Installation" Article for retaining-wall subdrainage.

D. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

E. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

F. Place drainage course in layers not exceeding 3 inches in loose depth; compact each layer placed and wrap top of drainage course with flat-style geotextile filter fabric.

G. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.

H. Install drainage panels on wall as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at base of footing as described elsewhere in this Specification. Do not install aggregate.
3. If weep holes are used instead of drainage pipe, cut 1/2-inch-diameter holes on core side at weep-hole locations. Do not cut fabric.
4. Mark horizontal calk line on wall at a point 6 inches less than panel width above footing bottom. Before marking wall, subtract footing width.
5. Separate 4 inches of fabric at beginning of roll and cut away 4 inches of core. Wrap fabric around end of remaining core.
6. Attach panel to wall at horizontal mark and at beginning of wall corner. Place core side of panel against wall. Use concrete nails with washers through product. Place nails from 2 to 6 inches below top of panel, approximately 48 inches apart. Construction adhesives, metal stick pins, or double-sided tape may be used instead of nails. Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
7. If another panel is required on same row, cut away 4 inches of installed panel core and wrap fabric over new panel.
8. If additional rows of panel are required, overlap lower panel with 4 inches of fabric.
9. Cut panel as necessary to keep top 12 inches below finish grade.
10. For inside corners, bend panel. For outside corners, cut core to provide 3 inches for overlap.

I. Fill to Grade: Place satisfactory soil fill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

3.6 LANDSCAPING DRAINAGE INSTALLATION

A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Install drainage conduits as indicated in Part 3 "Piping Installation" Article for landscaping subdrainage with horizontal distance of at least 6 inches between conduit and trench walls. Wrap drainage conduits without integral geotextile filter fabric with flat-style geotextile filter fabric before installation. Connect fabric sections with adhesive or tape.

E. Add drainage course to top of drainage conduits.

F. After satisfactory testing, cover drainage conduit to within 12 inches of finish grade.

G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

H. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.

I. Fill to Grade: Place satisfactory soil fill material over drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

3.7 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions and other requirements indicated.

1. Foundation Subdrainage: Install piping level and with a minimum cover of 36 inches unless otherwise indicated.
2. Underslab Subdrainage: Install piping level.
3. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches unless otherwise indicated.
4. Landscaping Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches unless otherwise indicated.
5. Lay perforated pipe with perforations down.
6. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install thermoplastic piping in accordance with ASTM D2321.

3.8 PIPE JOINT CONSTRUCTION

A. Join perforated PE pipe and fittings with couplings in accordance with ASTM D3212 with loose banded, coupled, or push-on joints.

B. Join perforated PVC sewer pipe and fittings in accordance with ASTM D3212 with loose bell-and-spigot, push-on joints.

C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.9 BACKWATER VALVE INSTALLATION

A. Comply with requirements for backwater valves specified in Section 334100 "Storm Utility Drainage Piping."

B. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping.

C. Install horizontal backwater valves in piping where indicated.

3.10 CLEANOUT INSTALLATION

A. Comply with requirements for cleanouts specified in Section 334100 "Storm Utility Drainage Piping."

B. Cleanouts for Landscaping Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. In nonvehicular-traffic areas, use NPS 4 cast-iron pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches deep. Set top of cleanout 1 inch above grade.
3. Comply with requirements for concrete specified in Section 033000 "Cast-in-Place Concrete."

C. Cleanouts for Underslab Subdrainage:

1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. Use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.11 CONNECTIONS

A. Comply with requirements for piping specified in Section 334100 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect low elevations of subdrainage system to solid-wall-piping storm drainage system.

C. Where required, connect low elevations of subdrainage to stormwater sump pumps. Comply with requirements for sump pumps specified in Section 221429 "Sump Pumps."

3.12 IDENTIFICATION

A. Arrange for installation of green warning tapes directly over piping. Comply with requirements for underground warning tapes specified in specified in Section 312000 "Earth Moving."

1. Install PE warning tape or detectable warning tape over ferrous piping.
2. Install detectable warning tape over nonferrous piping and over edges of underground structures.

3.13 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.14 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION