

# TCEQ EDWARDS AQUIFER RECHARGE ZONE EXCEPTION REQUEST

## WEST LAKE HILLS BOND PROGRAM

**PREPARED FOR:**  
CITY OF WEST LAKE HILLS



**PREPARED BY**



**JULY 2023**

# Recharge and Transition Zone Exception Request Form Checklist

- Edwards Aquifer Application Cover Page (TCEQ-20705)**
- General Information Form (TCEQ-0587)**
  - Attachment A - Road Map
  - Attachment B - USGS / Edwards Recharge Zone Map
  - Attachment C - Project Description
- Geologic Assessment Form (TCEQ-0585), if necessary**
  - Attachment A - Geologic Assessment Table (TCEQ-0585-Table)
  - Attachment B - Soil Profile and Narrative of Soil Units
  - Attachment C - Stratigraphic Column
  - Attachment D - Narrative of Site Specific Geology
  - Site Geologic Map(s)
  - Table or list for the position of features' latitude/longitude (if mapped using GPS)
- Recharge and Transition Zone Exception Request Form (TCEQ-0628)**
  - Attachment A - Nature of Exception
  - Attachment B - Documentation of Equivalent Water Quality Protection
- Temporary Stormwater Section (TCEQ-0602)**
  - Attachment A - Spill Response Actions
  - Attachment B - Potential Sources of Contamination
  - Attachment C - Sequence of Major Activities
  - Attachment D - Temporary Best Management Practices and Measures
  - Attachment E - Request to Temporarily Seal a Feature
  - Attachment F - Structural Practices
  - Attachment G - Drainage Area Map
  - Attachment H - Temporary Sediment Pond(s) Plans and Calculations
  - Attachment I - Inspection and Maintenance for BMPs
  - Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices
- Agent Authorization Form (TCEQ-0599)**
- Fee Application Form (TCEQ-0574)**
- Check Payable to the "Texas Commission on Environmental Quality"**
- Core Data Form (TCEQ-10400)**

# Texas Commission on Environmental Quality

## Edwards Aquifer Application Cover Page

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### Our Review of Your Application

**The Edwards Aquifer Program staff conducts an administrative and technical review of all applications. The turnaround time for administrative review can be up to 30 days as outlined in 30 TAC 213.4(e). Generally administrative completeness is determined during the intake meeting or within a few days of receipt. The turnaround time for technical review of an administratively complete Edwards Aquifer application is 90 days as outlined in 30 TAC 213.4(e). Please know that the review and approval time is directly impacted by the quality and completeness of the initial application that is received. In order to conduct a timely review, it is imperative that the information provided in an Edwards Aquifer application include final plans, be accurate, complete, and in compliance with [30 TAC 213](#).**

### Administrative Review

1. [Edwards Aquifer applications](#) must be deemed administratively complete before a technical review can begin. To be considered administratively complete, the application must contain completed forms and attachments, provide the requested information, and meet all the site plan requirements. The submitted application and plan sheets should be final plans. Please submit one full-size set of plan sheets with the original application, and half-size sets with the additional copies.

To ensure that all applicable documents are included in the application, the program has developed tools to guide you and web pages to provide all forms, checklists, and guidance. Please visit the below website for assistance: <http://www.tceq.texas.gov/field/eapp>.

2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.
3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.
4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.

An appointment should be made to resubmit the application. The application is re-examined to ensure all deficiencies are resolved. The application will only be deemed administratively complete when all administrative deficiencies are addressed.

5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.
6. If the geologic assessment was completed before October 1, 2004 and the site contains “possibly sensitive” features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

### Technical Review

1. When an application is deemed administratively complete, the technical review period begins. The regional office will distribute copies of the application to the identified affected city, county, and groundwater conservation district whose jurisdiction includes the subject site. These entities and the public have 30 days to provide comments on the application to the regional office. All comments received are reviewed by TCEQ.
2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be

clearly marked, features identified in the geologic assessment should be flagged, roadways marked and the alignment of the Sewage Collection System and manholes should be staked at the time the application is submitted. If the site is not marked the application may be returned.

3. We evaluate the application for technical completeness and contact the applicant and agent via Notice of Deficiency (NOD) to request additional information and identify technical deficiencies. There are two deficiency response periods available to the applicant. There are 14 days to resolve deficiencies noted in the first NOD. If a second NOD is issued, there is an additional 14 days to resolve deficiencies. If the response to the second notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, the application must be withdrawn or will be denied. Please note that because the technical review is underway, whether the application is withdrawn or denied **the application fee will be forfeited**.
4. The program has 90 calendar days to complete the technical review of the application. If the application is technically adequate, such that it complies with the Edwards Aquifer rules, and is protective of the Edwards Aquifer during and after construction, an approval letter will be issued. Construction or other regulated activity may not begin until an approval is issued.

**Mid-Review Modifications**

It is important to have final site plans prior to beginning the permitting process with TCEQ to avoid delays.

Occasionally, circumstances arise where you may have significant design and/or site plan changes after your Edwards Aquifer application has been deemed administratively complete by TCEQ. This is considered a “Mid-Review Modification”. Mid-Review Modifications may require redistribution of an application that includes the proposed modifications for public comment.

If you are proposing a Mid-Review Modification, two options are available:

- If the technical review has begun your application can be denied/withdrawn, your fees will be forfeited, and the plan will have to be resubmitted.
- TCEQ can continue the technical review of the application as it was submitted, and a modification application can be submitted at a later time.

If the application is denied/withdrawn, the resubmitted application will be subject to the administrative and technical review processes and will be treated as a new application. The application will be redistributed to the affected jurisdictions.

Please contact the regional office if you have questions. If your project is located in Williamson, Travis, or Hays County, contact TCEQ’s Austin Regional Office at 512-339-2929. If your project is in Comal, Bexar, Medina, Uvalde, or Kinney County, contact TCEQ’s San Antonio Regional Office at 210-490-3096

Please fill out all required fields below and submit with your application.

<b>1. Regulated Entity Name:</b> West Lake Hills Bond Program					<b>2. Regulated Entity No.:</b>				
<b>3. Customer Name:</b> City of West Lake Hills					<b>4. Customer No.:</b> CN600685515				
<b>5. Project Type:</b> (Please circle/check one)	New	Modification			Extension	Exception			
<b>6. Plan Type:</b> (Please circle/check one)	WPAP	CZP	SCS	UST	AST	EXP	EXT	Technical Clarification	Optional Enhanced Measures
<b>7. Land Use:</b> (Please circle/check one)	Residential	Non-residential			<b>8. Site (acres):</b>		10.92		
<b>9. Application Fee:</b>	\$500	<b>10. Permanent BMP(s):</b>			N/A				
<b>11. SCS (Linear Ft.):</b>	N/A		<b>12. AST/UST (No. Tanks):</b>			N/A			
<b>13. County:</b>	Travis		<b>14. Watershed:</b>			Eanes Creek, Little Bee Creek			

# Application Distribution

Instructions: Use the table below to determine the number of applications required. One original and one copy of the application, plus additional copies (as needed) for each affected incorporated city, county, and groundwater conservation district are required. Linear projects or large projects, which cross into multiple jurisdictions, can require additional copies. Refer to the “Texas Groundwater Conservation Districts within the EAPP Boundaries” map found at:

[http://www.tceq.texas.gov/assets/public/compliance/field\\_ops/eapp/EAPP%20GWCD%20map.pdf](http://www.tceq.texas.gov/assets/public/compliance/field_ops/eapp/EAPP%20GWCD%20map.pdf)

For more detailed boundaries, please contact the conservation district directly.

<b>Austin Region</b>			
<b>County:</b>	<b>Hays</b>	<b>Travis</b>	<b>Williamson</b>
Original (1 req.)	—	<u>  1  </u>	—
Region (1 req.)	—	<u>  1  </u>	—
County(ies)	—	<u>  1  </u>	—
Groundwater Conservation District(s)	<u>  </u> Edwards Aquifer Authority <u>  </u> Barton Springs/ Edwards Aquifer <u>  </u> Hays Trinity <u>  </u> Plum Creek	<u>  </u> Barton Springs/ Edwards Aquifer	NA
City(ies) Jurisdiction	<u>  </u> Austin <u>  </u> Buda <u>  </u> Dripping Springs <u>  </u> Kyle <u>  </u> Mountain City <u>  </u> San Marcos <u>  </u> Wimberley <u>  </u> Woodcreek	<u>  </u> Austin <u>  </u> Bee Cave <u>  </u> Pflugerville <u>  </u> Rollingwood <u>  </u> Round Rock <u>  </u> Sunset Valley <u>  </u> <input checked="" type="checkbox"/> West Lake Hills	<u>  </u> Austin <u>  </u> Cedar Park <u>  </u> Florence <u>  </u> Georgetown <u>  </u> Jerrell <u>  </u> Leander <u>  </u> Liberty Hill <u>  </u> Pflugerville <u>  </u> Round Rock

<b>San Antonio Region</b>					
<b>County:</b>	<b>Bexar</b>	<b>Comal</b>	<b>Kinney</b>	<b>Medina</b>	<b>Uvalde</b>
Original (1 req.)	—	—	—	—	—
Region (1 req.)	—	—	—	—	—
County(ies)	—	—	—	—	—
Groundwater Conservation District(s)	<u>  </u> Edwards Aquifer Authority <u>  </u> Trinity-Glen Rose	<u>  </u> Edwards Aquifer Authority	<u>  </u> Kinney	<u>  </u> EAA <u>  </u> Medina	<u>  </u> EAA <u>  </u> Uvalde
City(ies) Jurisdiction	<u>  </u> Castle Hills <u>  </u> Fair Oaks Ranch <u>  </u> Helotes <u>  </u> Hill Country Village <u>  </u> Hollywood Park <u>  </u> San Antonio (SAWS) <u>  </u> Shavano Park	<u>  </u> Bulverde <u>  </u> Fair Oaks Ranch <u>  </u> Garden Ridge <u>  </u> New Braunfels <u>  </u> Schertz	NA	<u>  </u> San Antonio ETJ (SAWS)	NA

I certify that to the best of my knowledge, that the application is complete and accurate. This application is hereby submitted to TCEQ for administrative review and technical review.

Victoria M Ortega

Print Name of Customer/Authorized Agent

*Victoria M Ortega*

7/21/2023

Signature of Customer/Authorized Agent

Date

**\*\*FOR TCEQ INTERNAL USE ONLY\*\***

Date(s) Reviewed:		Date Administratively Complete:	
Received From:		Correct Number of Copies:	
Received By:		Distribution Date:	
EAPP File Number:		Complex:	
Admin. Review(s) (No.):		No. AR Rounds:	
Delinquent Fees (Y/N):		Review Time Spent:	
Lat./Long. Verified:		SOS Customer Verification:	
Agent Authorization Complete/Notarized (Y/N):		Fee Check:	Payable to TCEQ (Y/N):
Core Data Form Complete (Y/N):			Signed (Y/N):
Core Data Form Incomplete Nos.:			Less than 90 days old (Y/N):

# General Information Form

## Texas Commission on Environmental Quality

For Regulated Activities on the Edwards Aquifer Recharge and Transition Zones and Relating to 30 TAC §213.4(b) & §213.5(b)(2)(A), (B) Effective June 1, 1999

**To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.**

**Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.**

## Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **General Information Form** is hereby submitted for TCEQ review. The application was prepared by:

Print Name of Customer/Agent: Victoria M Ortega, PE

Date: 7/21/2023

Signature of Customer/Agent:

Victoria M Ortega

## Project Information

1. Regulated Entity Name: West Lake Hills Bond Program
2. County: Travis
3. Stream Basin: Eanes Creek, Little Bee Creek
4. Groundwater Conservation District (If applicable): \_\_\_\_\_
5. Edwards Aquifer Zone:  
 Recharge Zone  
 Transition Zone
6. Plan Type:  
 WPAP  
 SCS  
 Modification  
 AST  
 UST  
 Exception Request

7. Customer (Applicant):

Contact Person: Trey Fletcher

Entity: City of West Lake Hills

Mailing Address: 911 Westlake Dr

City, State: West Lake Hills, Texas

Zip: 78746

Telephone: (512) 327-3628

FAX: \_\_\_\_\_

Email Address: tfletcher@westlakehills.gov

8. Agent/Representative (If any):

Contact Person: Victoria M. Ortega, PE

Entity: K Friese + Associates

Mailing Address: 1120 S Capital of Texas Highway, Bldg 2, Ste 100

City, State: Austin, TX

Zip: 78746

Telephone: (512) 338-1704

FAX: (512) 338-1784

Email Address: vortega@kfriese.com

9. Project Location:

- The project site is located inside the city limits of West Lake Hills.
- The project site is located outside the city limits but inside the ETJ (extra-territorial jurisdiction) of \_\_\_\_\_.
- The project site is not located within any city's limits or ETJ.

10.  The location of the project site is described below. The description provides sufficient detail and clarity so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.

Project is part of the West Lake Hills Bond Program, includes six projects. Two projects, Eanes Creek Low Water Crossings and Westlake Drive are located in Recharge Zone. Eanes Creek Low Water Crossings includes Camp Craft Rd, from 404 Camp Craft Rd to Eanes School Rd, and Eanes School Rd, between 223 Eanes School Rd and 304 Camp Craft Rd. Westlake Drive project is Bee Caves Rd to Skyline Dr.

11.  **Attachment A – Road Map.** A road map showing directions to and the location of the project site is attached. The project location and site boundaries are clearly shown on the map.
12.  **Attachment B - USGS / Edwards Recharge Zone Map.** A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached. The map(s) clearly show:
- Project site boundaries.
  - USGS Quadrangle Name(s).
  - Boundaries of the Recharge Zone (and Transition Zone, if applicable).
  - Drainage path from the project site to the boundary of the Recharge Zone.
13.  **The TCEQ must be able to inspect the project site or the application will be returned.** Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate

the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment.

Survey staking will be completed by this date: N/A

14.  **Attachment C – Project Description.** Attached at the end of this form is a detailed narrative description of the proposed project. The project description is consistent throughout the application and contains, at a minimum, the following details:

- Area of the site
- Offsite areas
- Impervious cover
- Permanent BMP(s)
- Proposed site use
- Site history
- Previous development
- Area(s) to be demolished

15. Existing project site conditions are noted below:

- Existing commercial site
- Existing industrial site
- Existing residential site
- Existing paved and/or unpaved roads
- Undeveloped (Cleared)
- Undeveloped (Undisturbed/Uncleared)
- Other: \_\_\_\_\_

### ***Prohibited Activities***

16.  I am aware that the following activities are prohibited on the Recharge Zone and are not proposed for this project:

- (1) Waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);
- (2) New feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;
- (3) Land disposal of Class I wastes, as defined in 30 TAC §335.1;
- (4) The use of sewage holding tanks as parts of organized collection systems; and
- (5) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).
- (6) New municipal and industrial wastewater discharges into or adjacent to water in the state that would create additional pollutant loading.

17.  I am aware that the following activities are prohibited on the Transition Zone and are not proposed for this project:

- (1) Waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);
- (2) Land disposal of Class I wastes, as defined in 30 TAC §335.1; and
- (3) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

### ***Administrative Information***

18. The fee for the plan(s) is based on:

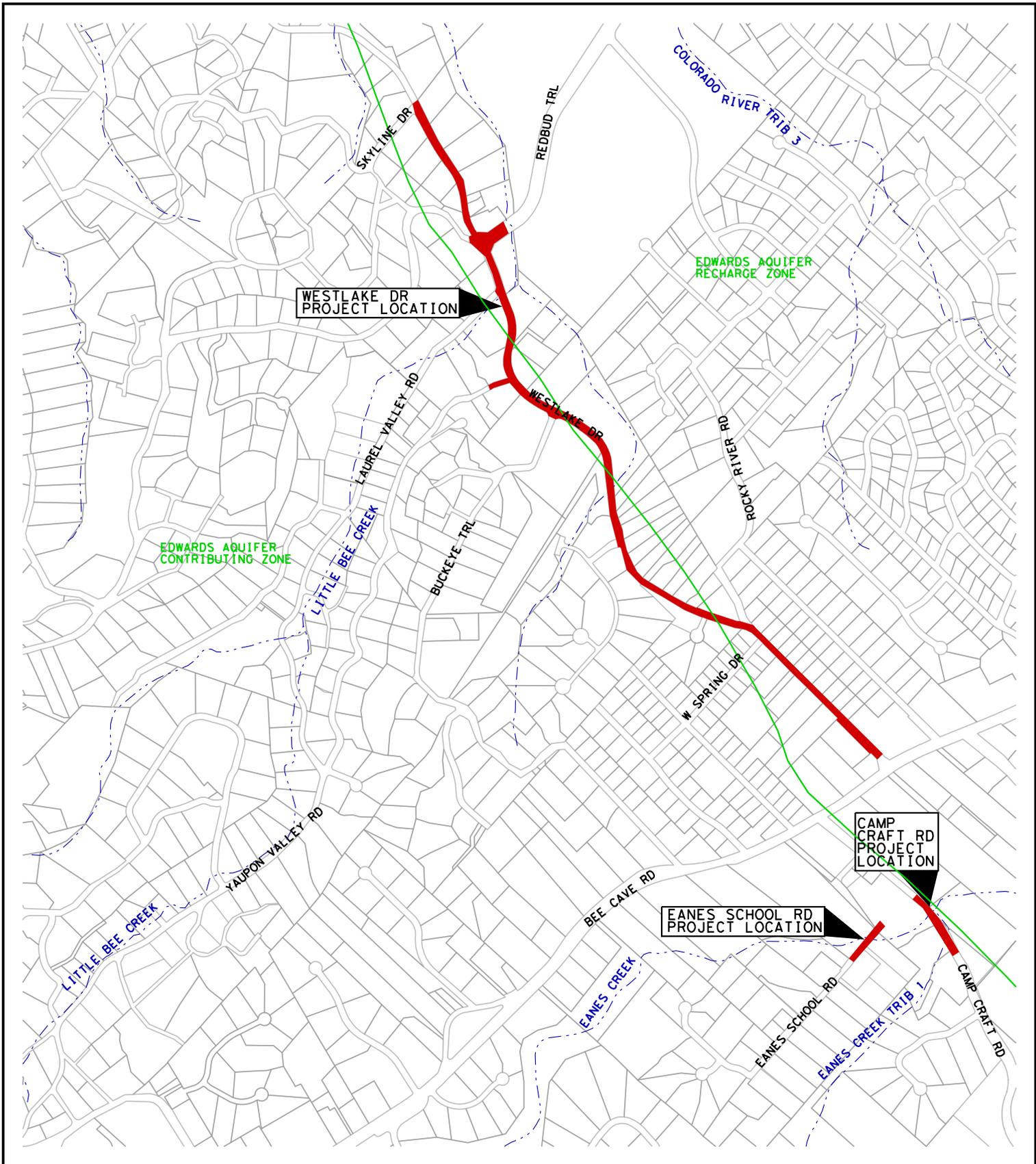
- For a Water Pollution Abatement Plan or Modification, the total acreage of the site where regulated activities will occur.
- For an Organized Sewage Collection System Plan or Modification, the total linear footage of all collection system lines.
- For a UST Facility Plan or Modification or an AST Facility Plan or Modification, the total number of tanks or piping systems.
- A request for an exception to any substantive portion of the regulations related to the protection of water quality.
- A request for an extension to a previously approved plan.

19.  Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

- TCEQ cashier
- Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
- San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

20.  Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

21.  No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.



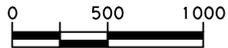
WESTLAKE DR PROJECT LOCATION

CAMP CRAFT RD PROJECT LOCATION

EANES SCHOOL RD PROJECT LOCATION

EDWARDS AQUIFER CONTRIBUTING ZONE

EDWARDS AQUIFER RECHARGE ZONE



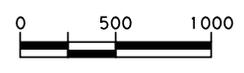
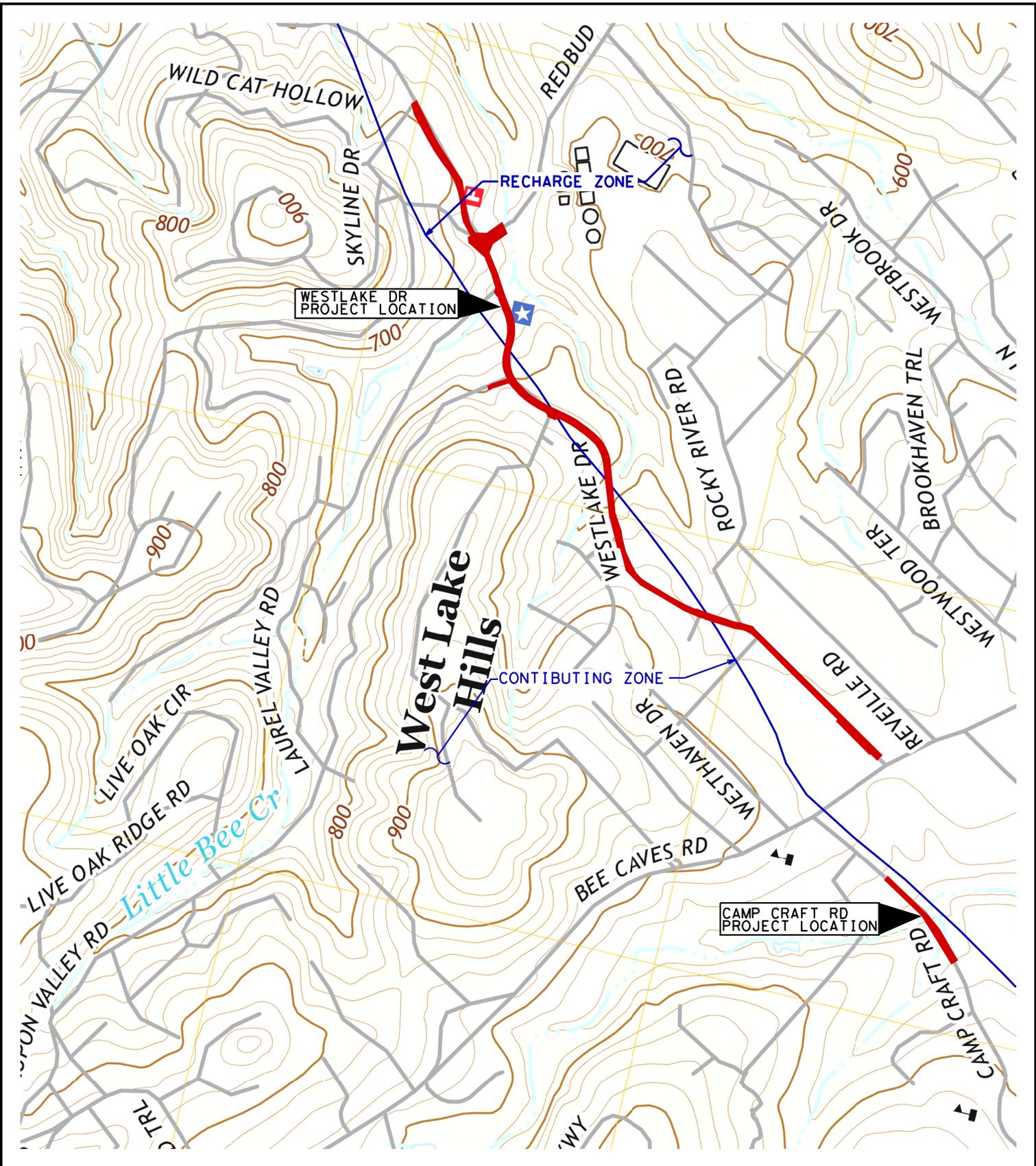
# WEST LAKE HILLS BOND PROGRAM

## ATTACHMENT A ROAD MAP

**K·FRIESE + ASSOCIATES**  
PUBLIC PROJECT ENGINEERING

1120 S. Capital of Texas Highway  
CityView 2, Suite 100  
Austin, Texas 78746  
P 512.338.1704 F 512.338.1784  
TBPE Firm Number 6535  
www.kfriesecom

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# WEST LAKE HILLS BOND PROGRAM

ATTACHMENT B  
USGS QUADRANGLE

**K·FRIESE  
+ ASSOCIATES**  
PUBLIC PROJECT ENGINEERING

1120 S. Capital of Texas Highway  
CityView 2, Suite 100  
Austin, Texas 78746  
P 512.338.1704 F 512.338.1784  
TBPE Firm Number 6535  
www.kfriesec.com

X:\Projects\0846\_WLH Bond Projects\300 Plans and Drawings\330 Plan Production\334 Exhibit\rs\0846E.xtRDusgs.dgn

## **ATTACHMENT C PROJECT DESCRIPTION**

West Lake Hills proposes maintenance improvements for existing roadways and drainage improvements as part of the West Lake Hills Bond Program. Maintenance activities consist of drainage improvements, including culvert replacement, storm sewer installation, ditch regrading, and roadway improvements, including reconstruction, mill and overlay, and crack sealing, along the existing roadways. Two of the projects, Eanes Creek Low Water Crossings and Westlake Dr Pavement and Drainage Improvements, are located within the Recharge Zone. Eanes Creek Low Water Crossings will reconstruct portions of Eanes School Rd and Camp Craft Rd and Westlake Dr Pavement and Drainage Improvements includes Westlake Dr from Bee Cave Rd to Skyline Dr.

The site area for the Project is contained within existing and proposed right-of-way and permanent and temporary easements and totals approximately 10.92 acres. Under pre-project conditions there is approximately 5.53 acres of impervious cover within the total project area. The proposed maintenance activities will remove 0.04 acres of impervious cover for a total post-project impervious cover of 5.49 acres, or 50.3 percent of the project area.

The right-of-way for the Project is owned by the City of West Lake Hills and currently includes the existing Camp Craft Rd and Westlake Dr, which are both two lane roadways. Proposed work on Eanes School Rd is contained within the existing and proposed right-of-way. The Project will reconstruct or repair the existing roadway within the footprint of the existing roadway base. There are no existing EAPP permits to be modified.

Three culverts will be upsized for the Eanes Creek Low Water Crossings project, Eanes Creek at Eanes School Rd, Eanes Creek at Camp Craft Rd, and Eanes Creek Trib 1 at Camp Craft Rd. The existing pipe culverts will be removed and replaced with box culverts to improve conveyance of offsite water through the site, maintaining existing drainage patterns. No parallel improvements are proposed along Eanes School Rd and storm sewer is proposed within Camp Craft Rd to replace the existing roadside ditches within the project limits. The project area contributes to Eanes Creek, which drains to the Colorado River. Offsite areas are comprised of developed residential and school.

One culvert will be replaced on Westlake Dr. The existing pipe culvert will be replaced with box culverts to improve conveyance of offsite runoff through the site, maintaining existing drainage patterns. Roadside channels along Westlake Dr will be improved to adequately convey water within the right-of-way to the culvert crossing. The project area contributes to Little Bee Creek, which drains to the Colorado River. Offsite areas are comprised of developed residential.

There are no permanent water quality BMPs proposed as part of this project as the overall project scope includes maintenance activities along previously disturbed areas, and the overall impervious cover will be reduced. Approximately 0.04 acres of impervious cover will be demolished and replaced with grass. This reduction is associated with the reconstruction of Camp Craft Rd and the proposed consistent typical section.

**TCEQ EDWARDS AQUIFER  
PROTECTION PROGRAM  
RECHARGE ZONE EXCEPTION REQUEST**

**WEST LAKE HILLS BOND PROGRAM**

ATTACHMENT C.1:  
CONSTRUCTION PLANS

**PREPARED FOR:**  
CITY OF WEST LAKE HILLS



**PREPARED:  
JULY 2023**

# CITY OF WEST LAKE HILLS

## ROAD AND DRAINAGE BOND PROGRAM

ROADWAY	POSTED SPEED
CAMP CRAFT RD	30 MPH
EANES SCHOOL RD	25 MPH
WESTLAKE DR	25 MPH
LAUREL VALLEY RD	25 MPH
YAUPON VALLEY RD	25 MPH
REDBUD TRL	25 MPH
TERRACE MOUNTAIN DR	25 MPH

### INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX OF SHEETS

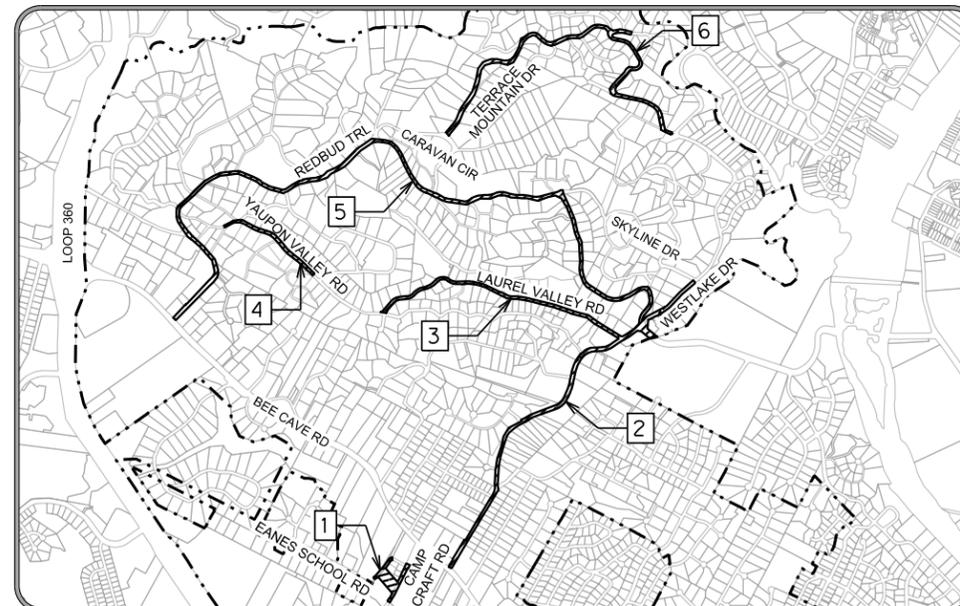
### PROGRAM TOTAL

NET LENGTH OF ROADWAY = 33,408.97 FT (6.327 MILES)  
 NET LENGTH OF BRIDGE = 214.80 FT (0.041 MILES)  
 NET LENGTH OF PROJECT = 33,623.77 FT (6.368 MILES)

FOR THE CONSTRUCTION OF: ROADWAY AND DRAINAGE IMPROVEMENTS  
 CONSISTING OF ASPHALT PAVEMENT, BRIDGES,  
 GRADING, CULVERT STRUCTURES, STORM SEWER,  
 AND PEDESTRIAN FACILITIES

### PROJECT DESCRIPTION AND LIMITS

- 1 EANES CREEK LOW WATER CROSSINGS:**  
 ROADWAY AND DRAINAGE RECONSTRUCTION, SIDEWALK IMPROVEMENTS,  
 & CHANNEL GRADING AT EANES SCHOOL RD AND CAMP CRAFT RD  
 NET LENGTH OF ROADWAY = 775.82 FT (0.147 MILES)  
 NET LENGTH OF BRIDGE = 78.13 FT (0.015 MILES)  
 NET LENGTH OF PROJECT = 853.95 FT (0.162 MILES)
- 2 WESTLAKE DR DRNG & PVMT IMPROV**  
 ROADWAY REPAIRS & DRAINAGE IMPROVEMENTS FROM BEE CAVE RD  
 TO THE HIGH ROAD  
 NET LENGTH OF ROADWAY = 7,486.94 FT (1.418 MILES)  
 NET LENGTH OF BRIDGE = 30.03 FT (0.006 MILES)  
 NET LENGTH OF PROJECT = 7,516.97 FT (1.424 MILES)
- 3 LAUREL VALLEY DRNG & PVMT IMPROV**  
 ROADWAY REPAIRS & DRAINAGE IMPROVEMENTS FROM YAUPON VALLEY  
 RD TO WESTLAKE DR  
 NET LENGTH OF ROADWAY = 4,083.06 FT (0.773 MILES)  
 NET LENGTH OF BRIDGE = 106.64 FT (0.020 MILES)  
 NET LENGTH OF PROJECT = 4,189.70 FT (0.794 MILES)
- 4 YAUPON VALLEY DRNG & PVMT IMPROV**  
 ROADWAY REPAIRS & DRAINAGE IMPROVEMENTS FROM JUNIPER RD TO  
 MADRONE RD.  
 NET LENGTH OF ROADWAY = 1,759.90 FT (0.333 MILES)  
 NET LENGTH OF BRIDGE = 0.00 FT (0.0 MILES)  
 NET LENGTH OF PROJECT = 1,759.90 FT (0.333 MILES)
- 5 REDBUD TRAIL DRNG & PVMT IMPROV**  
 ROADWAY REPAIRS & DRAINAGE IMPROVEMENTS FROM BEE CAVE RD  
 TO CITY LIMITS  
 NET LENGTH OF ROADWAY = 12,403.95 FT (2.349 MILES)  
 NET LENGTH OF BRIDGE = 0.00 FT (0.0 MILES)  
 NET LENGTH OF PROJECT = 12,403.95 FT (2.349 MILES)
- 6 TERRACE MOUNTAIN DRNG & PVMT IMPROV**  
 ROADWAY REPAIRS & DRAINAGE IMPROVEMENTS FROM CARAVAN CIR  
 TO WESTLAKE DR  
 NET LENGTH OF ROADWAY = 6,899.60 FT (1.307 MILES)  
 NET LENGTH OF BRIDGE = 0.00 FT (0.0 MILES)  
 NET LENGTH OF PROJECT = 6,899.60 FT (1.307 MILES)



LOCATION MAP  
 NTS



SUBMITTED FOR ACCEPTANCE BY:

*Victoria M Ortega*

VICTORIA ORTEGA, PE  
 K FRIESE + ASSOCIATES, INC.

7/17/2023  
 DATE

ACCEPTED BY:

ACTING CITY ENGINEER

DATE

ACCEPTED BY:

TREY FLETCHER, CITY ADMINISTRATOR

DATE

### NOTE:

ALL RESPONSIBILITY FOR THE ADEQUACY OF THESE PLANS REMAINS WITH THE ENGINEER WHO PREPARED THEM. IN ACCEPTING THESE PLANS, THE CITY OF WEST LAKE HILLS MUST RELY ON THE ADEQUACY OF THE WORK OF THE DESIGN ENGINEER.

ALL MATERIALS AND CONSTRUCTION METHODS FOR SITE GRADING, PAVING, AND SITEWORK SHALL BE IN ACCORDANCE WITH THE CITY OF AUSTIN STANDARD SPECIFICATIONS, UNLESS OTHERWISE NOTED. ALL MATERIALS AND CONSTRUCTION METHODS FOR DRAINAGE SHALL BE IN ACCORDANCE WITH TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND BRIDGES ADOPTED NOVEMBER 1, 2014 UNLESS OTHERWISE NOTED. ALL WORK SHALL BE IN ACCORDANCE WITH THE BUILDING CODES, ORDINANCES, SAFETY CODES, AND RULES AND PROCEDURES OF THE CITY OF WEST LAKE HILLS.



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REVISION DESCRIPTION	
DATE	
BY	
REV. NO.	
<b>K FRIESE &amp; ASSOCIATES, INC.</b> 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746 <b>WEST LAKE HILLS BOND PROGRAM</b> <b>INDEX OF SHEETS</b>	
WEST LAKE HILLS, TX	
SHEET 1 OF 1	
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DATE	7/17/2023
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**GENERAL CONSTRUCTION NOTES:**

1. AFTER THE CONSTRUCTION PERMIT HAS BEEN ISSUED AND PRIOR TO THE BEGINNING OF CONSTRUCTION, THE CONTRACTOR OR HIS REPRESENTATIVE SHALL SCHEDULE A PRE-CONSTRUCTION CONFERENCE BETWEEN THE CITY OF WEST LAKE HILLS, DESIGN ENGINEER, CONTRACTOR(S), OTHER UTILITY COMPANIES, AND ANY OTHER AFFECTED PARTIES. THE CITY OF WEST LAKE HILLS SHALL BE CONTACTED TO SET UP THE MEETING AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO THE PROPOSED MEETING TIME.
2. CONSTRUCTION NOTIFICATION:  
 CONTRACTOR WILL PROVIDE A MINIMUM OF FOURTEEN (14) DAYS NOTICE TO THE CITY OF WEST LAKE HILLS, THE POLICE DEPARTMENT, THE FIRE DEPARTMENT, THE EMERGENCY SERVICES DISTRICT, AND THE SCHOOL DISTRICT OF ALL ROADWAY CLOSURES.  
 CONTRACTOR SHALL PROVIDE A MINIMUM OF SEVEN (7) DAYS NOTICE TO LANDOWNER/TENANT PRIOR TO COMMENCING WORK ADJACENT TO OR AFFECTING ACCESS TO THE PROPERTY.  
 AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO ANY CONSTRUCTION ACTIVITY WITHIN THE RIGHT OF WAY, THE CONTRACTOR MUST NOTIFY:  
 CITY OF WEST LAKE HILLS - (512) 327-3628  
 CONTRACTOR SHALL SUBMIT PLACEMENT AND MESSAGES OF CHANGEABLE MESSAGE BOARDS TO THE ENGINEER FOR APPROVAL FOR EACH LOCATION AT LEAST FOURTEEN (14) DAYS PRIOR TO ANY CONSTRUCTION ACTIVITIES OR CHANGES TO TRAFFIC PATTERNS.
3. ALL MATERIALS AND CONSTRUCTION METHODS FOR SITE GRADING, PAVING, AND SITEWORK SHALL BE IN ACCORDANCE WITH THE CITY OF AUSTIN STANDARD SPECIFICATIONS, UNLESS OTHERWISE NOTED. ALL MATERIALS AND CONSTRUCTION METHODS FOR DRAINAGE SHALL BE IN ACCORDANCE WITH TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND BRIDGES ADOPTED NOVEMBER 1, 2014 UNLESS OTHERWISE NOTED. ALL WORK SHALL BE IN ACCORDANCE WITH THE BUILDING CODES, ORDINANCES, SAFETY CODES, AND RULES AND PROCEDURES OF THE CITY OF WEST LAKE HILLS.
4. ALL CONSTRUCTION OPERATIONS SHALL BE IN ACCORDANCE WITH APPLICABLE REGULATIONS OF THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION.
5. TRAFFIC CONTROL DEVICES, INCLUDING SIGNS AND PAVEMENT MARKINGS, PROVIDED HEREIN, SHALL BE IMPLEMENTED PER PLAN AND IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. ANY MODIFICATIONS MUST BE IN ACCORDANCE WITH TXMUTCD AND SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL.
6. ALL CONSTRUCTION ACTIVITY SHALL BE PERFORMED TO MAINTAIN A SAFE ENVIRONMENT FOR WORKERS AND PUBLIC SAFETY.
7. PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL APPLY FOR AND SECURE ALL PROPER PERMITS FROM THE APPROPRIATE AUTHORITIES.
8. BLASTING OR BURNING SHALL NOT BE PERMITTED ON THIS PROJECT.
9. THE CONTRACTOR SHALL VERIFY ALL DEPTHS AND LOCATIONS OF EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. ANY DISCREPANCIES WITH THE CONSTRUCTION PLANS FOUND IN THE FIELD SHALL BE BROUGHT TO THE ATTENTION OF THE DESIGN ENGINEER IMMEDIATELY. THE DESIGN ENGINEER SHALL BE RESPONSIBLE FOR REVISING THE PLANS AS APPROPRIATE AND SUBMITTING A REVISION TO THE CITY. CONTRACTOR SHALL TAKE PRECAUTIONARY MEASURES WHEN OPERATING IN THE VICINITY OF UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WORK WITH THE APPROPRIATE ELECTRIC / UTILITY COMPANY. CONTRACTOR SHALL CONTACT ONE CALL AND WATER DISTRICT 10 BEFORE BEGINNING CONSTRUCTION. NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK.
10. ANY CHANGES OR REVISIONS TO THESE APPROVED PLANS MUST BE SUBMITTED BY THE DESIGN ENGINEER AND APPROVED BY THE CITY OF WEST LAKE HILLS, OR THE OWNER'S REPRESENTATIVE, PRIOR TO CONSTRUCTION OF THE REVISION.
11. ANY EXISTING UTILITIES, PAVEMENT, CURBS, SIDEWALKS, STRUCTURES, TREES, ETC., NOT PLANNED FOR DESTRUCTION OR REMOVAL OR OTHER PUBLIC INFRASTRUCTURE DAMAGED OR REMOVED WILL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT HIS EXPENSE BEFORE FINAL ACCEPTANCE OF WORK.
12. CONTRACTOR WILL BE RESPONSIBLE FOR KEEPING ROADS AND DRIVES ADJACENT TO AND NEAR THE SITE FREE FROM SOIL, SEDIMENT AND DEBRIS. CONTRACTOR WILL NOT REMOVE SOIL, SEDIMENT OR DEBRIS FROM ANY AREA BY MEANS OF WATER, ONLY SHOVELING AND SWEEPING WILL BE ALLOWED. CONTRACTOR WILL BE RESPONSIBLE FOR DUST CONTROL FROM THE SITE. NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF ALL SPOILS MATERIAL FROM THE CONSTRUCTION SITE. ALL SPOILS MATERIAL SHALL BE DISPOSED OF BY THE CONTRACTOR AT AN APPROVED SPOIL SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND SECURING A PERMIT FOR THE SITE. NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK.
14. ACCESS TO RESIDENCES MUST BE MAINTAINED OVERNIGHT, BETWEEN 5PM AND 8AM. RESIDENTIAL DRIVEWAY CLOSURES MUST BE COORDINATED WITH PROPERTY OWNER AND/OR TENANT. CONSTRUCTION AT DRIVEWAYS SHALL BE COORDINATED WITH THE PROPERTY OWNER/TENANT.
15. MAINTAIN POSITIVE DRAINAGE FOR PERMANENT AND TEMPORARY WORK FOR THE DURATION OF THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR ANY ITEMS ASSOCIATED WITH THE TEMPORARY OR INTERIM DRAINAGE AND ALL RELATED MAINTENANCE. NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK.
16. CONTRACTOR PARKING: CONTRACTOR CAN UTILIZE UP TO 10 PARKING SPACES AT CITY HALL, SUBJECT TO AVAILABILITY AND CITY APPROVAL. COORDINATION SHALL BE DONE WEEKLY. PARKING ALONG RIGHT-OF-WAY WILL BE LIMITED WHERE ROADWAYS ARE ACTIVE.
17. STAGING & STORAGE: CONTRACTOR CAN USE CITY OWNED PROPERTY FOR STAGING AND STORAGE. USE WILL BE COORDINATED WITH THE CITY AND VEGETATION REMOVAL WILL BE LIMITED TO PLANTS 3-INCHES IN DIAMETER AND SMALLER.

**EROSION CONTROL NOTES:**

1. THE CONTRACTOR SHALL INSTALL EROSION/SEDIMENTATION CONTROLS AND TREE/NATURAL AREA PROTECTIVE FENCING PRIOR TO ANY SITE DISTURBANCE (CLEARING, GRUBBING OR EXCAVATION).
2. THE PLACEMENT OF EROSION/SEDIMENTATION CONTROLS SHALL BE IN ACCORDANCE WITH THE CURRENT CITY OF AUSTIN ENVIRONMENTAL CRITERIA MANUAL AS ADOPTED BY THE CITY OF WEST LAKE HILLS AND THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN. NO EROSION CONTROLS SHALL BE PLACED BEYOND THE PROPERTY LINES OF THE SITE UNLESS WRITTEN PERMISSION HAS BEEN OBTAINED FROM AFFECTED PROPERTY OWNERS.
3. MAJOR REVISIONS OF LOCATIONS OF EROSION CONTROLS MUST BE DOCUMENTED AND SUBMITTED FOR APPROVAL BY THE ENGINEER OF RECORD. MINOR CHANGES TO BE MADE AS FIELD REVISIONS TO THE EROSION AND SEDIMENTATION CONTROL PLAN MAY BE REQUIRED BY THE CITY INSPECTOR DURING THE COURSE OF CONSTRUCTION TO CORRECT CONTROL INADEQUACIES.
4. THE CONTRACTOR IS REQUIRED TO INSPECT THE CONTROLS AT WEEKLY INTERVALS AND AFTER ANY RAINFALL EVENT TO ENSURE THAT THEY ARE FUNCTIONING PROPERLY. THE PERSON(S) RESPONSIBLE FOR MAINTENANCE OF CONTROLS AND FENCES SHALL IMMEDIATELY MAKE ANY NECESSARY REPAIRS TO DAMAGED AREAS. SILT ACCUMULATION AT CONTROLS MUST BE REMOVED ONCE THE ACCUMULATED DEPTH REACHES SIX (6) INCHES.
5. PRIOR TO FINAL ACCEPTANCE BY THE CITY, HAUL ROADS AND WATERWAY CROSSINGS CONSTRUCTED FOR TEMPORARY CONTRACTOR ACCESS MUST BE REMOVED, ACCUMULATED SEDIMENT REMOVED FROM THE WATERWAY AND THE AREA RESTORED TO THE ORIGINAL GRADE OR DESIGN GRADE, AS APPROPRIATE, AND REVEGETATED OR STABILIZED. ALL LAND CLEARING DEBRIS SHALL BE DISPOSED OF IN APPROVED SPOIL DISPOSAL SITES.
6. TEMPORARY AND PERMANENT EROSION CONTROL: ALL DISTURBED AREAS SHALL BE RESTORED AS NOTED BELOW.
  - A. ALL DISTURBED AREAS TO BE REVEGETATED ARE REQUIRED TO PLACE A MINIMUM OF FOUR (4) INCHES OF TOPSOIL (SEE STANDARD SPECIFICATION ITEM NO. 601S.3(A)). DO NOT ADD TOPSOIL WITHIN THE CRITICAL ROOT ZONE OF EXISTING TREES. THE TOPSOIL SHALL BE COMPOSED OF 4 PARTS OF SOIL MIXED WITH 1 PART COMPOST, BY VOLUME. THE COMPOST SHALL MEET THE DEFINITION OF COMPOST AS DEFINED BY TXDOT SPECIFICATION ITEM 161. THE SOIL SHALL BE LOCALLY AVAILABLE NATIVE SOIL THAT MEETS THE FOLLOWING SPECIFICATIONS:
  - B. SHALL BE FREE OF TRASH, WEEDS, DELETERIOUS MATERIALS, ROCKS, AND DEBRIS.
  - C. 100% SHALL PASS THROUGH A 1.5-INCH (38-MM) SCREEN.
  - D. TOPSOIL SALVAGED FROM THE EXISTING SITE MAY OFTEN BE USED, BUT IT SHOULD MEET THE SAME STANDARDS AS SET FORTH IN THESE STANDARDS.

THE VEGETATIVE STABILIZATION OF AREAS DISTURBED BY CONSTRUCTION SHALL BE AS FOLLOWS:

**TEMPORARY VEGETATIVE STABILIZATION:**

1. FROM SEPTEMBER 15 TO MARCH 1, SEEDING SHALL BE WITH COOL SEASON COVER CROPS (WHEAT AT 0.5 POUNDS PER 1000 SF, OATS AT 0.5 POUNDS PER 1000 SF, CEREAL RYE GRAIN AT 0.5 POUNDS PER 1000 SF) WITH A TOTAL RATE OF 1.5 POUNDS PER 1000 SF. COOL SEASON COVER CROPS ARE NOT PERMANENT EROSION CONTROL.
2. FROM MARCH 2 TO SEPTEMBER 14, SEEDING SHALL BE WITH HULLED BERMUDA AT A RATE OF 1 POUNDS PER 1000 SF.
  - A. FERTILIZER SHALL BE WATER SOLUBLE WITH AN ANALYSIS OF 15-15-15 TO BE APPLIED ONCE AT PLANTING AND ONCE DURING THE PERIOD OF ESTABLISHMENT AT A RATE OF 1/2 POUND PER 1000 SF.
  - B. HYDROMULCH SHALL COMPLY WITH TABLE 1, BELOW.
  - C. TEMPORARY EROSION CONTROL SHALL BE ACCEPTABLE WHEN THE GRASS HAS GROWN AT LEAST 1-1/2 INCHES HIGH WITH 95% COVERAGE, PROVIDED NO BARE SPOTS LARGER THAN 16 SQUARE FEET EXIST.

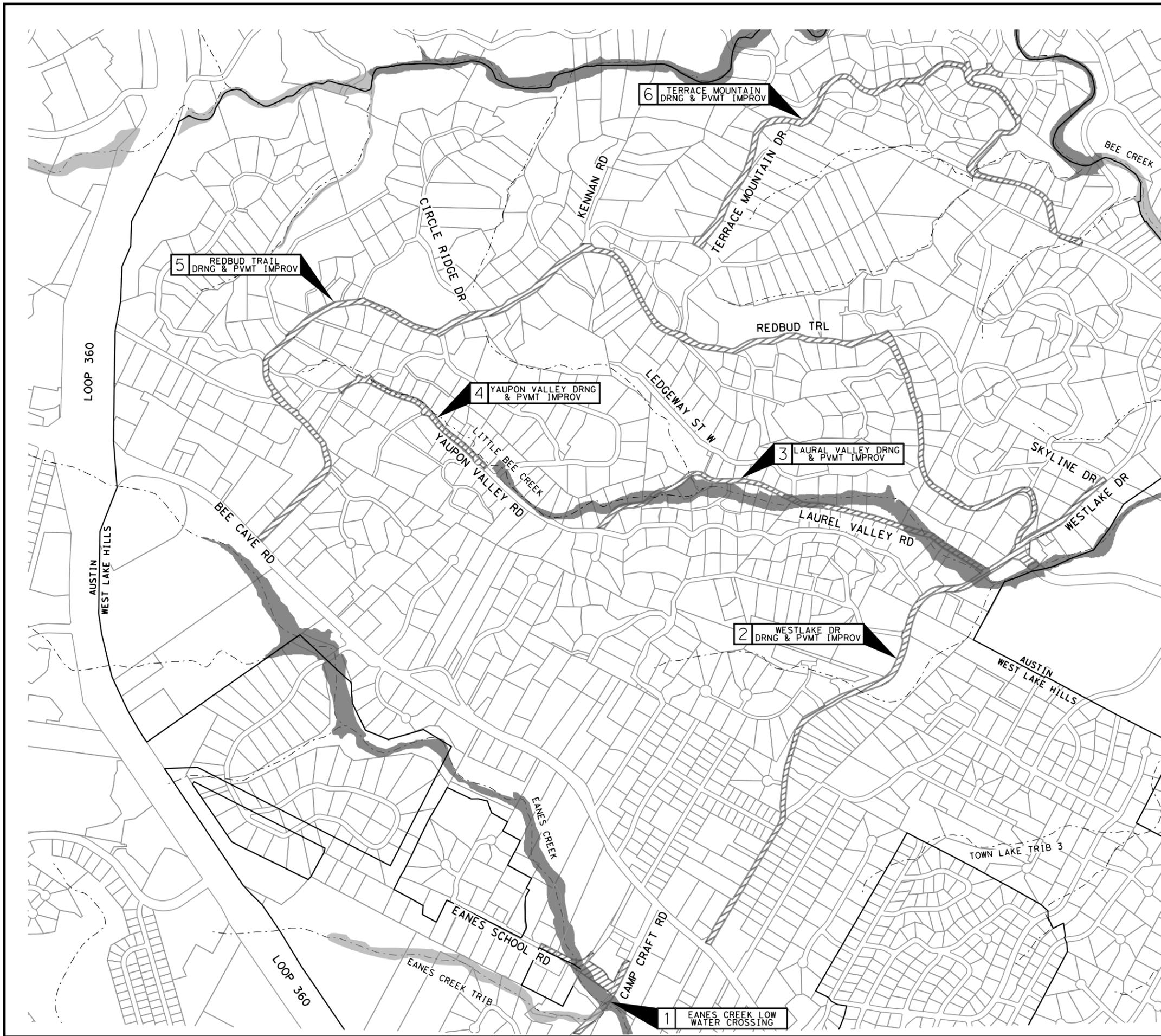
**PERMANENT VEGETATIVE STABILIZATION:**

1. FROM SEPTEMBER 15 TO MARCH 1, SEEDING IS CONSIDERED TO BE TEMPORARY STABILIZATION ONLY. IF COOL SEASON COVER CROPS EXIST WHERE PERMANENT VEGETATIVE STABILIZATION IS DESIRED, THE GRASSES SHALL BE MOWED TO A HEIGHT OF LESS THAN ONE-HALF (1/2) INCH AND THE AREA SHALL BE RE-SEEDED IN ACCORDANCE WITH 2. BELOW.
2. FROM MARCH 2 TO SEPTEMBER 14, SEEDING SHALL BE WITH HULLED BERMUDA AT A RATE OF 1 POUND PER 1000 SF WITH A PURITY OF 95% WITH 85% GERMINATION. BERMUDA GRASS IS A WARM SEASON GRASS AND IS CONSIDERED PERMANENT EROSION CONTROL.
  - A. FERTILIZER SHALL BE A WATER SOLUBLE WITH AN ANALYSIS OF 15-15-15 TO BE APPLIED ONCE AT PLANTING AND ONCE DURING THE PERIOD OF ESTABLISHMENT AT A RATE OF 1/2 POUND PER 1000 SF.
  - B. THE PLANTED AREA SHALL BE TEMPORARILY IRRIGATED OR SPRINKLED IN A MANNER THAT WILL NOT ERODE THE TOPSOIL, BUT WILL SUFFICIENTLY SOAK THE SOIL TO A DEPTH OF SIX INCHES. THE IRRIGATION SHALL OCCUR AT DAILY INTERVALS (MINIMUM) DURING THE FIRST TWO MONTHS. RAINFALL OCCURRENCES OF 1/2 INCH OR MORE SHALL POSTPONE THE WATERING SCHEDULE FOR ONE WEEK.
  - C. PERMANENT EROSION CONTROL SHALL BE ACCEPTABLE WHEN THE GRASS HAS GROWN AT LEAST 1-1/2 INCHES HIGH WITH 95% COVERAGE, PROVIDED NO BARE SPOTS LARGER THAN 16 SQUARE FEET EXIST.

**EROSION CONTROL NOTES (CONT.):**

3. THE CONTRACTOR SHALL NOT DISPOSE OF SURPLUS EXCAVATED MATERIAL FROM THE SITE WITHOUT NOTIFYING THE CITY OF WEST LAKE HILLS AT LEAST FORTY-EIGHT (48) HOURS PRIOR WITH THE LOCATION AND A COPY OF THE PERMIT ISSUED TO RECEIVE THE MATERIAL.
4. EROSION CONTROL AND STABILIZATION MEASURES MUST BE INITIATED IMMEDIATELY IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY CEASED AND WILL NOT RESUME FOR A PERIOD EXCEEDING FOURTEEN (14) CALENDAR DAYS.
5. ALL EROSION AND SEDIMENTATION CONTROLS SHALL BE OF PLASTIC FREE, BIODEGRADABLE MATERIALS UNLESS OTHERWISE SPECIFIED.

REVISION DESCRIPTION	
DATE	
BY	
REV. NO.	
	
K FRIESE & ASSOCIATES, INC. 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746 WEST LAKE HILLS BOND PROGRAM GENERAL NOTES	
	
	
WEST LAKE HILLS, TX	
SHEET 1 OF 1	
SCALE	NTS
DATE	7/17/2023
SHEET NUMBER	3 OF 388



**LEGEND**

- ROADWAY CENTERLINE
- - - STREAM CENTERLINE
- ▭ FEMA FLOODPLAIN (JAN 22, 2020)
- ▭ FEMA FLOODPLAIN (JAN 22, 2020) & FLOODWAY
- CITY LIMIT
- ▨ WORK AREA

**CONSTRUCTION SEQUENCE NOTES:**

1. THE CONTRACTOR SHALL SUBMIT A COMPREHENSIVE CONSTRUCTION SCHEDULE PER SPECIFICATIONS. CONSTRUCTION SEQUENCING SHALL BE DETERMINED BY THE CONTRACTOR WITH THE FOLLOWING RESTRICTIONS:
  - A: ALL IMPROVEMENTS SHALL BE CONSTRUCTED FROM DOWNSTREAM TO UPSTREAM.
  - B: PROJECTS WILL BE CONSTRUCTED IN THE FOLLOWING SEQUENCE:
    - WESTLAKE DRIVE DRAINAGE AND PAVEMENT IMPROV PROJECT
    - LAUREL VALLEY DRAINAGE AND PAVEMENT IMPROV PROJECT
    - YAUPON VALLEY DRAINAGE AND PAVEMENT IMPROV PROJECT
  - C: CAMP CRAFT ROAD, REDBUD TRAIL, AND WESTLAKE DRIVE CANNOT BE CONSTRUCTED CONCURRENTLY.
  - D: EANES CREEK LOW WATER CROSSINGS PROJECT TO BE CONSTRUCTED DURING SUMMER MONTHS WHEN SCHOOL IS OUT OF SESSION.
2. ATTEND PRECONSTRUCTION CONFERENCE
3. THE CONTRACTOR SHALL CONDUCT A PRE-CONSTRUCTION SURVEY PER SPECIFICATION 01335.
4. CONTRACTOR SHALL EMPLOY TRAFFIC CONTROL MEASURES PER PLAN.
5. INSTALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS AND TREE PROTECTION FENCING PER PLAN.
6. CONTRACTOR SHALL CONSTRUCT PROPOSED IMPROVEMENTS AT EACH SITE IN ACCORDANCE WITH CONSTRUCTION SCHEDULE.
7. FINAL PAVING TO BE COMPLETED AS FINAL EFFORT.
8. PERFORM FINAL CLEAN-UP WITHIN LIMITS OF CONSTRUCTION INCLUDING REMOVAL OF SEDIMENTATION CONTROLS.

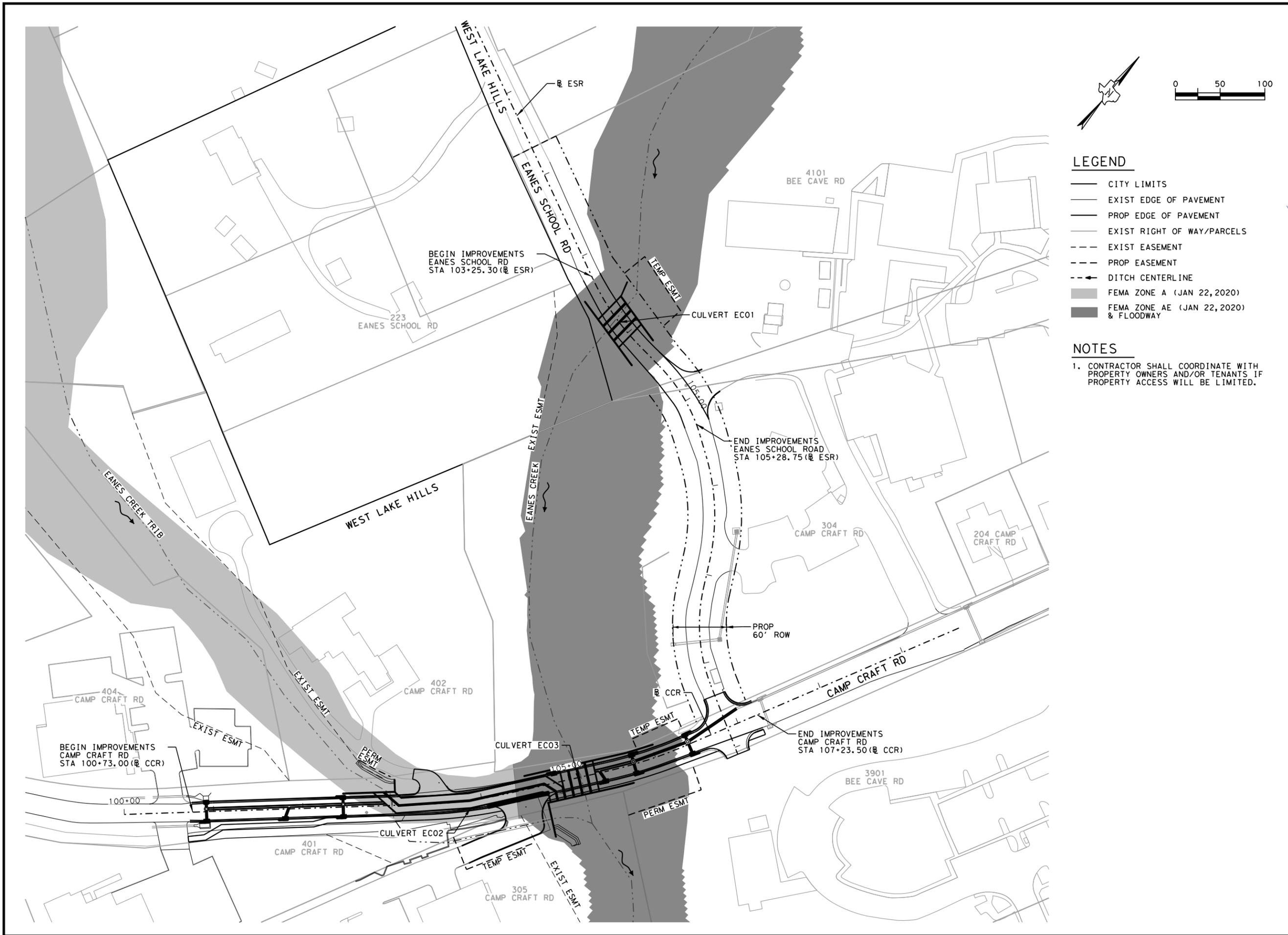
REV. NO.	BY	DATE	REVISION DESCRIPTION



K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**OVERALL PROJECT LAYOUT**



WEST LAKE HILLS, TX	
SHEET 1 OF 1	
SCALE	1"=1200'
DATE	7/17/2023
SHEET NUMBER	4 OF 388



**LEGEND**

- CITY LIMITS
- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- EXIST RIGHT OF WAY/PARCELS
- - - EXIST EASEMENT
- - - PROP EASEMENT
- - - DITCH CENTERLINE
- FEMA ZONE A (JAN 22, 2020)
- FEMA ZONE AE (JAN 22, 2020) & FLOODWAY

**NOTES**

1. CONTRACTOR SHALL COORDINATE WITH PROPERTY OWNERS AND/OR TENANTS, IF PROPERTY ACCESS WILL BE LIMITED.

REV. NO.	BY	DATE	REVISION DESCRIPTION

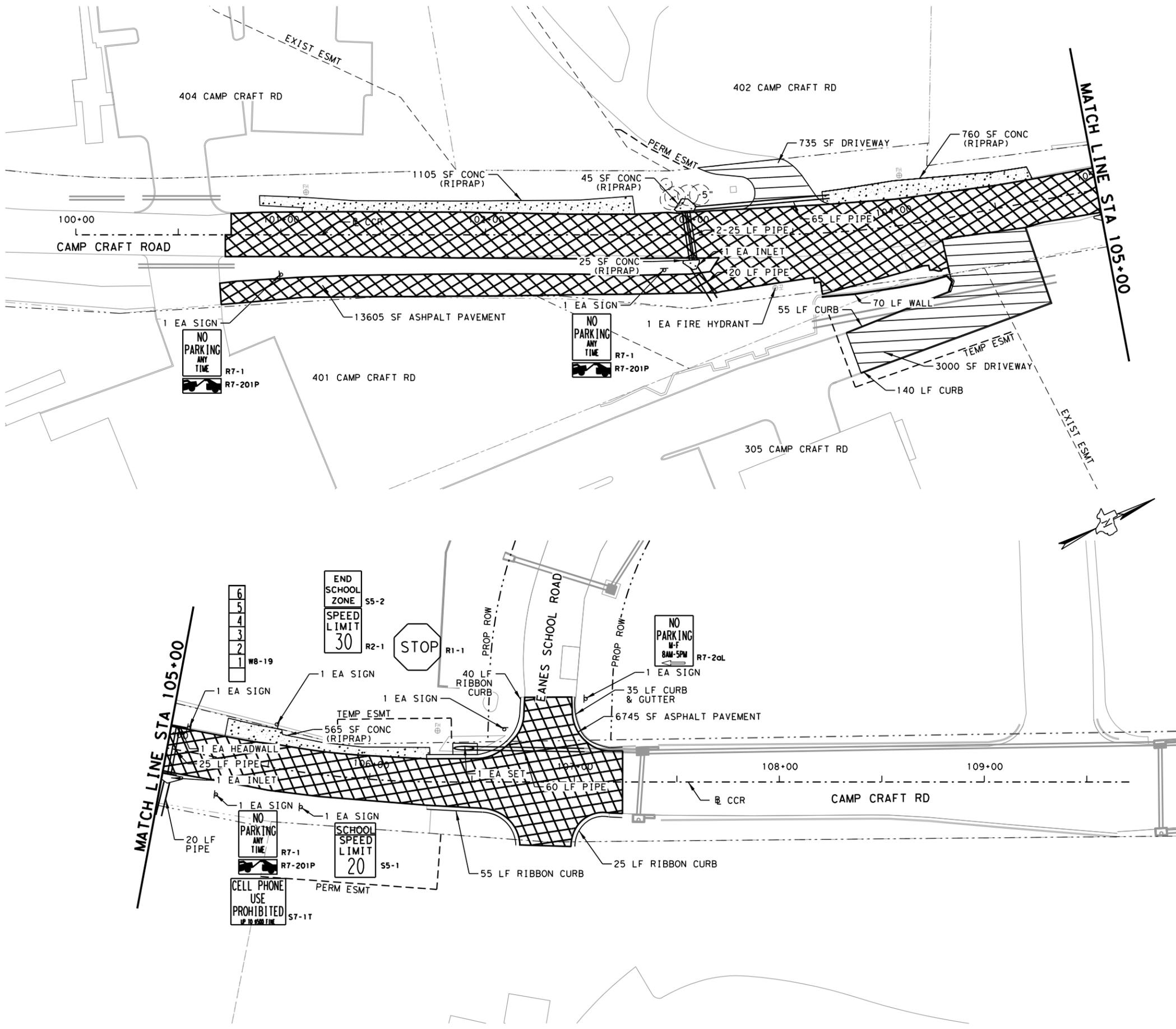
*Victoria M Ortega*

**K FRIESE & ASSOCIATES, INC.**  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**PROJECT LAYOUT**



WEST LAKE HILLS, TX	
SHEET 1 OF 1	
SCALE	1"=100'
DATE	7/17/2023
SHEET NUMBER	13 OF 388

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- ### LEGEND
- REMOVING SIGN
  - REMOVING CONC (PAVE)
  - REMOVING CONC (RIPRAP)
  - REMOVING ASPHALT PAVEMENT
  - TREES TO BE REMOVED

- ### NOTES
1. PREPARING OF RIGHT-OF-WAY (CITY OF AUSTIN BID ITEM 101S) FOR CONSTRUCTION OPERATIONS INCLUDES THE REMOVAL AND DISPOSAL OF ALL OBSTRUCTIONS FROM THE RIGHT-OF-WAY AND FROM DESIGNATED EASEMENTS, WHERE REMOVAL OF SUCH OBSTRUCTIONS IS NOT OTHERWISE INDICATED AS A SEPARATE PAY ITEM.
  2. CITY OF AUSTIN BID ITEM 101S SHALL INCLUDE, BUT NOT BE LIMITED TO, THE REMOVAL OF TREES, STUMPS, ROOTS, BUSHES, SHRUBS, CURB AND GUTTER, DRIVEWAYS, PAVED PARKING AREAS, MISCELLANEOUS STONE, BRICK, SIDEWALKS, DRAINAGE STRUCTURES, MANHOLES, INLETS, ABANDONED RAILROAD TRACKS, SCRAP IRON, AND ALL RUBBISH AND DEBRIS WHETHER ABOVE OR BELOW GROUND. CARE SHOULD BE TAKEN TO IDENTIFY AND PROTECT EXISTING INFRASTRUCTURE.
  3. REMOVAL OF THE EXISTING ROADWAY FOR RECONSTRUCTION SHALL BE SUBSIDIARY TO STREET EXCAVATION, BID ITEM 110S-A.
  4. ONLY SIGNS IMPACTED SHALL BE REMOVED AND REPLACED, AS INDICATED. SIGN PLAQUES IN GOOD CONDITION CAN BE STORED AND REINSTALLED ON NEW POSTS. ENGINEER WILL MAKE FINAL DETERMINANT OF APPROVED SIGNS.

TREE REMOVAL		
TREE ID	SIZE	TYPE
4070	5"	ASHE JUNIPER

REV. NO.	BY	DATE	REVISION DESCRIPTION



K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**REMOVAL LAYOUT**  
**CAMP CRAFT RD STA BEGIN - END**



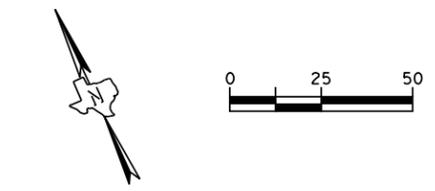
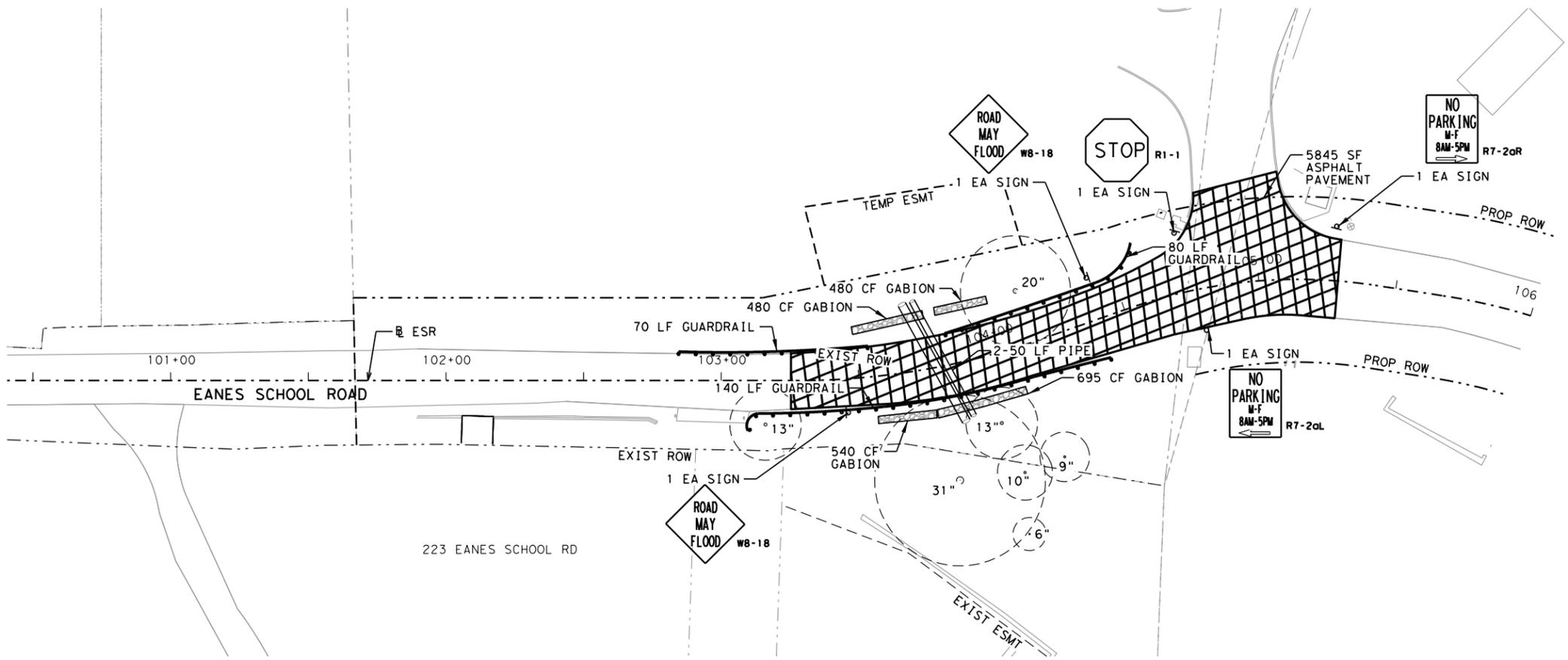
WEST LAKE HILLS, TX

SHEET 1 OF 2

SCALE 1"=50'

DATE 7/17/2023

SHEET NUMBER 14 OF 388



- LEGEND**
- REMOVING SIGN
  - REMOVING CONC (PAVE)
  - REMOVING CONC (RIPRAP)
  - REMOVING ASPHALT PAVEMENT
  - TREES TO BE REMOVED

- NOTES**
1. PREPARING OF RIGHT-OF-WAY (CITY OF AUSTIN BID ITEM 101S) FOR CONSTRUCTION OPERATIONS INCLUDES THE REMOVAL AND DISPOSAL OF ALL OBSTRUCTIONS FROM THE RIGHT-OF-WAY AND FROM DESIGNATED EASEMENTS, WHERE REMOVAL OF SUCH OBSTRUCTIONS IS NOT OTHERWISE INDICATED AS A SEPARATE PAY ITEM.
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TREE REMOVAL		
TREE ID	SIZE	TYPE
973	13"	SYCAMORE
974	20"	LIGUSTRUM
975	31"	PECAN
979	13"	HACKBERRY
1515	6"	SYCAMORE
1541	10"	SYCAMORE
1542	9"	SYCAMORE

REV. NO.	BY	DATE	REVISION DESCRIPTION



K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**REMOVAL LAYOUT**  
**EANES SCHOOL RD STA BEGIN - END**



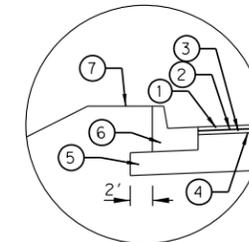
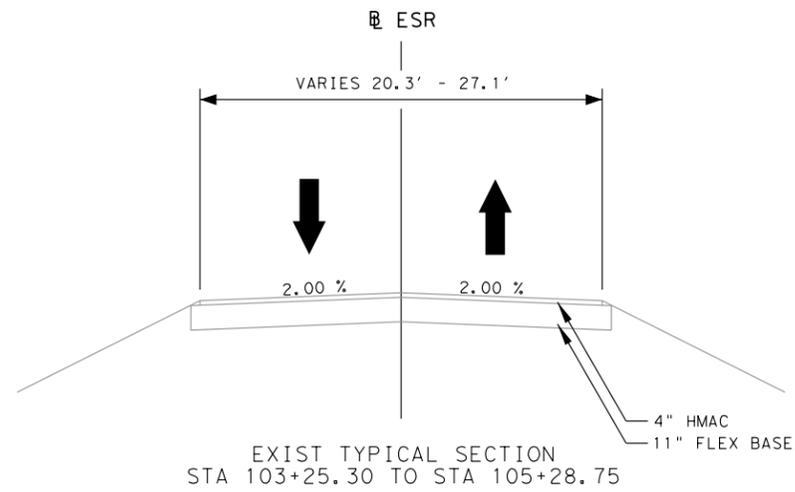
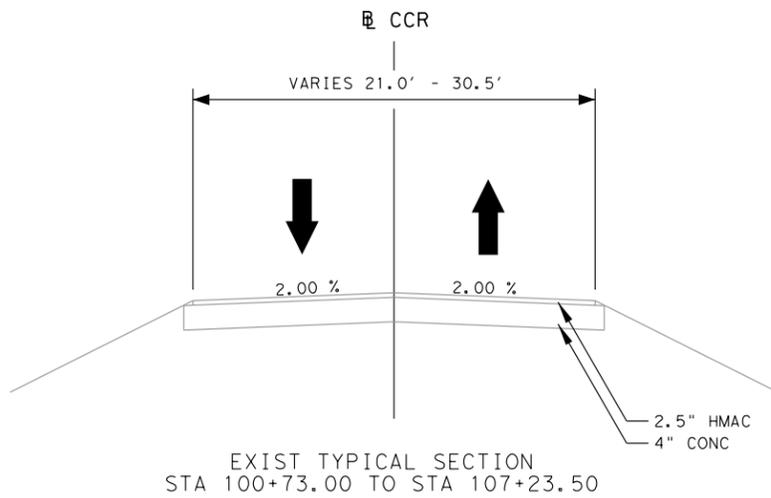
WEST LAKE HILLS, TX

SHEET 2 OF 2

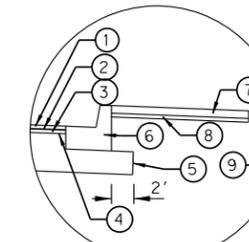
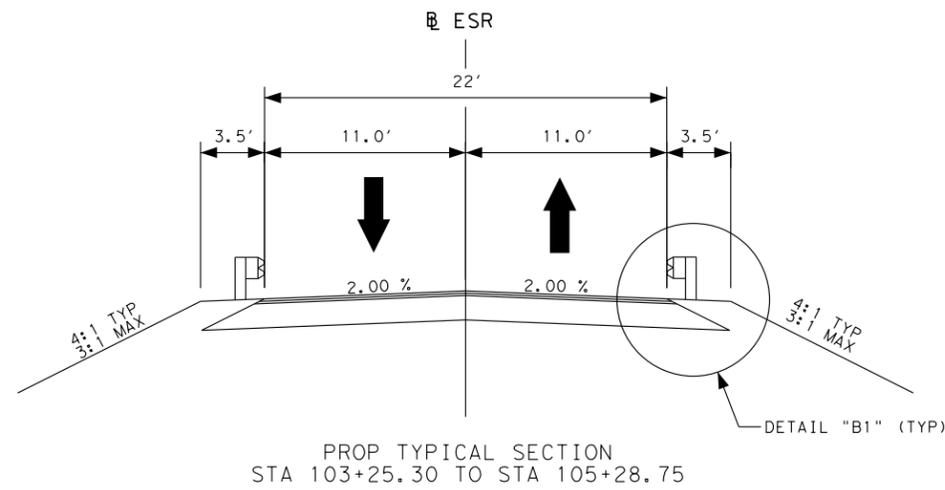
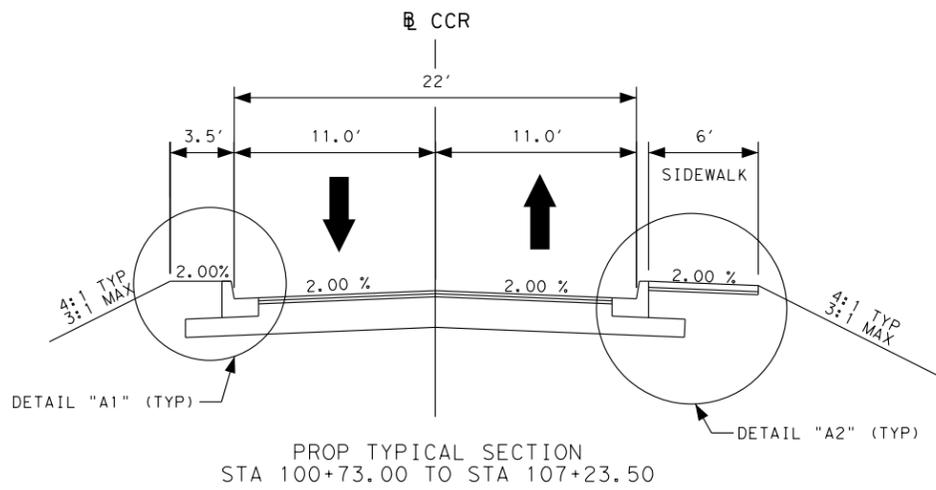
SCALE 1"=50'

DATE 7/17/2023

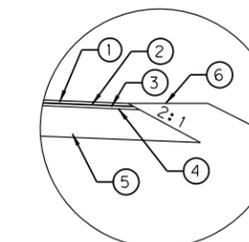
SHEET NUMBER **15** OF **388**



- DETAIL "A1"  
N. T. S.
- ① 1.5" HMAC TYPE D (340S)
  - ② TACK COAT (307S)
  - ③ 2" HMAC TYPE D (340S)
  - ④ PRIME COAT (306S)
  - ⑤ 10" FLEXIBLE BASE
  - ⑥ CURB AND GUTTER TYPE II P.C. (430S)
  - ⑦ 4" TOPSOIL (604S) AND SEEDING (604S)



- DETAIL "A2"  
N. T. S.
- ① 1.5" HMAC TYPE D (340S)
  - ② TACK COAT (307S)
  - ③ 2" HMAC TYPE D (340S)
  - ④ PRIME COAT (306S)
  - ⑤ 10" FLEXIBLE BASE
  - ⑥ CURB AND GUTTER TYPE II P.C. (430S)
  - ⑦ 5" SIDEWALK
  - ⑧ 2" SAND CUSHION
  - ⑨ 4" TOPSOIL (604S) AND SEEDING (604S)



- DETAIL "B1"  
N. T. S.
- ① 1.5" HMAC TYPE D (340S)
  - ② TACK COAT (307S)
  - ③ 2" HMAC TYPE D (340S)
  - ④ PRIME COAT (306S)
  - ⑤ 10" FLEXIBLE BASE
  - ⑥ 4" TOPSOIL (604S) AND SEEDING (604S)

REV. NO.	BY	DATE	REVISION DESCRIPTION

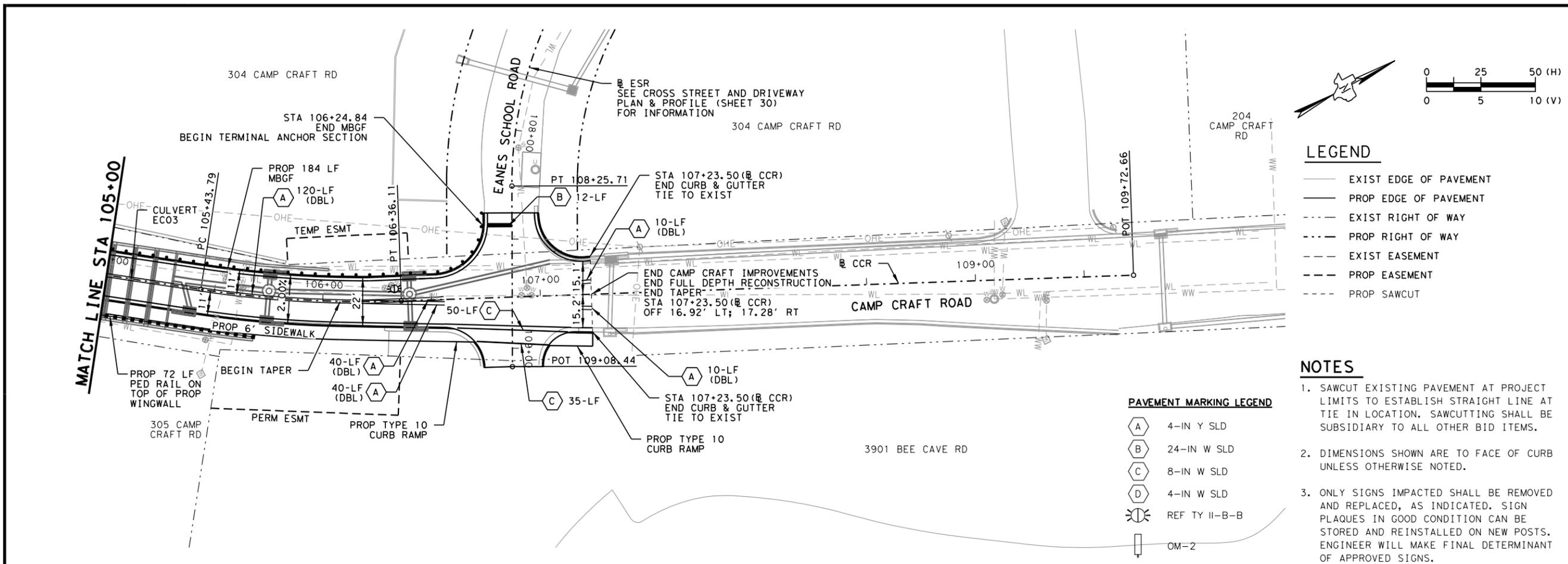


K FRIESE & ASSOCIATES, INC.  
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
WEST LAKE HILLS BOND PROGRAM  
EANES CREEK LOW WATER CROSSINGS  
TYPICAL SECTIONS



WEST LAKE HILLS, TX	
SHEET 1 OF 1	
SCALE	NTS
DATE	7/17/2023
SHEET NUMBER	17 OF 388





**LEGEND**

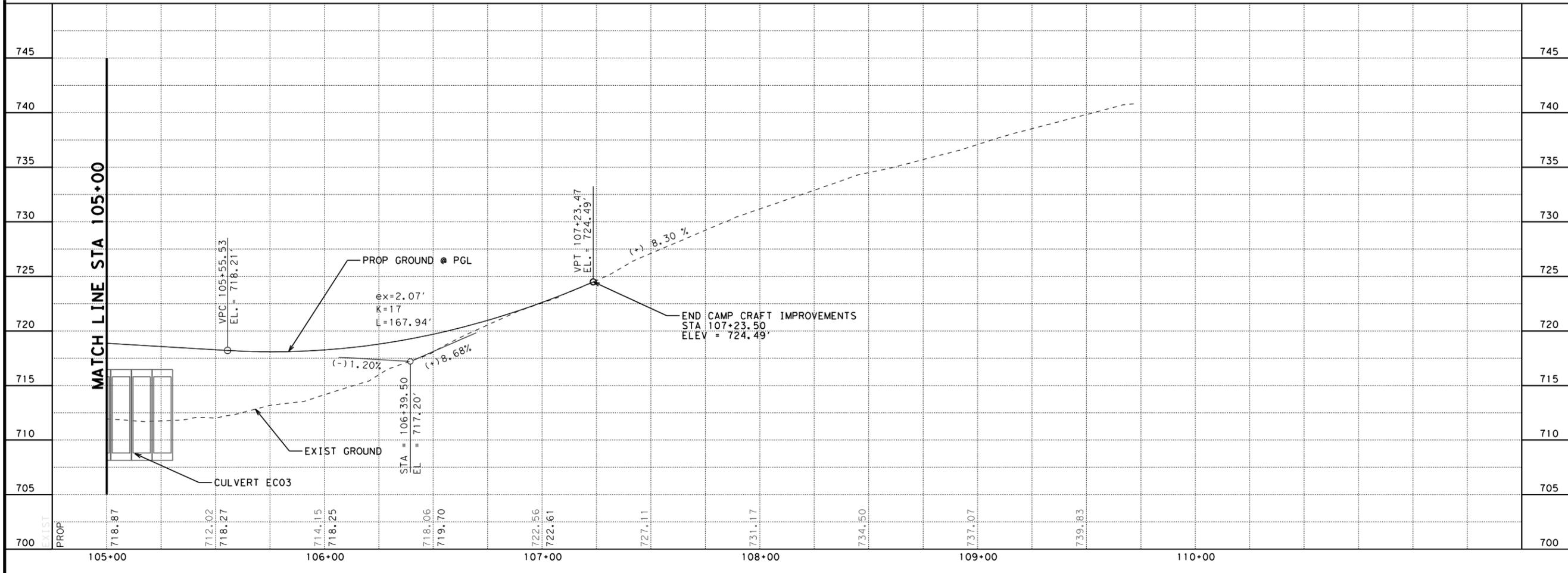
- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- - - EXIST EASEMENT
- - - PROP EASEMENT
- - - PROP SAWCUT

**PAVEMENT MARKING LEGEND**

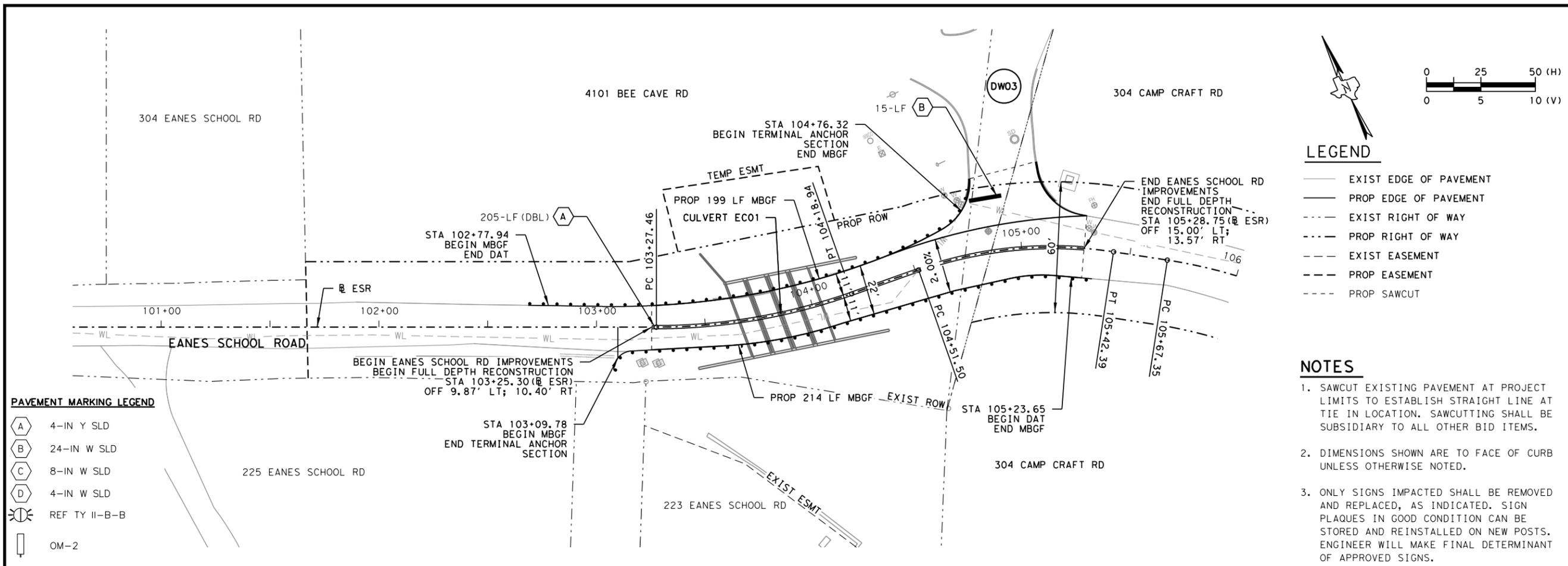
- (A) 4-IN Y SLD
- (B) 24-IN W SLD
- (C) 8-IN W SLD
- (D) 4-IN W SLD
- ⊕ REF TY II-B-B
- OM-2

**NOTES**

1. SAWCUT EXISTING PAVEMENT AT PROJECT LIMITS TO ESTABLISH STRAIGHT LINE AT TIE IN LOCATION. SAWCUTTING SHALL BE SUBSIDIARY TO ALL OTHER BID ITEMS.
2. DIMENSIONS SHOWN ARE TO FACE OF CURB UNLESS OTHERWISE NOTED.
3. ONLY SIGNS IMPACTED SHALL BE REMOVED AND REPLACED, AS INDICATED. SIGN PLAQUES IN GOOD CONDITION CAN BE STORED AND REINSTALLED ON NEW POSTS. ENGINEER WILL MAKE FINAL DETERMINANT OF APPROVED SIGNS.



REVISION DESCRIPTION					
DATE					
REV. BY					
NO.					
<b>K FRIESE &amp; ASSOCIATES, INC.</b> 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746 <b>WEST LAKE HILLS BOND PROGRAM</b> <b>EANES CREEK LOW WATER CROSSINGS</b> <b>ROADWAY PLAN &amp; PROFILE</b> <b>CAMP CRAFT RD STA 105+00 - END</b>					
WEST LAKE HILLS, TX					
SHEET 2 OF 3					
SCALE 1"=50' H; 1"=10' V					
DATE 7/17/2023					
SHEET NUMBER 25 OF 388					



**LEGEND**

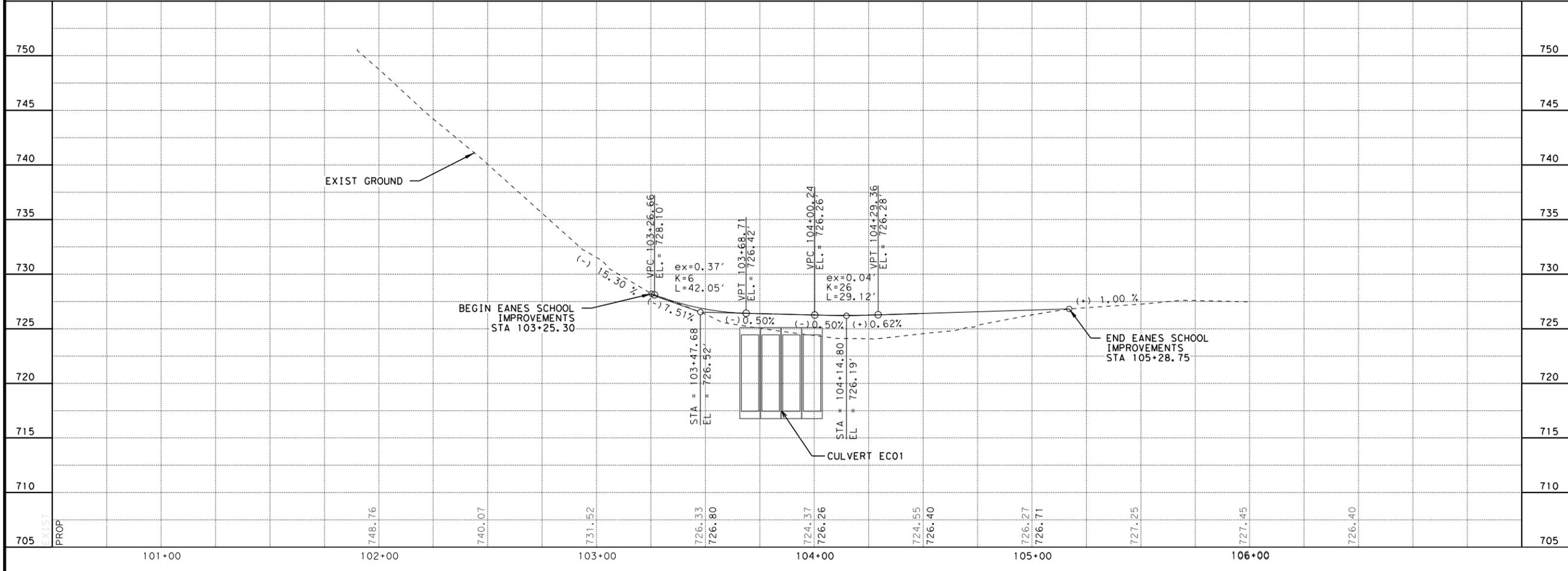
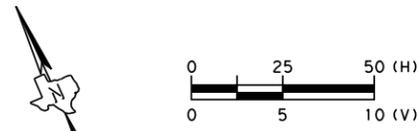
- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- - - EXIST EASEMENT
- - - PROP EASEMENT
- - - PROP SAWCUT

**NOTES**

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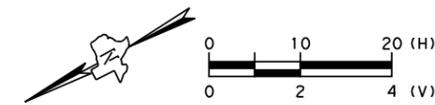
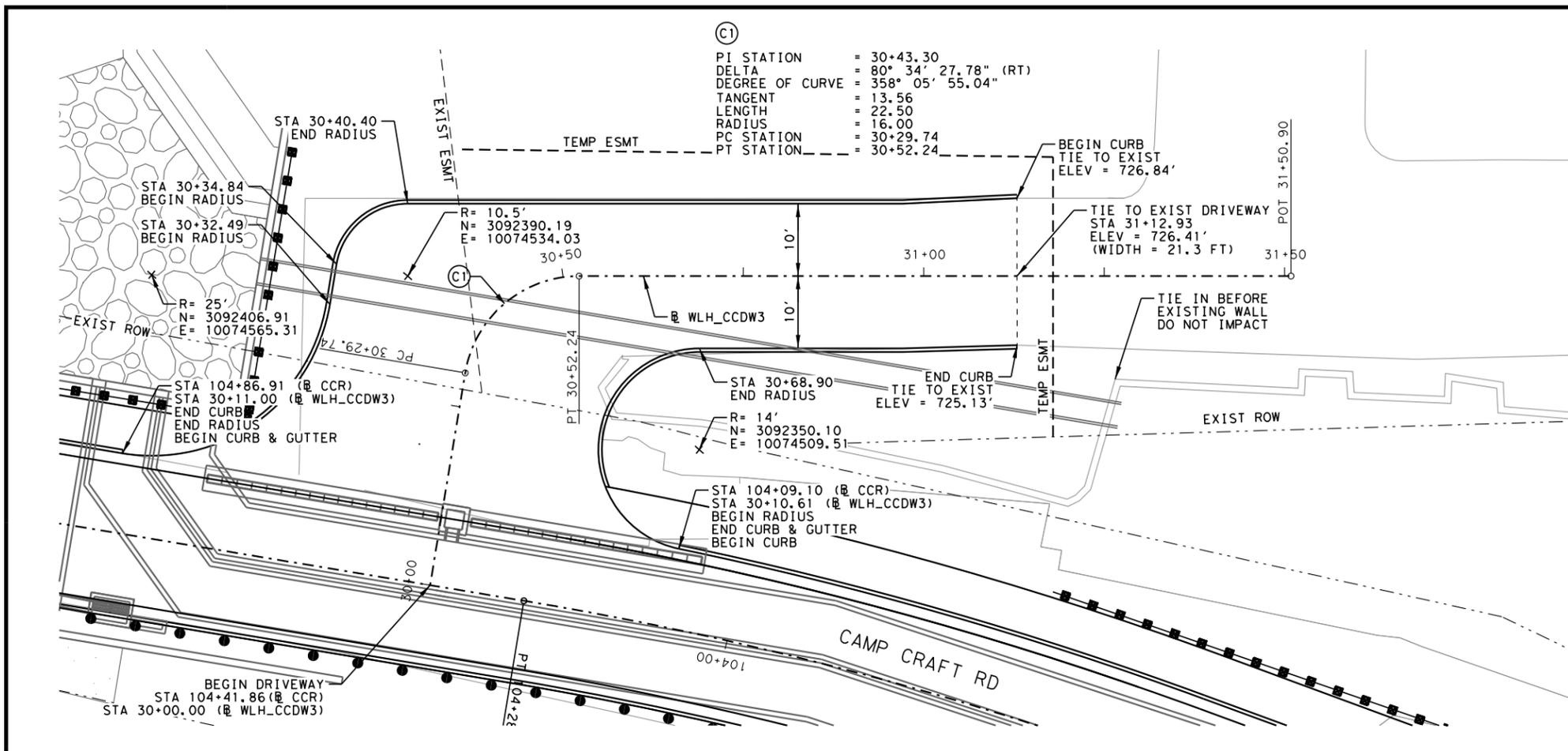
**PAVEMENT MARKING LEGEND**

- (A) 4-IN Y SLD
- (B) 24-IN W SLD
- (C) 8-IN W SLD
- (D) 4-IN W SLD
- REF TY II-B-B
- OM-2



REVISION DESCRIPTION					
DATE					
REV. BY					
NO.					
<b>K FRIESE &amp; ASSOCIATES, INC.</b> 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746 <b>WEST LAKE HILLS BOND PROGRAM</b> <b>EANES CREEK LOW WATER CROSSINGS</b> <b>ROADWAY PLAN &amp; PROFILE</b> <b>EANES SCHOOL RD STA BEGIN - END</b>					
WEST LAKE HILLS, TX					
SHEET 3 OF 3					
SCALE		1"=50' H; 1"=10' V			
DATE		7/17/2023			
SHEET NUMBER		26 OF 388			





**LEGEND**

- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- - - EXIST EASEMENT
- - - PROP EASEMENT
- - - PROP SAWCUT

**NOTES**

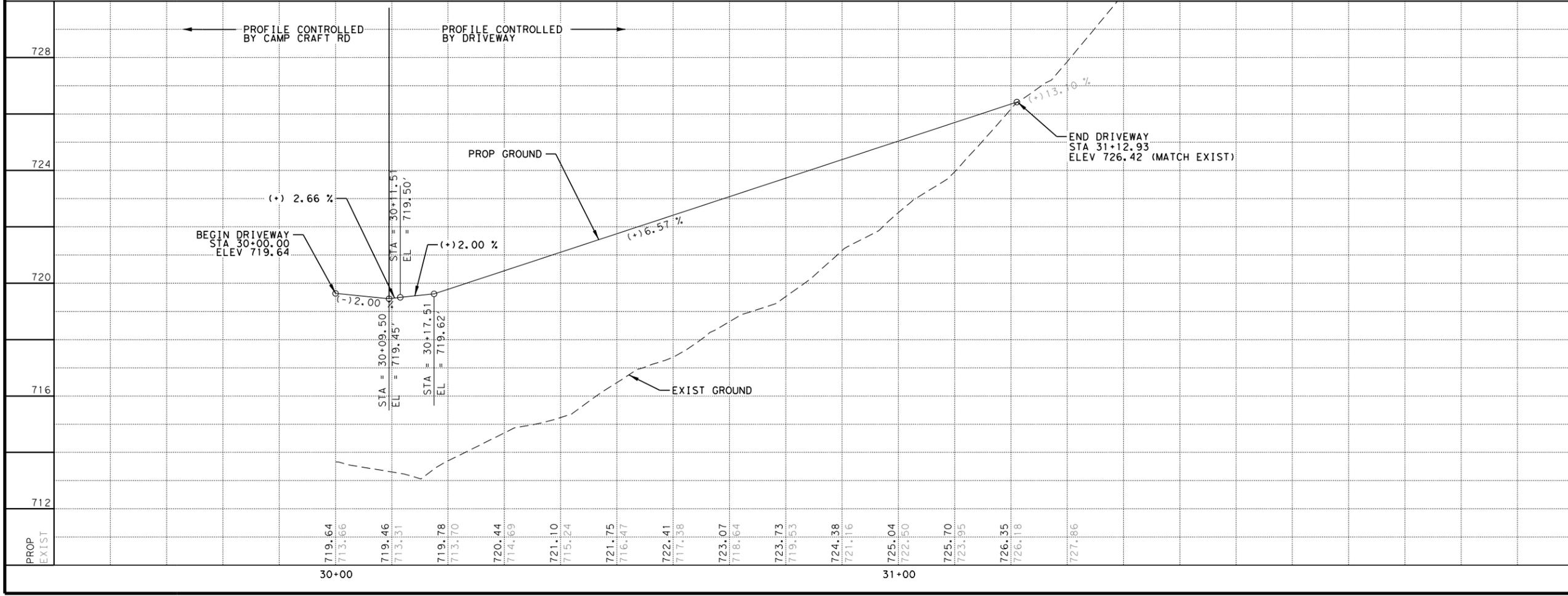
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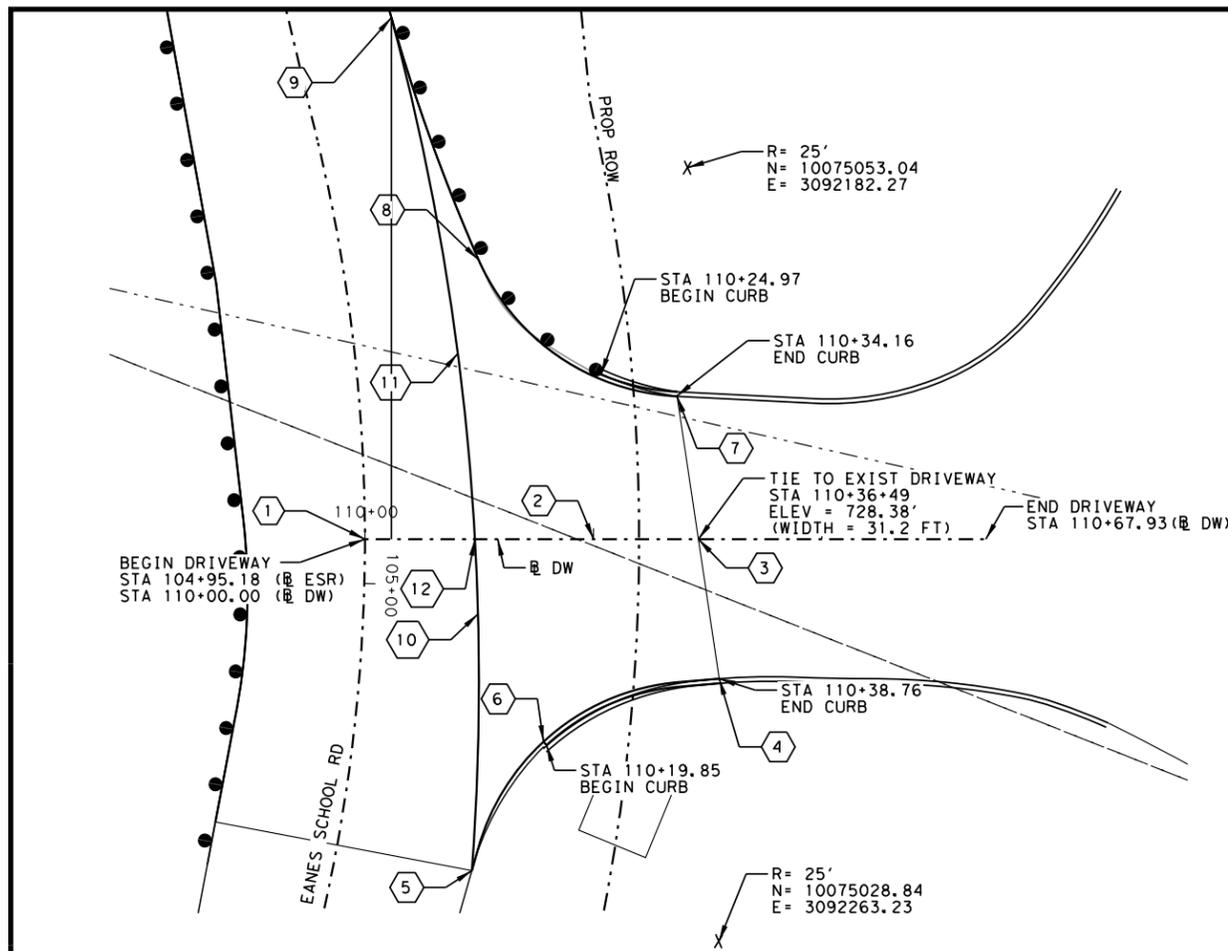
REV. NO.	BY	DATE	REVISION DESCRIPTION

**K FRIESE & ASSOCIATES, INC.**  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**CROSS STREET AND DRIVEWAY PLAN & PROFILE**  
**DRIVEWAY 02**



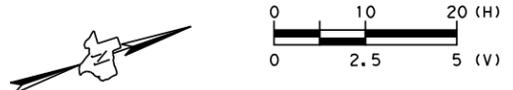
WEST LAKE HILLS, TX	
SHEET 2 OF 4	
SCALE	1":20' H; 1":4' V
DATE	7/17/2023
SHEET NUMBER	28 OF 388





POINT	STATION	OFFSET	ELEVATION	POINT DESCRIPTION
1	110+00.00	0.00	726.68*	TIE TO PAVEMENT
2	110+25.00	0.00	727.48	CENTER LINE
3	110+36.49	0.00	728.38*	TIE TO PAVEMENT
4	110+38.80	15.72	728.95*	TIE TO PAVEMENT
5	110+11.70	36.17	727.18*	TIE TO PAVEMENT
6	110+19.54	22.10	727.09	GUTTER
7	110+34.20	-16.10	727.28*	TIE TO EXIST GUTTER
8	110+12.44	-30.50	726.56	EDGE OF PAVEMENT
9	110+02.90	-56.93	726.12*	TIE TO PAVEMENT
10	110+12.37	8.16	726.48*	GUTTER
11	110+10.16	-20.26	726.34*	GUTTER
12	110+11.00	0.00	726.46*	GUTTER

\* MATCH EXISTING  
\* MATCH PROPOSED EANES SCHOOL RD

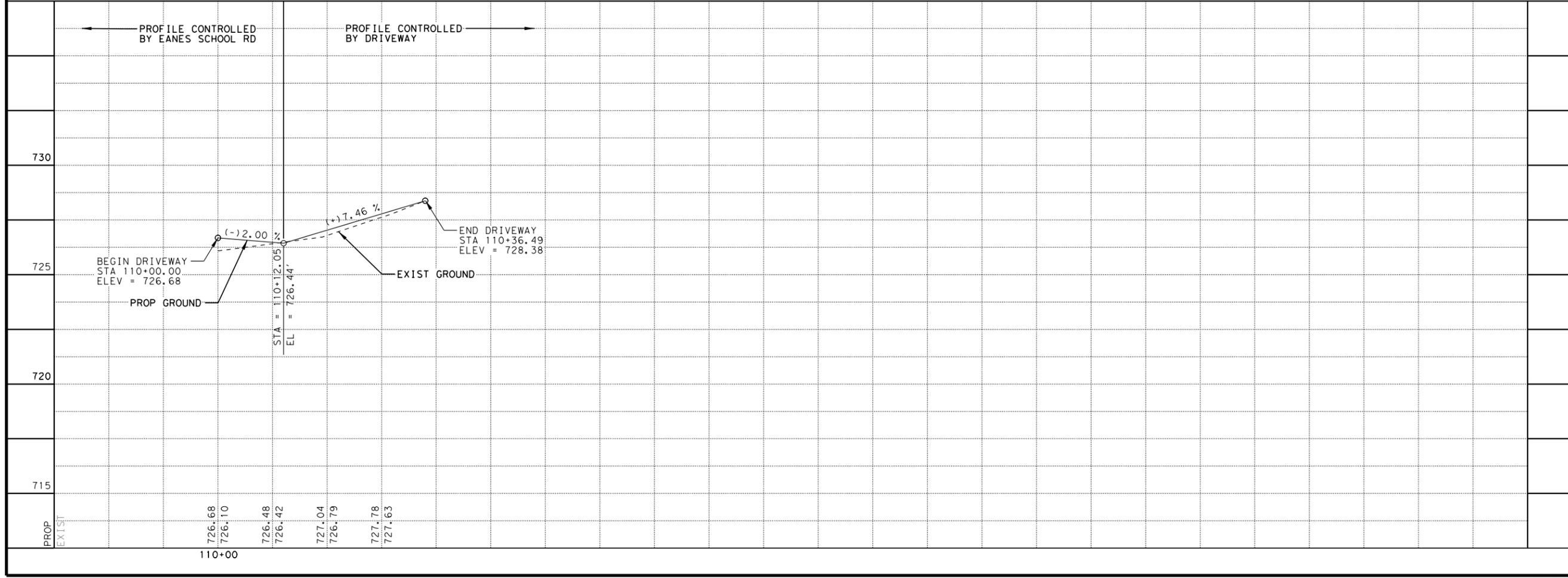


**LEGEND**

- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- - - EXIST EASEMENT
- - - PROP EASEMENT
- - - PROP SAWCUT

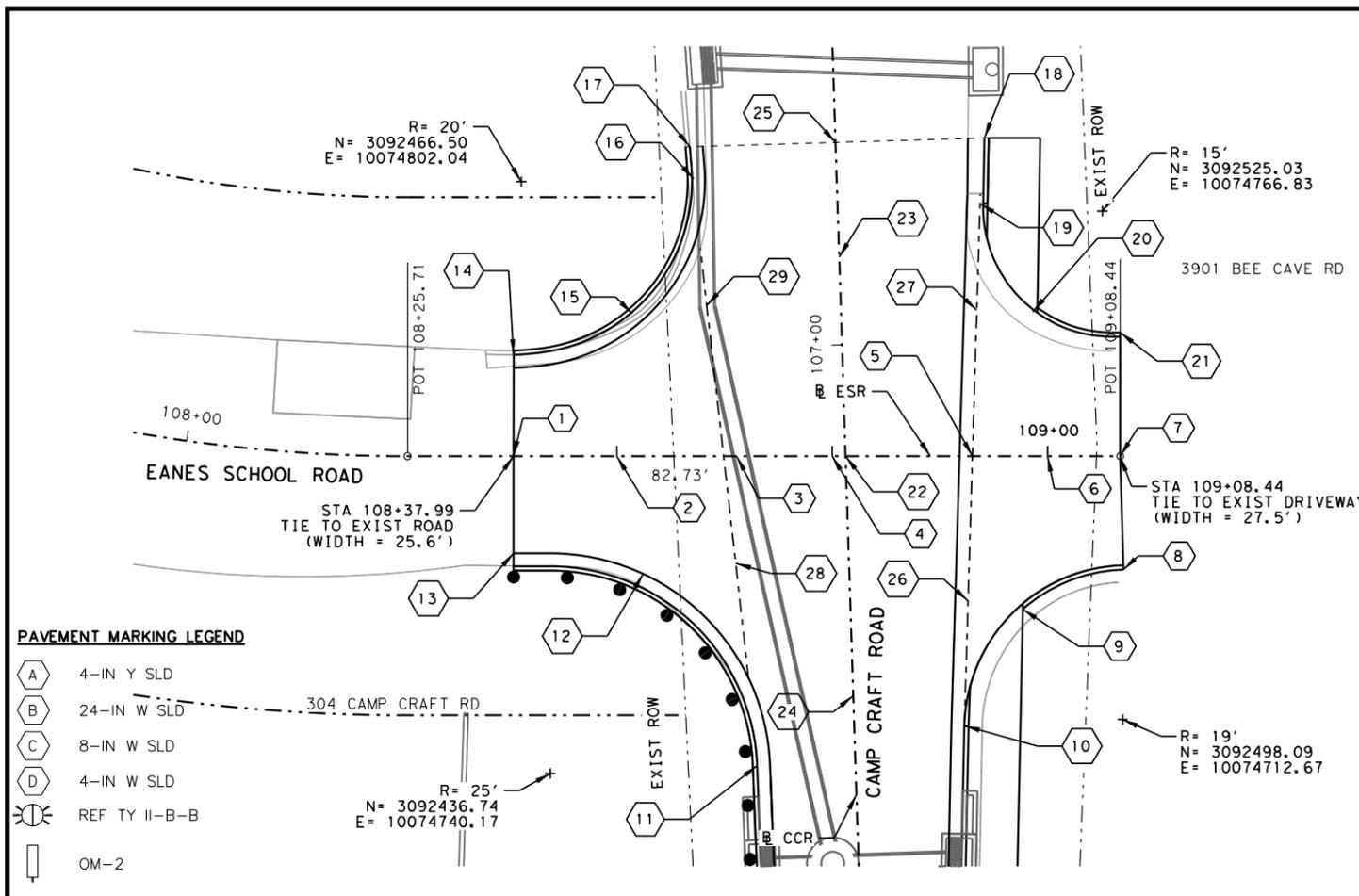
**NOTES**

1. SAWCUT EXISTING PAVEMENT AT PROJECT LIMITS TO ESTABLISH STRAIGHT LINE AT TIE IN LOCATION. SAWCUTTING SHALL BE SUBSIDIARY TO ALL OTHER BID ITEMS.
2. DIMENSIONS SHOWN ARE TO FACE OF CURB UNLESS OTHERWISE NOTED.
3. ONLY SIGNS IMPACTED SHALL BE REMOVED AND REPLACED, AS INDICATED. SIGN PLAQUES IN GOOD CONDITION CAN BE STORED AND REINSTALLED ON NEW POSTS. ENGINEER WILL MAKE FINAL DETERMINANT OF APPROVED SIGNS.



REVISION DESCRIPTION					
DATE					
REV. NO.					
<b>K FRIESE &amp; ASSOCIATES, INC.</b> 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746 <b>WEST LAKE HILLS BOND PROGRAM</b> <b>EANES CREEK LOW WATER CROSSINGS</b> <b>CROSS STREET AND DRIVEWAY PLAN &amp; PROFILE</b> <b>DRIVEWAY 03</b>					
WEST LAKE HILLS, TX					
SHEET 3 OF 4					
SCALE		1":20' H; 1":4' V			
DATE		7/17/2023			
SHEET NUMBER		29 OF 388			

x:\Projects\0846\_WLH\_Bond Projects\300 Plans and Drawings\330 Plan Production\333 Plan Sheets\02\_Eanes Creek\0846ShrDRdr.wyEA01.dgn



POINT	STATION	OFFSET	ELEVATION	POINT DESCRIPTION
1	108+37.99	0.00	721.67*	CENTER LINE
2	108+50.00	0.00	721.59	CENTER LINE
3	108+63.91	0.00	721.49	CENTER LINE
4	108+75.00	0.00	721.69	CENTER LINE
5	108+91.29	0.00	721.47	CENTER LINE
6	109+00.00	0.00	721.68	CENTER LINE
7	109+08.44	0.00	721.98*	CENTER LINE
8	109+08.44	13.13	721.18*	GUTTER
9	108+97.14	16.96	720.529	GUTTER
10	108+90.35	31.45	719.68*	GUTTER
11	108+67.79	35.77	719.58	GUTTER
12	108+53.06	13.63	720.77	GUTTER
13	108+37.99	12.26	720.86*	GUTTER
14	108+37.99	-10.33	722.10	TOP OF CURB
15	108+51.81	-16.52	723.00	GUTTER
16	108+60.41	-32.46	723.89	GUTTER
17	108+60.30	-36.91	724.19	GUTTER
18	108+90.77	-36.89	724.14	GUTTER
19	108+90.70	-30.41	723.51*	GUTTER
20	108+98.28	-16.74	722.66	GUTTER
21	109+08.44	-14.33	722.81*	GUTTER
22	108+76.56	0.00	721.72	CENTER LINE
23	108+75.82	-23.06	723.38*	CENTER LINE
24	108+77.45	27.76	720.13*	CENTER LINE
25	108+75.39	-36.40	724.49*	TIE TO PAVEMENT
26	108+90.35	16.77	720.41*	GUTTER
27	108+91.79	-16.93	722.53*	GUTTER
28	108+63.80	12.42	720.68*	GUTTER
29	108+60.44	-17.49	722.72*	GUTTER

\* MATCH EXISTING  
\* MATCH PROPOSED CAMP CRAFT RD



**LEGEND**

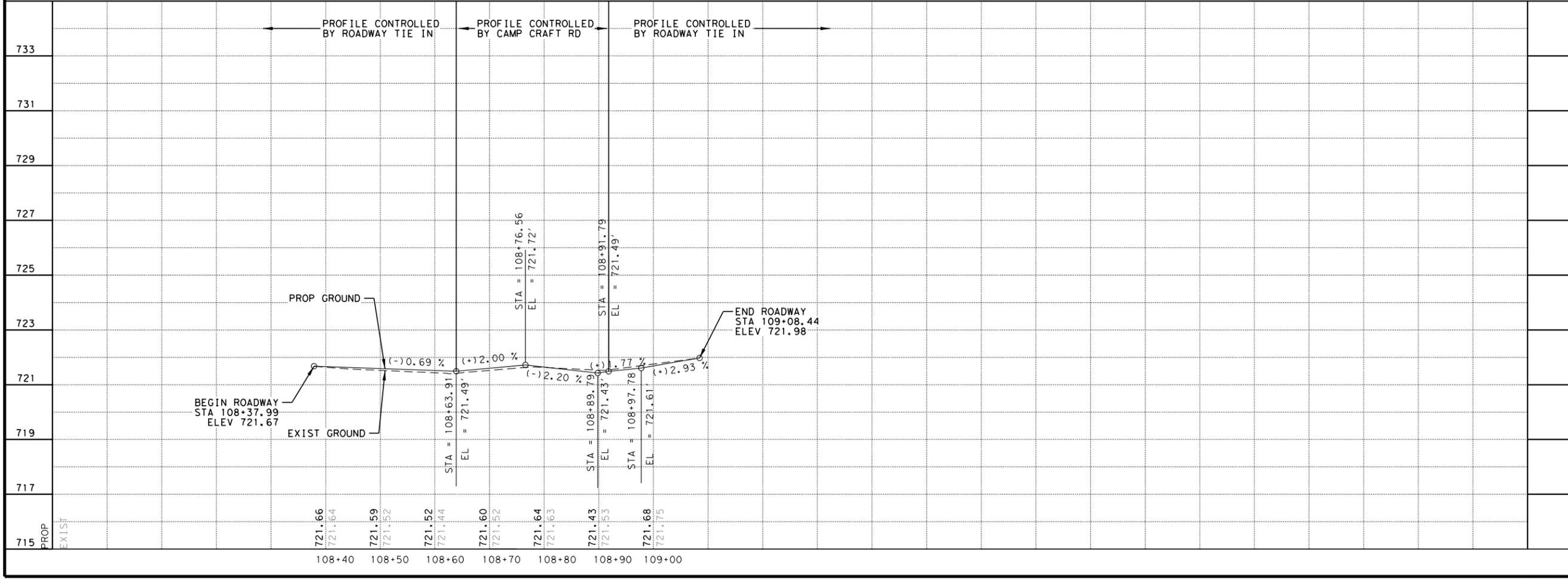
- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- - - EXIST EASEMENT
- - - PROP EASEMENT
- - - PROP SAWCUT

**NOTES**

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**PAVEMENT MARKING LEGEND**

- A 4-IN Y SLD
- B 24-IN W SLD
- C 8-IN W SLD
- D 4-IN W SLD
- REF TY II-B-B
- OM-2



REVISION DESCRIPTION DATE BY NO.		<p style="text-align: center;">K FRIESE &amp; ASSOCIATES, INC.</p> <p style="text-align: center;">1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746</p> <p style="text-align: center;">WEST LAKE HILLS BOND PROGRAM EANES CREEK LOW WATER CROSSINGS CROSS STREET AND DRIVEWAY PLAN &amp; PROFILE EANES SCHOOL ROAD</p> <p style="text-align: center;"><b>K·FRIESE + ASSOCIATES</b> PUBLIC PROJECT ENGINEERING (FIRM # 6535)</p> <p style="text-align: center;"><b>WEST LAKE HILLS TEXAS</b></p> <p style="text-align: center;">WEST LAKE HILLS, TX</p> <p style="text-align: right;">SHEET 4 OF 4</p> <p>SCALE 1"=20' H; 1"=4' V</p> <p>DATE 7/17/2023</p> <p>SHEET NUMBER <b>30</b> OF <b>388</b></p>
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**LEGEND**

- PARCEL
- - - STREAM CENTERLINE
- ▨ FEMA FLOODPLAIN ZONE A WITH FLOODWAY
- ▩ FEMA FLOODPLAIN ZONE AE WITH FLOODWAY
- ▭ DRAINAGE BOUNDARY
- XX DRAINAGE AREA ID
- XX AC DRAINAGE AREA
- - - FLOW PATH
- FLOW DIRECTION
- XX## POINT OF INTEREST

**NOTES**

1. THE FLOODPLAIN SHOWN IS ZONE AE ACCORDING TO TRAVIS COUNTY FIRM PANELS 48453C0440J AND 48453C0445K EFFECTIVE JANUARY 22, 2020.
2. PEAK FLOWS WERE COMPUTED FROM THE SCS UNIT HYDROGRAPH FOR EACH SUBBASIN WITH AN SCS CURVE NUMBER LOSS METHOD.
3. PRECIPITATION DEPTHS WERE OBTAINED FROM THE CITY OF WEST LAKE HILLS DRAINAGE AND EROSION CONTROL CRITERIA MANUAL. FLOWS ARE REPRESENTATIVE OF ATLAS 14.
4. REFER TO LAUREL VALLEY DRNG & PVMT IMPROV DRAINAGE AREA MAP FOR INFORMATION ON SUBBASINS SHOWN WITHOUT AREAS IN ACRES.

OVERALL CONTRIBUTING DRAINAGE AREAS GREATER THAN 200-ACRES										
DRAINAGE AREA ID	SCS UNIT HYDROGRAPH PARAMETERS			SCS COMPUTED FLOW RATES						
	AREA (AC)	AREA (SQ MI)	CN	Tc (MIN)	LAG TIME (MIN)	Q2 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
EC01	609	0.951	83	54.9	32.9	868	1620	2130	2533	2971
EC02	182	0.285	83	36.8	22.1	325	602	788	933	1089
EC03	15	0.024	81	11.5	6.9	42	80	105	124	145

POINT OF INTEREST	SCS COMPUTED FLOW RATES				
	Q2 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
EC01	868	1620	2130	2533	2971
EC02	325	602	788	933	1089
EC03	875	1630	2138	2541	2984

REV. NO.	BY	DATE	REVISION DESCRIPTION

Victoria M Ortega  
  
 7/17/2023

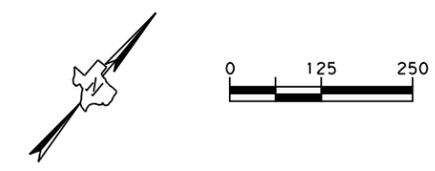
K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**DRAINAGE AREA MAP**  
**CROSS STRUCTURES**

**K·FRIESE + ASSOCIATES**  
 PUBLIC PROJECT ENGINEERING  
 (FIRM # 6535)



WEST LAKE HILLS, TX	
SHEET 1 OF 2	
SCALE	1"=1000'
DATE	7/17/2023
SHEET NUMBER	31 OF 388





**LEGEND**

- EDGE OF PAVEMENT
- - - PARCELS
- - - STREAM CENTERLINE
- FEMA FLOODPLAIN (JAN 22, 2020)
- FEMA FLOODPLAIN (JAN 22, 2020) & FLOODWAY
- ▨ PRE-PROJECT INUNDATION BOUNDARY
- ▩ POST-PROJECT INUNDATION BOUNDARY
- HEC-RAS CROSS SECTION

RIVER	HEC-RAS STA	100-YR WSEL (FT)		
		EXIST	PROP	DIFF
EC	3782	745.86	745.85	-0.01
EC	3722	743.36	743.36	0.00
EC	3606	741.13	741.13	0.00
EC	3460	738.55	738.55	0.00
EC	3306	736.35	736.33	-0.02
EC	3045	732.49	732.56	0.07
EC	2800	730.61	729.86	-0.75
EC	2760	730.48	729.60	-0.88
EC	2603	730.01	728.65	-1.36
EC	2480	729.94	728.50	-1.44
EC	2454	729.68	728.29	-1.39
<b>EANES SCHOOL ROAD (CULVERT EC01)</b>				
EC	2388	724.04	723.95	-0.09
EC	2368	724.04	724.04	0.00
EC	2229	722.60	722.59	-0.01
EC	2092	720.41	720.47	0.06
EC	1987	718.36	719.25	0.89
EC	1923	717.13	718.95	1.82
EC	1892	717.00	718.93	1.93
EC	1890	715.98	718.80	2.82
EC	1887	715.85	718.82	2.97
<b>CAMP CRAFT ROAD (CULVERT EC03)</b>				
EC	1824	716.22	715.63	-0.59
EC	1785	715.19	715.19	0.00
EC	1738	714.59	714.59	0.00
EC	1569	711.93	711.93	0.00
EC	1385	709.83	709.83	0.00

RIVER	HEC-RAS STA	100-YR WSEL (FT)		
		EXIST	PROP	DIFF
EC TRIB	1189	734.13	734.13	0.00
EC TRIB	1021	726.75	726.75	0.00
EC TRIB	863	723.06	724.31	1.25
EC TRIB	851	722.37	724.35	1.98
<b>CAMP CRAFT ROAD (CULVERT EC02)</b>				
EC TRIB	591	716.11	716.44	0.33
EC TRIB	492	714.59	714.59	0.00
EC TRIB	322	711.93	711.93	0.00
EC TRIB	138	709.83	709.83	0.00

**NOTES**

1. THE EANES CREEK TRIBUTARY FEMA FLOODPLAIN SHOWN IS ZONE A ACCORDING TO THE TRAVIS COUNTY FIRM PANEL 48453C0445K DATED JANUARY 22, 2020. PRE-PROJECT AND POST-PROJECT INUNDATION BOUNDARIES REPRESENT ATLAS 14 FLOWS, CROSS SECTION MODELING, AND UPDATED TOPOGRAPHY ACCOUNTING FOR DIFFERENCES SEEN IN BOUNDARIES.
2. THE EANES CREEK FEMA FLOODPLAIN SHOWN IS ZONE AE WITH FLOODWAY ACCORDING TO THE TRAVIS COUNTY FIRM PANEL 48453C0445K DATED JANUARY 22, 2020. PRE-PROJECT AND POST-PROJECT INUNDATION BOUNDARIES REPRESENT ATLAS 14 FLOWS, ADDITIONAL CROSS SECTION LOCATIONS, AND UPDATED TOPOGRAPHY ACCOUNTING FOR DIFFERENCES SEEN IN BOUNDARIES.
3. THE IMPACTS OF THE INCREASE IN WATER SURFACE ELEVATIONS IS DUE TO THE REVISIONS IN ROADWAY PROFILE. NO STRUCTURES ARE IMPACTED DUE TO THE RISE IN WATER SURFACE ELEVATION AND ACCESS HAS NOT BE ADVERSELY IMPACTED.

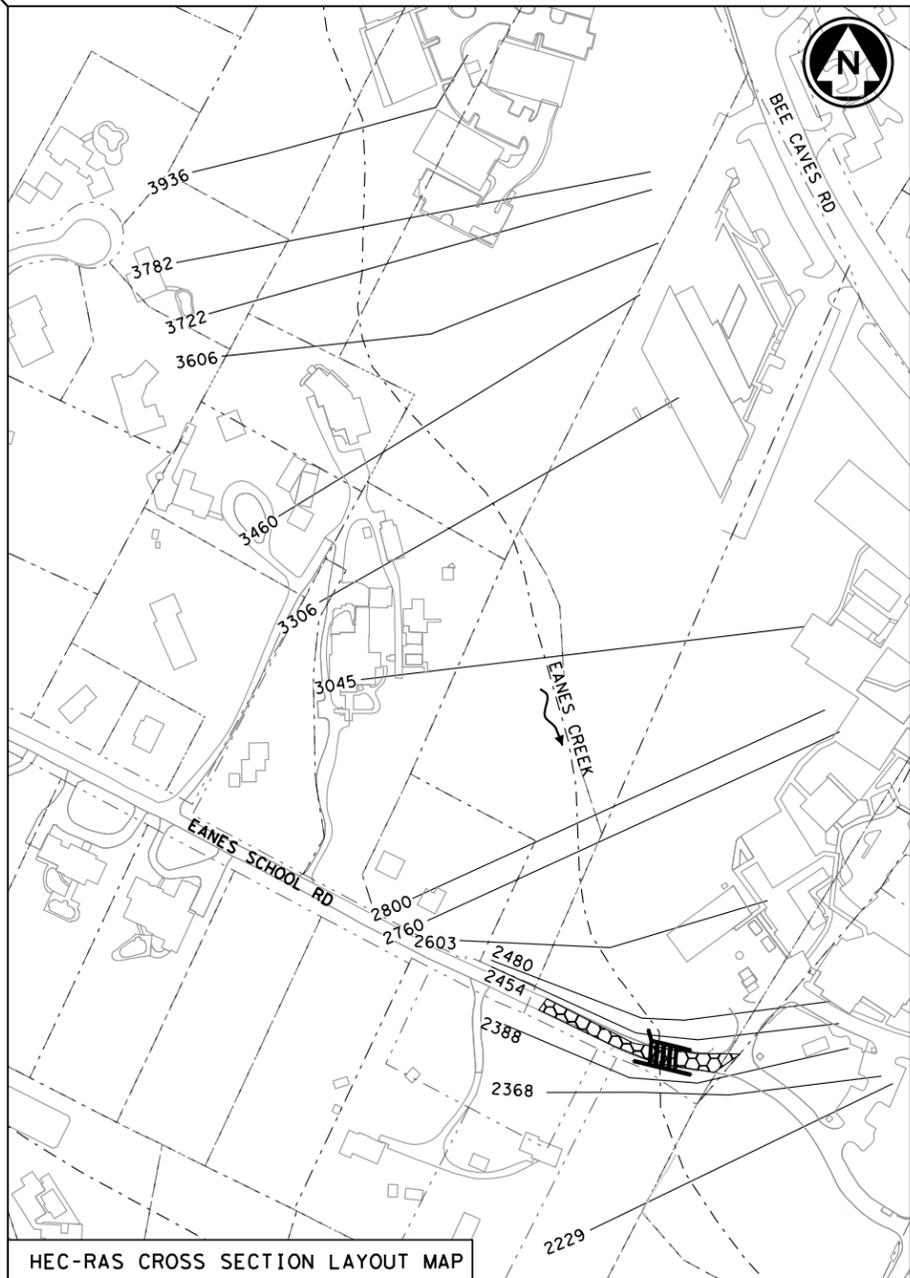
REV. NO.	BY	DATE	REVISION DESCRIPTION

K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**CHANNEL HYDRAULIC DATA**

PUBLIC PROJECT ENGINEERING  
 (FIRM # 6535)



WEST LAKE HILLS, TX	
SHEET 1 OF 1	
SCALE	1"=250'
DATE	7/17/2023
SHEET NUMBER	33 OF 388



HEC-RAS CROSS SECTION LAYOUT MAP

**HYDROLOGIC METHOD:**

1. ANALYSIS OF THE PEAK FLOWS FOR THE EXISTING AND PROPOSED STRUCTURES WAS PERFORMED USING THE SCS UNIT HYDROGRAPH METHOD. THE SCS UNIT HYDROGRAPH PEAK FLOWS FOR THE DRAINAGE AREAS WERE COMPUTED USING HEC-HMS VER 4.9.0

**HYDRAULIC METHOD:**

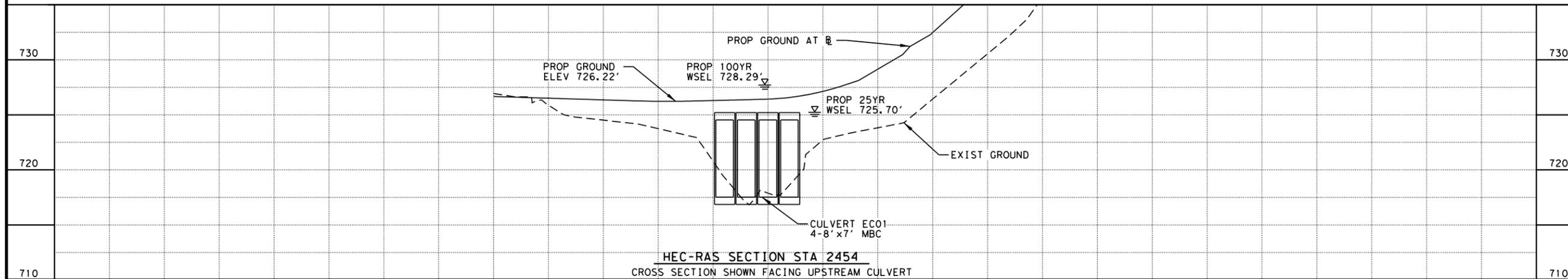
1. HEC-RAS (VER 6.1.0) WAS USED TO COMPUTE EXISTING AND PROPOSED CONDITION WATER SURFACE ELEVATIONS. CHANNEL CROSS SECTIONS WERE OBTAINED FROM TOPOGRAPHIC SURVEY DATA. CROSS SECTION DATA WAS SUPPLEMENTED WITH LIDAR DATA
2. NORMAL DEPTH WAS USED AS THE DOWNSTREAM BOUNDARY CONDITION FOR EANES CREEK. A SLOPE OF 0.014 WAS USED FOR THE EXISTING AND PROPOSED CONDITION
3. 25-YR (DESIGN) 100-YR (CHECK)

**FLOOD HAZARD AREA:**

1. EANES CREEK (FEMA DRY CREEK 2) IS LOCATED WITHIN THE FEMA SPECIAL FLOOD HAZARD ZONE "AE" WITH FLOODWAY ACCORDING TO FEMA FIRM PANELS 48453C0445K AND 48453C0440J EFFECTIVE JANUARY 22, 2020.

CULVERT EC01										
DESCRIPTION	DIST. TO UPSTREAM XS (FT)	ENT LOSS COEFF.	EXIT LOSS COEFF.	CULV MANNING'S "n"	UPSTREAM INVERT ELEV (FT)	DOWNSTREAM INVERT ELEV (FT)	DOWNSTREAM BOUNDARY CONDITIONS	MANNING'S "n" VALUE		
								LOB	CHANNEL	ROB
(EXIST) 1 - 24" X 48' CMP	5	0.9	1	0.024	717.44	717.17	NORMAL DEPTH	0.150	0.080	0.150
(EXIST) 1 - 36" X 48' CMP	5	0.9	1	0.024	718.62	718.24	NORMAL DEPTH	0.150	0.080	0.150
(PROP) 4 - 8' X 7' X 37' MBC	13	0.2	1	0.015	717.53	717.36	NORMAL DEPTH	0.150	0.080	0.150

HEC-RAS RIVER STA	DOWNSTREAM REACH LENGTH (FT)	FLOWS (CFS)	DESIGN FREQUENCY 25-YR					CHECK FREQUENCY 100-YR					
			COMPUTED WATER SURFACE			VELOCITIES (FPS)		COMPUTED WATER SURFACE			VELOCITIES (FPS)		
			EXIST	PROP	DIFFERENCE	EXIST	PROP	EXIST	PROP	DIFFERENCE	EXIST	PROP	
3936	154	2130	747.91	747.92	0.01	6.63	6.63	2971	748.58	748.58	0.00	7.70	7.70
3782	60	2130	745.27	745.27	0.00	4.64	4.64	2971	745.86	745.85	-0.01	5.36	5.37
3722	116	2130	742.88	742.88	0.00	7.74	7.76	2971	743.36	743.36	0.00	8.59	8.60
3606	146	2130	740.24	740.24	0.00	4.79	4.79	2971	741.13	741.13	0.00	5.35	5.35
3460	154	2130	737.70	737.71	0.01	6.68	6.66	2971	738.55	738.55	0.00	7.58	7.58
3306	261	2130	735.41	735.35	-0.06	5.44	5.52	2971	736.35	736.33	-0.02	6.12	6.14
3045	245	2130	731.59	731.80	0.21	6.06	5.78	2971	732.49	732.56	0.07	6.97	6.87
2800	40	2130	729.77	728.77	-1.00	3.69	4.77	2971	730.61	729.86	-0.75	4.30	5.04
2760	157	2130	729.64	728.37	-1.27	3.09	4.26	2971	730.48	729.60	-0.88	3.63	4.35
2603	123	2130	729.26	726.50	-2.76	2.69	4.88	2971	730.01	728.65	-1.36	3.34	4.18
2480	26	2130	729.21	726.12	-3.09	1.55	2.58	2971	729.94	728.50	-1.44	1.98	2.39
2454	66	2130	729.04	725.70	-3.34	4.34	5.12	2971	729.68	728.29	-1.39	5.53	4.44
EANES SCHOOL ROAD (CULVERT EC01)													
2388	20	2130	723.31	723.29	-0.02	8.97	7.38	2971	724.04	723.95	-0.09	10.38	9.15
2368	139	2130	723.26	723.26	0.00	3.93	3.93	2971	724.04	724.04	0.00	4.49	4.49
2229	137	2130	721.85	721.85	0.00	4.60	4.60	2971	722.60	722.59	-0.01	5.26	5.27



HEC-RAS SECTION STA 2454 CROSS SECTION SHOWN FACING UPSTREAM CULVERT

REV. NO.	BY	DATE	REVISION DESCRIPTION



K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
 CULVERT HYDRAULIC DATA  
 CULVERT EC01

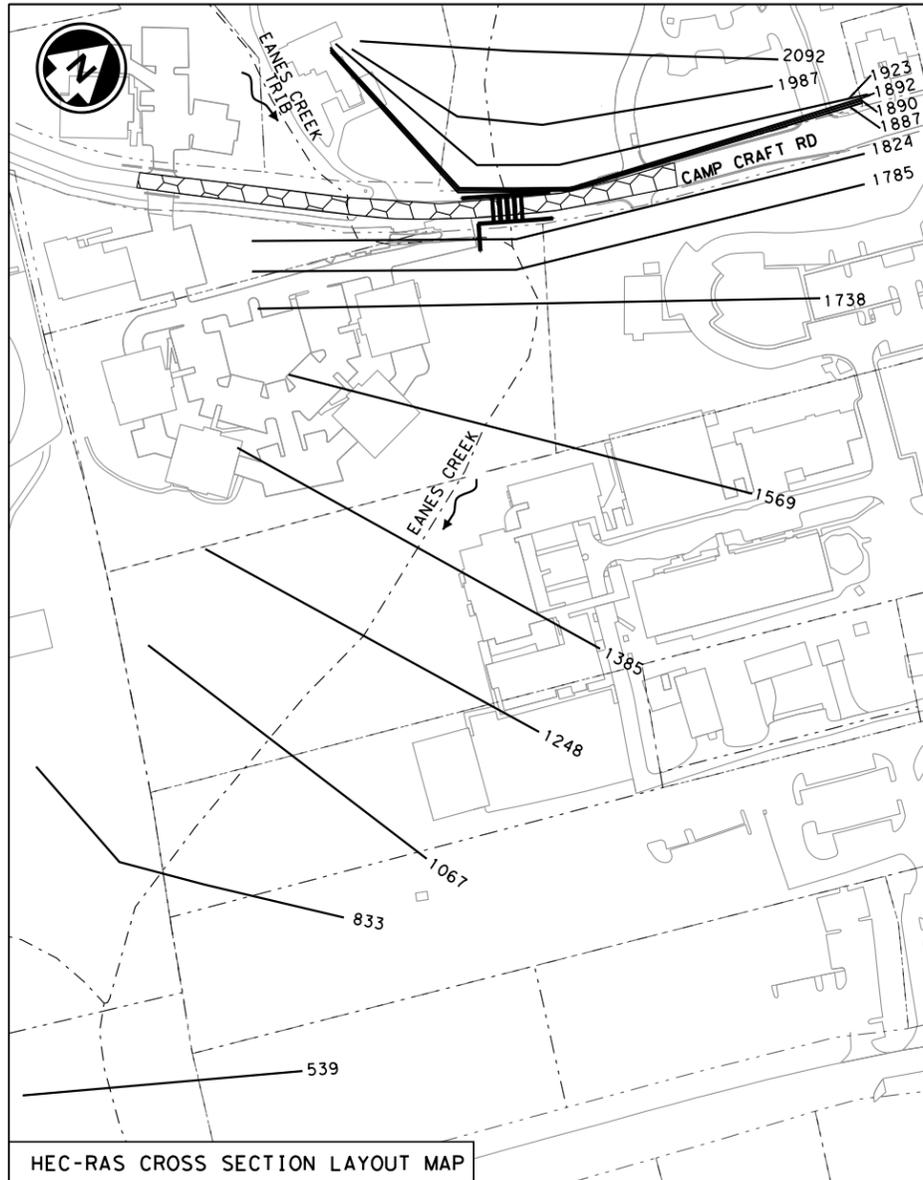


WEST LAKE HILLS, TX

SHEET 1 OF 3

SCALE	NTS
DATE	7/17/2023
SHEET NUMBER	34 OF 388





**HYDROLOGIC METHOD:**

- ANALYSIS OF THE PEAK FLOWS FOR THE EXISTING AND PROPOSED STRUCTURES WAS PERFORMED USING THE SCS UNIT HYDROGRAPH METHOD. THE SCS UNIT HYDROGRAPH PEAK FLOWS FOR THE DRAINAGE AREAS WERE COMPUTED USING HEC-HMS VER 4.9.0

**HYDRAULIC METHOD:**

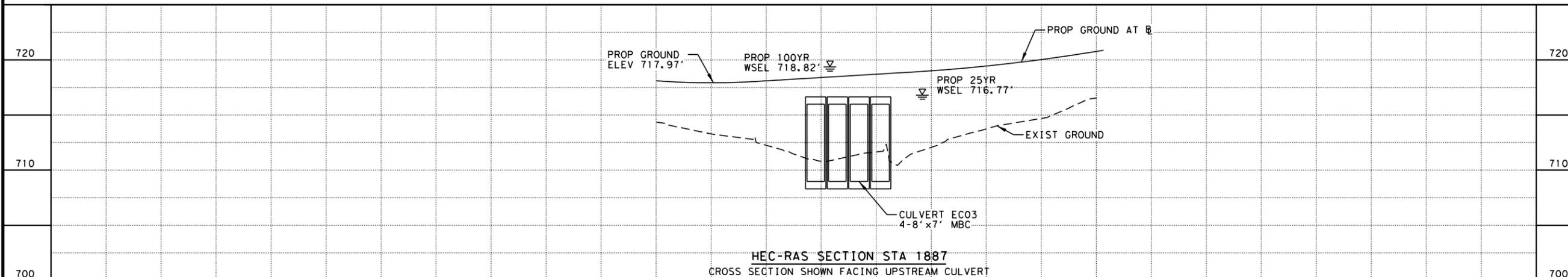
- HEC-RAS (VER 6.1.0) WAS USED TO COMPUTE EXISTING AND PROPOSED CONDITION WATER SURFACE ELEVATIONS. CHANNEL CROSS SECTIONS WERE OBTAINED FROM TOPOGRAPHIC SURVEY DATA. CROSS SECTION DATA WAS SUPPLEMENTED WITH LIDAR DATA
- NORMAL DEPTH WAS USED AS THE DOWNSTREAM BOUNDARY CONDITION FOR EANES CREEK. A SLOPE OF 0.014 WAS USED FOR THE EXISTING AND PROPOSED CONDITION
- 25-YR (DESIGN) 100-YR (CHECK)

**FLOOD HAZARD AREA:**

- EANES CREEK (FEMA DRY CREEK 2) IS LOCATED WITHIN THE FEMA SPECIAL FLOOD HAZARD ZONE "AE" WITH FLOODWAY ACCORDING TO FEMA FIRM PANELS 48453C0445K AND 48453C0440J EFFECTIVE JANUARY 22, 2020.

CULVERT EC03										
DESCRIPTION	DIST. TO UPSTREAM XS (FT)	ENT LOSS COEFF.	EXIT LOSS COEFF.	CULV MANNING'S "n"	UPSTREAM INVERT ELEV (FT)	DOWNSTREAM INVERT ELEV (FT)	DOWNSTREAM BOUNDARY CONDITIONS	MANNING'S "n" VALUE		
								LOB	CHANNEL	ROB
(EXIST) 1 - 18" X 45' CMP	8.5	0.5	1	0.024	710.08	709.94	NORMAL DEPTH	0.150	0.080	0.150
(PROP) 4 - 8' X 7' X 36' MBC	7	0.2	1	0.015	709.00	708.50	NORMAL DEPTH	0.150	0.080	0.150

HEC-RAS RIVER STA	DOWNSTREAM REACH LENGTH (FT)	DESIGN FREQUENCY 25-YR						CHECK FREQUENCY 100-YR					
		FLOWS (CFS)	COMPUTED WATER SURFACE			VELOCITIES (FPS)		FLOWS (CFS)	COMPUTED WATER SURFACE			VELOCITIES (FPS)	
			EXIST	PROP	DIFFERENCE	EXIST	PROP		EXIST	PROP	DIFFERENCE	EXIST	PROP
2092	105	2130	719.69	719.66	-0.03	5.90	5.94	2971	720.41	720.47	0.06	6.63	6.49
1987	64	2130	717.69	717.89	0.20	5.62	5.28	2971	718.36	719.25	0.89	6.44	5.19
1923	31	2138	716.49	717.24	0.75	5.35	4.28	2984	717.13	718.95	1.82	6.14	4.02
1892	2	2138	716.35	717.19	0.84	3.70	3.03	2984	717.00	718.93	1.93	4.41	3.03
1890	3	2138	715.49	717.00	1.51	7.96	4.46	2984	715.98	718.80	2.82	8.88	4.05
1887	63	2138	714.76	716.77	2.01	11.39	5.56	2984	715.85	718.82	2.97	10.64	4.12
CAMP CRAFT ROAD (CULVERT EC03)													
1824	39	2138	714.98	714.57	-0.41	6.76	5.61	2984	716.22	715.63	-0.59	7.10	6.60
1785	47	2814	713.98	713.98	0.00	6.22	6.22	3919	715.19	715.19	0.00	6.74	6.74
1738	169	2814	713.36	713.36	0.00	6.09	6.09	3919	714.59	714.59	0.00	6.77	6.77
1569	184	2814	710.66	710.66	0.00	7.29	7.29	3919	711.93	711.93	0.00	8.22	8.22
1385	137	2814	708.51	708.51	0.00	6.14	6.14	3919	709.83	709.83	0.00	7.02	7.02
1248	181	2814	707.49	707.49	0.00	5.26	5.26	3919	708.87	708.87	0.00	5.92	5.92
1067	234	2814	705.90	705.90	0.00	6.08	6.08	3919	707.23	707.23	0.00	6.93	6.93
833	294	2814	704.01	704.01	0.00	5.48	5.48	3919	705.40	705.40	0.00	6.17	6.17
539	0	2814	700.60	700.60	0.00	7.36	7.36	3919	701.93	701.93	0.00	8.36	8.36



REV. NO.	BY	DATE	REVISION DESCRIPTION



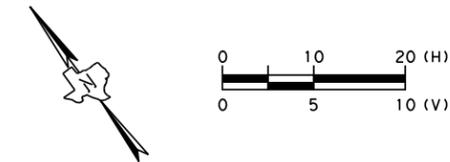
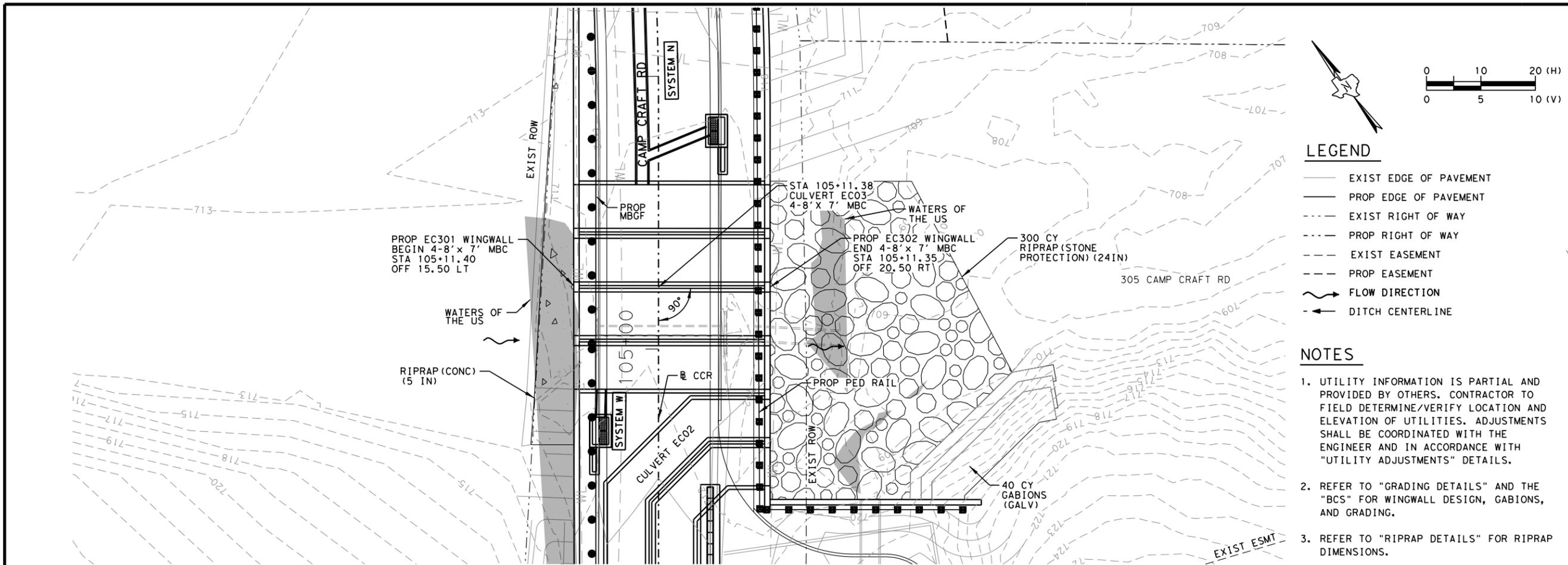
**K FRIESE & ASSOCIATES, INC.**  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**CULVERT HYDRAULIC DATA**  
**CULVERT EC03**



WEST LAKE HILLS, TX	
SHEET 3 OF 3	
SCALE	NTS
DATE	7/17/2023
SHEET NUMBER	36 OF 388

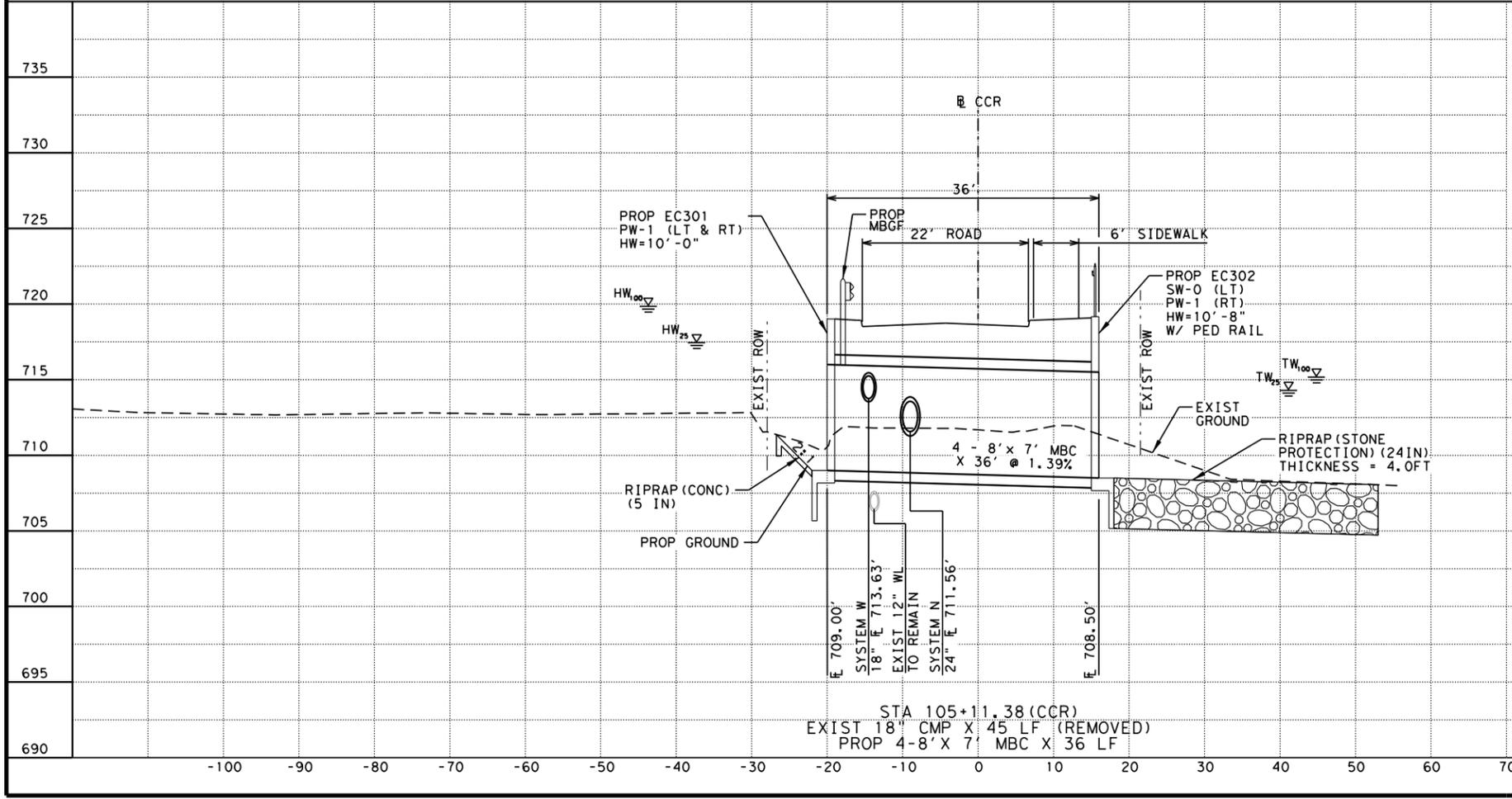






- LEGEND**
- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - - - EXIST EASEMENT
  - - - PROP EASEMENT
  - ~ FLOW DIRECTION
  - ← DITCH CENTERLINE

- NOTES**
1. UTILITY INFORMATION IS PARTIAL AND PROVIDED BY OTHERS. CONTRACTOR TO FIELD DETERMINE/VERIFY LOCATION AND ELEVATION OF UTILITIES. ADJUSTMENTS SHALL BE COORDINATED WITH THE ENGINEER AND IN ACCORDANCE WITH "UTILITY ADJUSTMENTS" DETAILS.
  2. REFER TO "GRADING DETAILS" AND THE "BCS" FOR WINGWALL DESIGN, GABIONS, AND GRADING.
  3. REFER TO "RIPRAP DETAILS" FOR RIPRAP DIMENSIONS.



CULVERT OPENING HYDRAULIC DATA (RS 1856)

ELEMENT	INSIDE CULV US	INSIDE CULV DS
	2138	
PROP 25-YR W. S. ELEV (FT)	716.77	714.57
PROP 25-YR VEL TOTAL (FPS)	12.91	11.01
	2984	
PROP 100-YR W. S. ELEV (FT)	718.82	715.63
PROP 100-YR VEL TOTAL (FPS)	12.92	12.92

REVISION DESCRIPTION

REV. NO.	DATE	BY

Victoria M Ortega  
 STATE OF TEXAS  
 VICTORIA M. ORTEGA  
 113096  
 LICENSED PROFESSIONAL ENGINEER  
 7/17/2023

K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
 WEST LAKE HILLS BOND PROGRAM  
 EANES CREEK LOW WATER CROSSINGS  
 CULVERT LAYOUT  
 CULVERT EC03

**K·FRIESE + ASSOCIATES**  
 PUBLIC PROJECT ENGINEERING  
 (FIRM # 6535)



WEST LAKE HILLS, TX  
 SHEET 3 OF 3  
 SCALE 1":20' H; 1":10' V  
 DATE 7/17/2023  
 SHEET NUMBER 39 OF 388

**SYSTEM S**

AREA ID	AREA (AC)	RUNOFF COEFF	T <sub>r</sub> (MIN)	25-YR		100-YR	
				I	Q	I	Q
				(IN/HR)	(CFS)	(IN/HR)	(CFS)
S01	0.04	0.81	0.5	9.40	0.3	12.25	0.5
S01A	0.91	0.47	4.8	9.40	4.4	12.25	6.5
S02	0.01	0.81	0.5	9.40	0.1	12.25	0.1
S02A	2.91	0.71	3.3	9.40	21.5	12.25	31.6
S03	0.15	0.44	0.7	9.40	0.7	12.25	1.0
S04	0.04	0.81	0.9	9.40	0.3	12.25	0.5
S05	0.08	0.54	0.7	9.40	0.4	12.25	0.7

INLET INFORMATION		ROADWAY INFORMATION			HYDRAULIC PARAMETERS			25-YR Q (CFS)	BY PASS			PONDED WIDTH		PONDED DEPTH	
INLET ID	INLET TYPE	PROFILE TYPE	LONG SLOPE (%)	CROSS SLOPE (%)	CURB LENGTH (FT)	GRATE LENGTH (FT)	GRATE AREA (SF)		ALLOW (CFS)	ACTUAL (CFS)	NODE TO	ALLOW (FT)	ACTUAL (FT)	ALLOW (FT)	ACTUAL (FT)
S01	PCU	On Grade	7.96	2.00	5.0	5.0	3.13	0.3	0.50	0.04	S04	5.5	3.1	0.50	0.06
S01A	OPEN	Sag	N/A	2.00	5.0	n/a	n/a	4.4	N/A	N/A	N/A	N/A	N/A	0.75	0.52
S02	PCU	On Grade	7.96	2.00	9.5	5.0	3.13	0.1	0.50	0.00	S03	5.5	1.7	0.50	0.03
S02A	OPEN	Sag	N/A	2.00	9.5	n/a	n/a	21.4	N/A	N/A	N/A	N/A	N/A	0.75	0.71
S03	PCU	On Grade	4.57	2.00	9.5	5.0	3.13	0.7	0.50	0.01	S05	5.5	4.6	0.50	0.09
S04	PCU	On Grade	2.07	2.00	9.5	5.0	3.13	0.4	0.50	0.00	W01	5.5	4.2	0.50	0.08
S05	PCU	On Grade	2.07	2.00	9.5	5.0	3.13	0.5	0.50	0.00	E02	5.5	4.6	0.50	0.09

LINK ID	US NODE ID	DS NODE ID	LINK SIZE	ACTUAL LENGTH (FT)	LINK SLOPE (%)	US FL ELEV (FT)	DS FL ELEV (FT)	CUMM TC (MIN)	DISCHARGE (CFS)	CAPACITY (CFS)	ACTUAL VELOCITY (FPS)	US HGL (FT)	DS HGL (FT)	JUNC LOSS (FT)
S01	S01	SJ1	1-18" RCP	4	5.00	726.64	726.44	10.0	4.7	27.4	2.7	728.41	728.39	0.01
S02	S02	SJ1	1-18" RCP	11	5.00	726.95	726.44	10.0	21.5	27.4	12.2	730.48	728.39	1.61
SJ1	SJ1	SJ2	1-24" RCP	91	4.62	725.94	721.74	10.0	26.2	56.7	15.4	728.39	722.80	0.56
S03	S03	SJ2	1-18" RCP	14	0.50	722.31	722.24	10.0	0.7	8.7	0.4	723.72	723.71	0.00
SJ2	SJ2	SJ3	1-24" RCP	58	4.62	721.74	719.06	10.1	26.8	56.6	14.6	723.71	720.20	0.08
S04	S04	SJ3	1-18" RCP	5	5.00	719.77	719.56	10.0	0.3	27.4	0.2	721.43	720.03	0.00
S05	S05	SJ3	1-18" RCP	11	5.00	720.07	719.56	10.0	0.4	27.4	0.3	721.43	721.43	0.00
SJ3	SJ3	SOUT	1-24" RCP	45	4.59	719.06	717.00	10.2	27.5	56.5	8.7	721.43	720.75	0.09

**SYSTEM E**

AREA ID	AREA (AC)	RUNOFF COEFF	T <sub>r</sub> (MIN)	25-YR		100-YR	
				I	Q	I	Q
				(IN/HR)	(CFS)	(IN/HR)	(CFS)
E01	0.07	0.81	1.0	9.40	0.6	12.25	0.9
E02	0.15	0.81	0.9	9.40	1.2	12.25	1.9

INLET INFORMATION		ROADWAY INFORMATION			HYDRAULIC PARAMETERS			25-YR Q (CFS)	BY PASS			PONDED WIDTH		PONDED DEPTH	
INLET ID	INLET TYPE	PROFILE TYPE	LONG SLOPE (%)	CROSS SLOPE (%)	CURB LENGTH (FT)	GRATE LENGTH (FT)	GRATE AREA (SF)		ALLOW (CFS)	ACTUAL (CFS)	NODE TO	ALLOW (FT)	ACTUAL (FT)	ALLOW (FT)	ACTUAL (FT)
E01	TDD	On Grade	2.30	2.00	n/a	32.0	32.00	0.6	0.50	0.00	E02	11.0	5.1	0.50	0.10
E02	TDD	On Grade	2.30	2.00	n/a	32.0	32.00	1.2	0.50	0.01	N11	11.0	6.5	0.50	0.13

LINK ID	US NODE ID	DS NODE ID	LINK SIZE	ACTUAL LENGTH (FT)	LINK SLOPE (%)	US FL ELEV (FT)	DS FL ELEV (FT)	CUMM TC (MIN)	DISCHARGE (CFS)	CAPACITY (CFS)	ACTUAL VELOCITY (FPS)	US HGL (FT)	DS HGL (FT)	JUNC LOSS (FT)
E01	E01	EOUT	1-18" RCP	2	2.00	713.46	713.42	10.0	1.9	17.3	1.0	716.16	716.15	0.01

**SYSTEM W**

AREA ID	AREA (AC)	RUNOFF COEFF	T <sub>r</sub> (MIN)	25-YR		100-YR	
				I	Q	I	Q
				(IN/HR)	(CFS)	(IN/HR)	(CFS)
W01	0.07	0.81	1.1	9.40	0.6	12.25	0.9

INLET INFORMATION		ROADWAY INFORMATION			HYDRAULIC PARAMETERS			25-YR Q (CFS)	BY PASS			PONDED WIDTH		PONDED DEPTH	
INLET ID	INLET TYPE	PROFILE TYPE	LONG SLOPE (%)	CROSS SLOPE (%)	CURB LENGTH (FT)	GRATE LENGTH (FT)	GRATE AREA (SF)		ALLOW (CFS)	ACTUAL (CFS)	NODE TO	ALLOW (FT)	ACTUAL (FT)	ALLOW (FT)	ACTUAL (FT)
W01	PCU	On Grade	1.20	2.00	9.5	5.0	3.13	0.6	0.50	0.00	N12	11.0	5.7	0.50	0.11

LINK ID	US NODE ID	DS NODE ID	LINK SIZE	ACTUAL LENGTH (FT)	LINK SLOPE (%)	US FL ELEV (FT)	DS FL ELEV (FT)	CUMM TC (MIN)	DISCHARGE (CFS)	CAPACITY (CFS)	ACTUAL VELOCITY (FPS)	US HGL (FT)	DS HGL (FT)	JUNC LOSS (FT)
W01	W01	WOUT	1-18" RCP	6	2.00	713.73	713.63	10.0	0.6	17.3	0.3	717.52	717.52	0.00

**SYSTEM N**

AREA ID	AREA (AC)	RUNOFF COEFF	T <sub>r</sub> (MIN)	25-YR		100-YR	
				I	Q	I	Q
				(IN/HR)	(CFS)	(IN/HR)	(CFS)
N01	0.13	0.81	0.7	9.40	1.1	12.25	1.6
N03	0.10	0.81	0.8	9.40	0.8	12.25	1.2
N04	0.12	0.81	0.8	9.40	1.0	12.25	1.5
N05	0.09	0.81	0.9	9.40	0.8	12.25	1.1
N06	0.14	0.81	0.9	9.40	1.2	12.25	1.7
N07	0.12	0.81	0.8	9.40	1.0	12.25	1.5
N08	0.11	0.81	0.8	9.40	0.9	12.25	1.4
N09	0.05	0.81	0.7	9.40	0.5	12.25	0.6
N10	0.05	0.81	0.7	9.40	0.5	12.25	0.6
N11	0.04	0.81	0.7	9.40	0.4	12.25	0.5
N12	0.05	0.81	0.8	9.40	0.4	12.25	0.6
N13	0.03	0.81	0.7	9.40	0.2	12.25	0.4

INLET INFORMATION		ROADWAY INFORMATION			HYDRAULIC PARAMETERS			25-YR Q (CFS)	BY PASS			PONDED WIDTH		PONDED DEPTH	
INLET ID	INLET TYPE	PROFILE TYPE	LONG SLOPE (%)	CROSS SLOPE (%)	CURB LENGTH (FT)	GRATE LENGTH (FT)	GRATE AREA (SF)		ALLOW (CFS)	ACTUAL (CFS)	NODE TO	ALLOW (FT)	ACTUAL (FT)	ALLOW (FT)	ACTUAL (FT)
N01	EXIST PCU	On Grade	5.00	2.00	5.0	5.0	3.13	1.1	0.50	0.32	N03	5.5	5.0	0.50	0.10
N03	EXIST PCU	On Grade	5.70	2.00	5.0	5.0	3.13	1.1	0.50	0.35	N05	5.5	5.0	0.50	0.10
N04	EXIST PCU	On Grade	5.70	2.00	9.5	5.0	3.13	1.0	0.50	0.07	N06	5.5	4.9	0.50	0.10
N05	EXIST PCU	On Grade	5.70	2.00	5.0	n/a	n/a	1.1	0.50	0.45	N07	5.5	5.0	0.50	0.10
N06	EXIST PCU	On Grade	5.70	2.00	9.5	5.0	3.13	1.2	0.50	0.12	N08	5.5	5.2	0.50	0.10
N07	EXIST PCU	On Grade	8.69	2.00	9.5	n/a	n/a	1.5	0.50	0.29	N09	5.5	5.1	0.50	0.10
N08	EXIST PCU	On Grade	8.69	2.00	9.5	5.0	3.13	1.0	0.50	0.09	N10	5.5	4.5	0.50	0.09
N09	PCU	On Grade	3.77	2.00	9.5	5.0	3.13	0.7	0.50	0.01	N11	5.5	4.9	0.50	0.10
N10	PCU	On Grade	3.77	2.00	9.5	5.0	3.13	0.5	0.50	0.00	N12	5.5	4.4	0.50	0.09
N11	PCU	Sag	N/A	2.00	9.5	5.0	3.13	0.4	N/A	N/A	N/A	5.5	5.1	0.50	0.10
N12	PCU	Sag	N/A	2.00	9.5	5.0	3.13	0.4	N/A	N/A	N/A	5.5	5.1	0.50	0.10
N13	PCU	On Grade	1.20	2.00	9.5	5.0	3.13	0.2	0.50	0.00	N11	5.5	3.8	0.50	0.08

LINK ID	US NODE ID	DS NODE ID	LINK SIZE	ACTUAL LENGTH (FT)	LINK SLOPE (%)	US FL ELEV (FT)	DS FL ELEV (FT)	CUMM TC (MIN)	DISCHARGE (CFS)	CAPACITY (CFS)	ACTUAL VELOCITY (FPS)	US HGL (FT)	DS HGL (FT)	JUNC LOSS (FT)
N01	N01	N03	EXIST 1-18" RCP	226	4.43	760.00	750.00	10.0	1.1	25.8	6.8	760.66	750.22	0.04
N03	N03	N05	EXIST 1-18" RCP	197	6.60	750.00	737.00	10.6	1.8	31.5	9.2	750.87	737.25	0.01
N05	N05	N06	EXIST 1-18" RCP	41	1.25	737.00	736.50	10.9	2.6	13.7	1.6	737.84	737.80	0.13
N04	N04	N06	EXIST 1-18" RCP	265	6.81	754.50	736.50	10.0	1.0	32.0	7.8	755.24	736.69	0.02
N06	N06	N08	EXIST 1-18" RCP	248	6.46	736.50	720.50	11.1	4.6	31.1	12.0	737.80	720.91	0.15
N07	N07	N08	EXIST 1-18" RCP	30	1.67	721.00	720.50	10.0	1.0	15.8	0.6	721.84	721.83	0.02
N08	N08	NJ1	EXIST 1-18" RCP	26	6.33	720.50	718.87	11.4	6.4	30.8	11.1	721.83	719.41	0.19
N09	N09	NJ2	1-18" RCP	11	0.75	713.56	713.48	10.0	0.4	10.6	0.3	716.88	716.88	0.00
NJ1	NJ1	NJ2	1-18" RCP	64	6.33	718.87	714.84	11.4	6.4	30.8	12.6	720.05	715.33	0.05
N10	N10	NJ2	1-18" RCP	5	0.75	713.51	713.48	10.0	0.5	10.6	0.3	716.88	716.88	0.00
NJ2	NJ2	NJ3	1-18" RCP	60	2.03	713.48	712.27	11.5	7.2	17.4	4.1	716.88	716.51	0.11
N11	N11	NJ3	1-18" RCP	10	0.75	712.35	712.27	10.0	0.4	10.6	0.2	716.51	716.51	0.00
N12	N12	NJ3	1-18" RCP	4	0.75	712.30	712.27	10.0	0.4	10.6	0.2	716.51	716.51	0.00
NJ3	NJ3	NJ4	1-24" RCP	38	0.50	711.77	711.59	11.7	7.9	18.6	2.5	716.51	716.46	0.00
N13	N13	NJ4	1-18" RCP	14	4.50	712.68	712.09	10.0	0.2	26.0	0.1	716.46	716.46	0.00
NJ4	NJ4	NOUT	1-24" RCP	5	0.50	711.59	711.56	11.8	8.1	18.6	2.6	716.46	716.45	0.01

**NOTES**

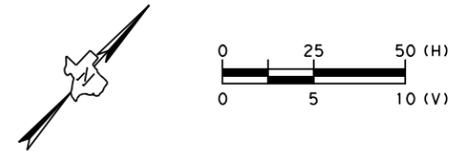
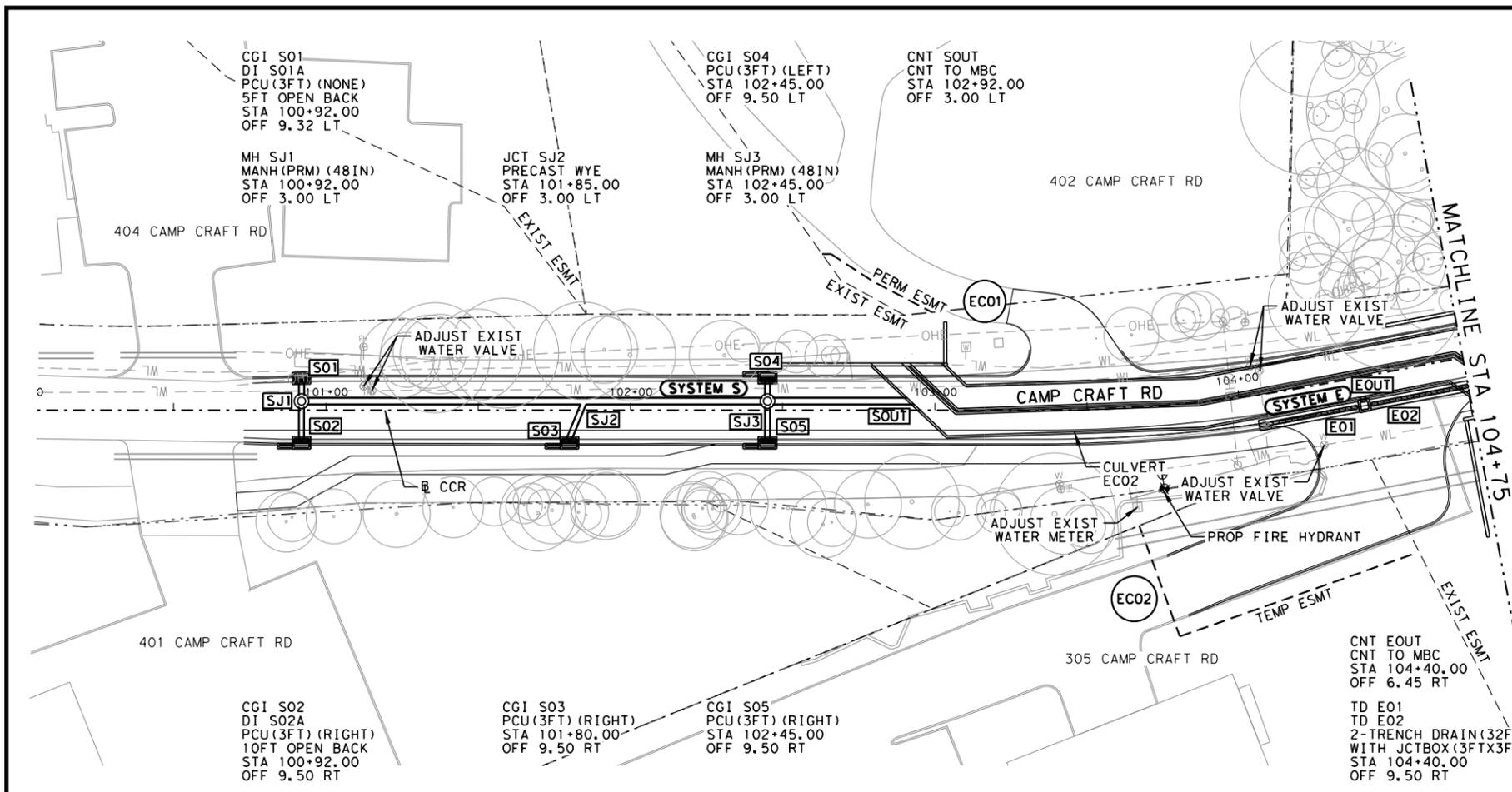
- ANALYSIS WAS PERFORMED USING THE CURRENT EDITION OF GEOPAK DRAINAGE, PERFORMING CALCULATIONS IN ACCORDANCE WITH FHWA HEC-22.
- DRAINAGE PARAMETERS AND CRITERIA ARE IN ACCORDANCE WITH THE CITY OF WEST LAKE HILLS DRAINAGE AND EROSION CONTROL MANUAL (2020).
- PEAK FLOWS WERE CALCULATED USING THE RATIONAL METHOD. MINIMUM TIME OF CONCENTRATION USED IS 10 MIN.
- INTENSITIES WERE DETERMINED FROM TABLE 3-1 OF THE WLH DRAINAGE AND EROSION CONTROL MANUAL.
- SYSTEM TAILWATERS WERE SET TO THE DOWNSTREAM WSEL OR NORMAL DEPTH, WHICHEVER IS GREATER.
- ALL PIPE IS CONCRETE WITH A MANNINGS OF 0.012 UNLESS OTHERWISE NOTED.
- A MANNINGS OF 0.015 WAS ASSUMED FOR ALL PAVEMENT SURFACES FOR INLET COMPUTATIONS.

REVISION DESCRIPTION	
DATE	
BY	
REV. NO.	

Victoria M Ortega  
  
 7/17/2023

K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
 HYDRAULIC COMPUTATIONS





**LEGEND**

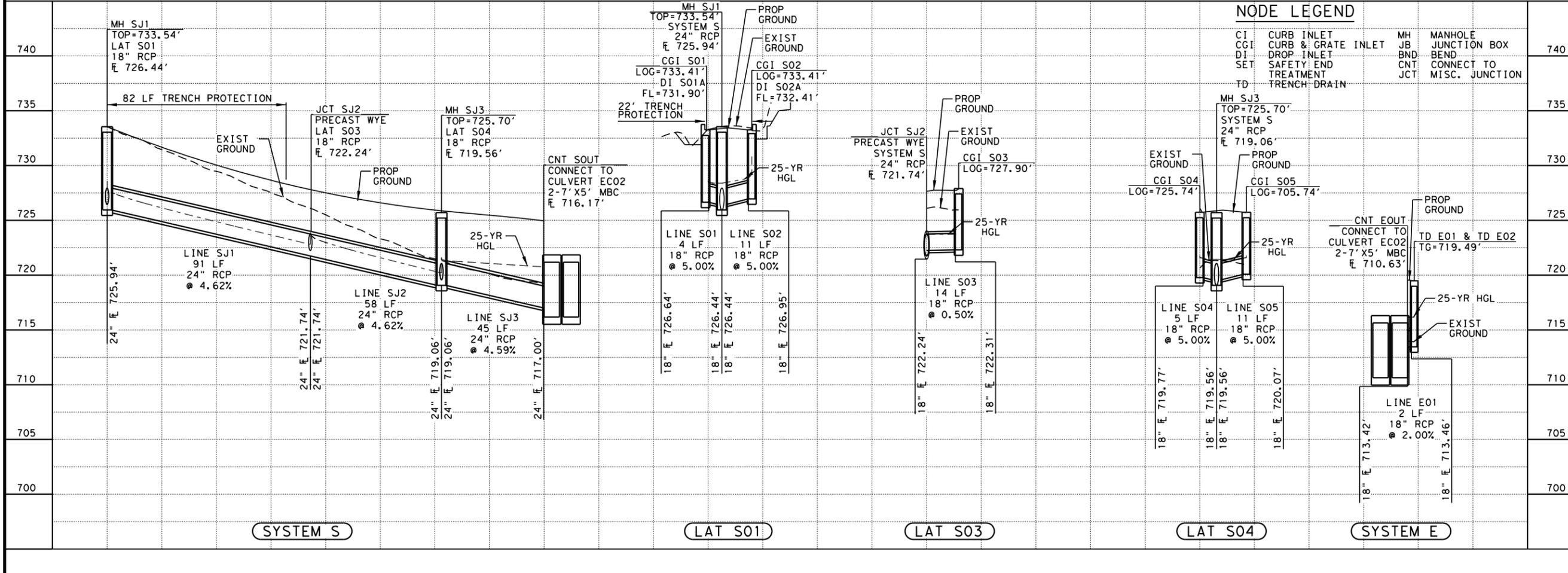
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- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- ← DITCH CENTERLINE
- XX DRAINAGE NODE
- XX SYSTEM ID
- XX DRIVEWAY ID

**NOTES**

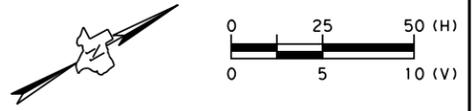
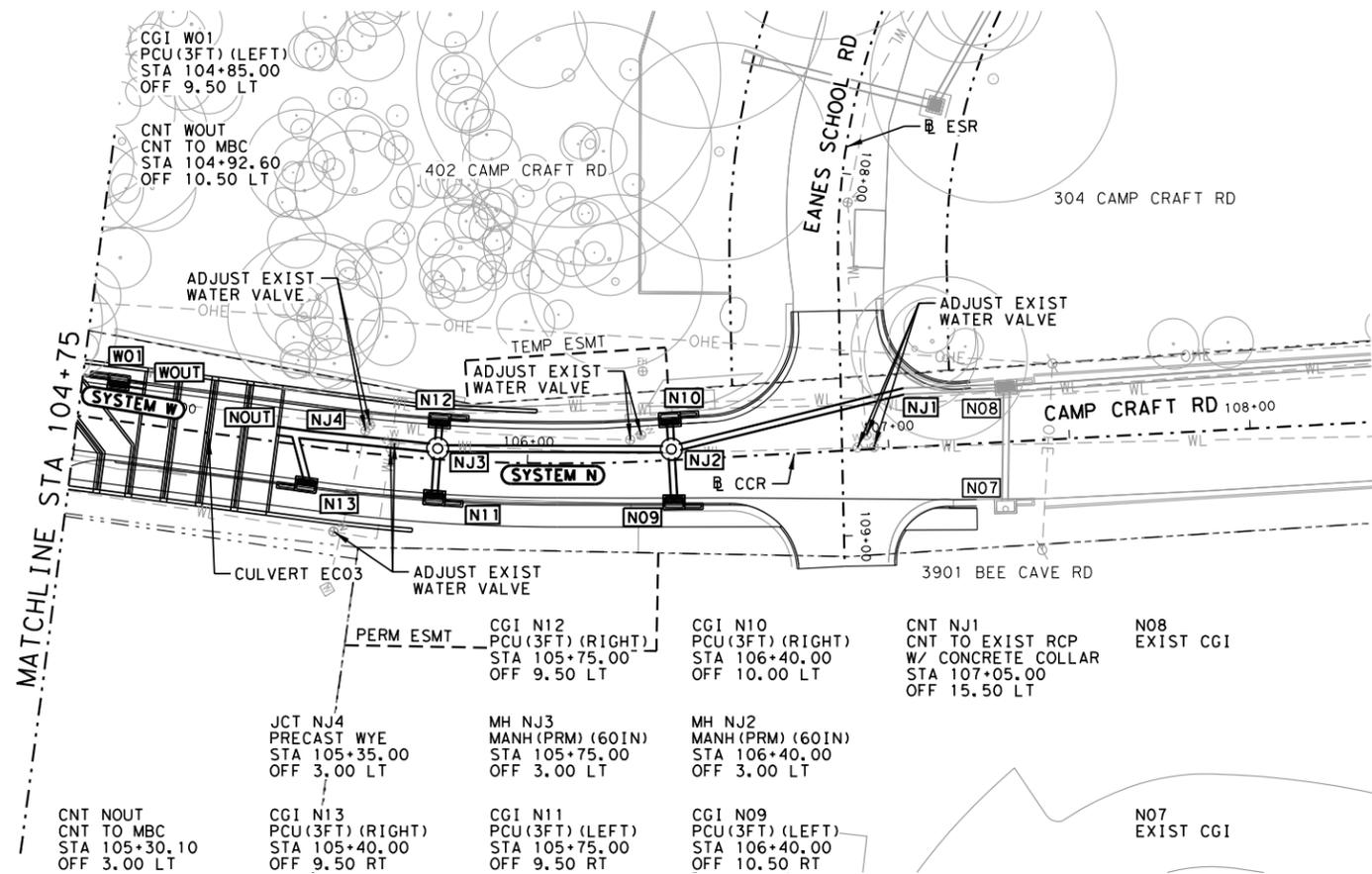
1. UTILITY INFORMATION IS PARTIAL AND PROVIDED BY OTHERS. CONTRACTOR TO FIELD VERIFY LOCATION AND ELEVATION OF UTILITIES. ADJUSTMENTS SHALL BE COORDINATED WITH THE ENGINEER AND IN ACCORDANCE WITH "UTILITY ADJUSTMENTS" DETAILS.
2. REFER TO "INLET POINT CONTROL" DETAILS FOR STRUCTURE CONTROL LOCATIONS.
3. CONNECTIONS TO STRUCTURES SHALL FOLLOW TxDOT STANDARDS. PIPE DEFLECTIONS NOT SHOWN FOR CLARITY.
4. LINK NAMES ARE CONSISTENT WITH THE UPSTREAM NODE NAME.

**NODE LEGEND**

- |     |                    |     |                |     |
|-----|--------------------|-----|----------------|-----|
| CI  | CURB INLET         | MH  | MANHOLE        | 740 |
| CGI | CURB & GRATE INLET | JB  | JUNCTION BOX   |     |
| DI  | DROP INLET         | BND | BEND           |     |
| SET | SAFETY END         | CNT | CONNECT TO     |     |
| TD  | TRENCH DRAIN       | JCT | MISC. JUNCTION |     |



REVISION DESCRIPTION					
DATE					
REV. BY					
NO.					
<b>K FRIESE &amp; ASSOCIATES, INC.</b> 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746 <b>WEST LAKE HILLS BOND PROGRAM</b> <b>EANES CREEK LOW WATER CROSSINGS</b> <b>DRAINAGE PLAN &amp; PROFILE</b> <b>BEGIN - STA 104+75</b>					
WEST LAKE HILLS, TX					
SHEET 1 OF 2					
SCALE 1"=50' H; 1"=10' V					
DATE 7/17/2023					
SHEET NUMBER 41 OF 388					

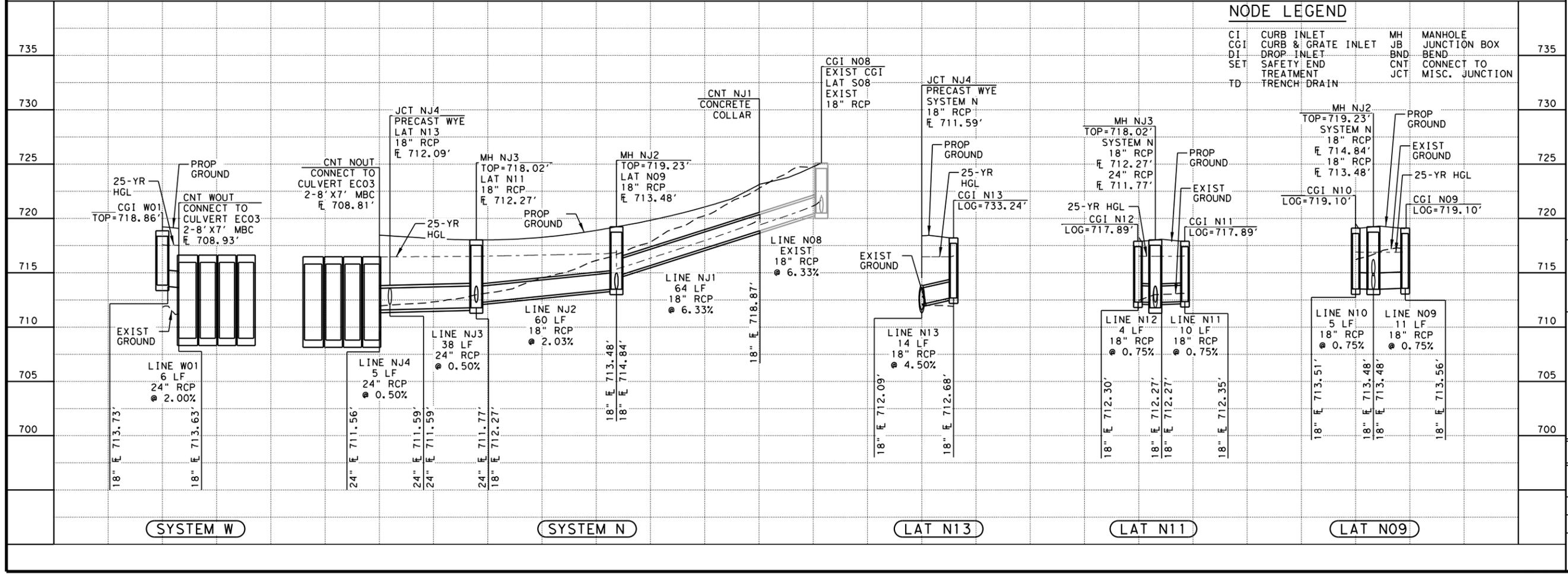


- ### LEGEND
- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - ← DITCH CENTERLINE
  - XX DRAINAGE NODE
  - XX SYSTEM ID
  - XX DRIVEWAY ID

- ### NOTES
- UTILITY INFORMATION IS PARTIAL AND PROVIDED BY OTHERS. CONTRACTOR TO FIELD VERIFY LOCATION AND ELEVATION OF UTILITIES. ADJUSTMENTS SHALL BE COORDINATED WITH THE ENGINEER AND IN ACCORDANCE WITH "UTILITY ADJUSTMENTS" DETAILS.
  - REFER TO "INLET POINT CONTROL" DETAILS FOR STRUCTURE CONTROL LOCATIONS.
  - CONNECTIONS TO STRUCTURES SHALL FOLLOW TxDOT STANDARDS. PIPE DEFLECTIONS NOT SHOWN FOR CLARITY.
  - LINK NAMES ARE CONSISTENT WITH THE UPSTREAM NODE NAME.

### NODE LEGEND

CI	CURB INLET	MH	MANHOLE	
CGI	CURB & GRATE INLET	JB	JUNCTION BOX	
DI	DROP INLET	BND	BEND	
SET	SAFETY END TRENCH DRAIN	CNT	CONNECT TO MISC. JUNCTION	



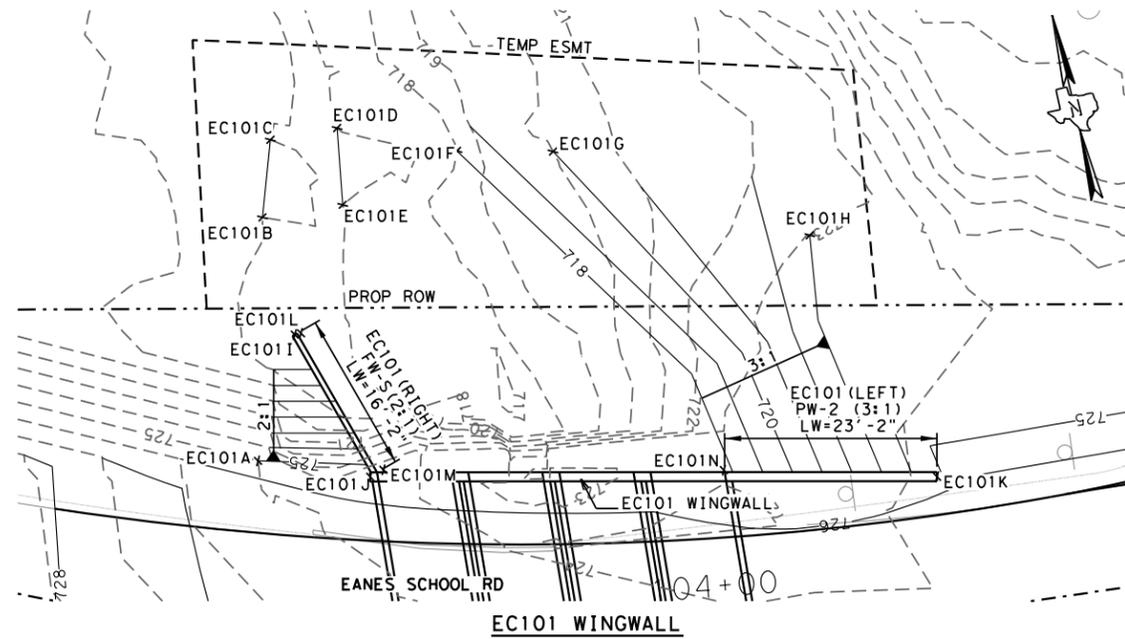
REV. NO.	DATE	BY	DESCRIPTION

K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**DRAINAGE PLAN & PROFILE**  
**STA 104+75-END**

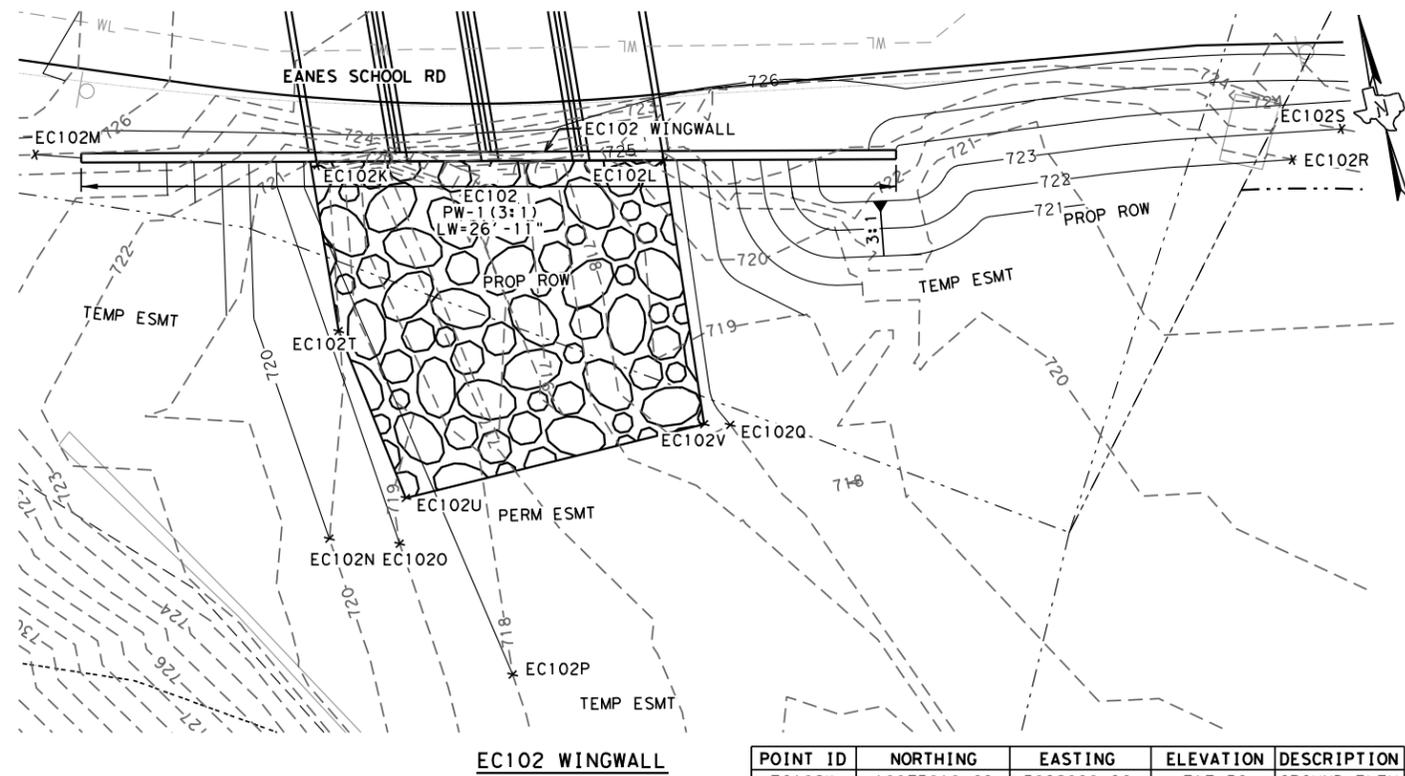


WEST LAKE HILLS, TX	
SHEET 2 OF 2	
SCALE	1"=50' H; 1"=10' V
DATE	7/17/2023
SHEET NUMBER	42 OF 388

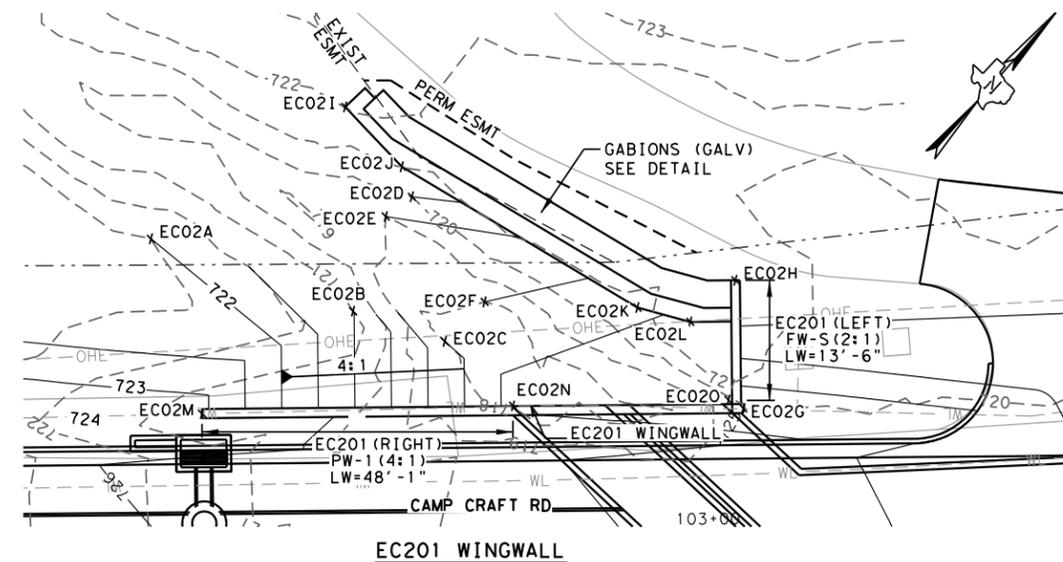
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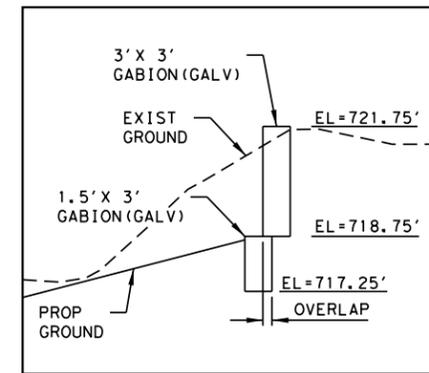
POINT ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
EC101A	10075052.20	3092071.35	725.00	GRADE TIE
EC101B	10075077.90	3092078.11	719.00	GRADE TIE
EC101C	10075085.93	3092080.97	719.00	GRADE TIE
EC101D	10075085.44	3092088.36	718.00	GRADE TIE
EC101E	10075077.15	3092086.97	718.00	GRADE TIE
EC101F	10075079.89	3092100.51	718.00	GRADE TIE
EC101G	10075077.36	3092110.71	720.00	GRADE TIE
EC101H	10075061.82	3092135.83	723.00	GRADE TIE
EC101I	10075064.64	3092078.51	718.50	TOP OF WGWL
EC101J	10075047.60	3092082.85	725.55	TOP OF WGWL
EC101K	10075032.91	3092143.10	725.55	TOP OF WGWL
EC101L	10075064.89	3092079.14	718.50	GROUND ELEV
EC101M	10075047.91	3092083.70	717.53	GROUND ELEV
EC101N	10075038.90	3092120.64	171.53	GROUND ELEV



POINT ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
EC102K	10075010.68	3092080.96	717.36	GROUND ELEV
EC102L	10075001.82	3092117.91	717.36	GROUND ELEV
EC102M	10075018.73	3092051.22	725.00	GRADE TIE
EC102N	10074970.38	3092072.57	720.00	GRADE TIE
EC102O	10074968.01	3092079.91	719.00	GRADE TIE
EC102P	10074951.21	3092088.52	718.00	GRADE TIE
EC102Q	10074971.62	3092116.38	718.00	GRADE TIE
EC102R	10074989.68	3092160.10	722.00	GRADE TIE
EC102S	10074994.19	3092189.20	723.00	GRADE TIE
EC102T	10074992.14	3092078.92	719.75	RIPRAP END
EC102U	10074972.70	3092081.75	719.65	RIPRAP END
EC102V	10074972.79	3092115.36	717.50	RIPRAP END



POINT ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
EC02A	10074433.35	3092185.79	723.00	GRADE TIE
EC02B	10074442.06	3092207.59	721.00	GRADE TIE
EC02C	10074446.25	3092217.29	718.00	GRADE TIE
EC02D	10074455.68	3092204.14	720.00	GRADE TIE
EC02E	10074452.18	3092203.44	719.00	GRADE TIE
EC02F	10074452.36	3092217.71	718.00	GRADE TIE
EC02G	10074462.39	3092246.63	725.16	TOP OF WGWL
EC02H	10074472.30	3092236.71	722.75	TOP OF WGWL
EC02I	10074458.21	3092192.19	718.75	TOP OF GABION
EC02J	10074457.42	3092201.16	718.75	TOP OF GABION
EC02K	10074462.96	3092230.64	718.75	TOP OF GABION
EC02L	10074465.62	3092236.02	718.75	TOP OF GABION
EC02M	10074422.74	3092202.61	725.16	TOP OF WGWL
EC02N	10074445.81	3092227.47	716.66	GROUND ELEV
EC02O	10074461.96	3092245.04	716.66	GROUND ELEV



GABION DETAIL

NOTES

- GABIONS SHALL BE IN ACORDANCE WITH TXDOT SPECIFICATION 459.
- CONTRACTOR TO USE STANDARD LENGTHS TO CREATE CURVE.



K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**EANES CREEK LOW WATER CROSSINGS**  
**GRADING DETAILS**  
**CULV CC01**



WEST LAKE HILLS, TX  
 SHEET 1 OF 2  
 SCALE 1"=20'  
 DATE 7/17/2023  
 SHEET NUMBER **43** OF **388**



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: 7/17/2023  
 FILE: X:\Projects\0846\_WLH\_Bond Projects\300 Plans and Drawings\330 Plan Production\02\_Eanes Creek\0846ShrTEVepicE001.dgn

**I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402**

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. CITY OF WEST LAKE HILLS
- 2.
- No Action Required     Required Action

Action No.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

**II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404**

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
- Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# \_\_\_\_\_

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

- EANES CREEK
- EANES CREEK TRIBUTARY
- 
- 

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

**Best Management Practices:**

<b>Erosion</b>	<b>Sedimentation</b>	<b>Post-Construction TSS</b>
<input checked="" type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input checked="" type="checkbox"/> Blankets/Matting	<input checked="" type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input checked="" type="checkbox"/> Mulch Filter Berm and Socks
<input checked="" type="checkbox"/> Mulch Filter Berm and Socks	<input checked="" type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Grassy Swales

**III. CULTURAL RESOURCES**

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

- No Action Required     Required Action

Action No.

- AN ARCHAEOLOGIST MUST BE ONSITE TO MONITOR CONSTRUCTION ACTIVITIES WITHIN THE 100-YR FLOODPLAIN.
- 
- 
- 

**IV. VEGETATION RESOURCES**

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

- No Action Required     Required Action

Action No.

- ESTABLISH VEGETATION IN ALL DISTURBED AREAS AS DETAILED IN THE EROSION CONTROL PLAN.
- 
- 
- 

**V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.**

- No Action Required     Required Action

Action No.

- BEFORE REMOVING ANY TREES, CONFIRM NO NESTS ARE PRESENT.
- 
- 
- 

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

**LIST OF ABBREVIATIONS**

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOT: Notice of Termination	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- \* Dead or distressed vegetation (not identified as normal)
- \* Trash piles, drums, canister, barrels, etc.
- \* Undesirable smells or odors
- \* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

- Yes     No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

- Yes     No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

- No Action Required     Required Action

Action No.

- ASPHALT PRODUCTS
- FUELS
- 

**VII. OTHER ENVIRONMENTAL ISSUES**

(includes regional issues such as Edwards Aquifer District, etc.)

- No Action Required     Required Action

Action No.

- TCEQ EDWARDS AQUIFER RECHARGE ZONE
- 
- 

		<b>Design Division Standard</b>
<h2>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</h2> <h1>EPIC</h1>		
FILE: epic.dgn	DN: TxDOT	CK: RG
©TxDOT: February 2015	CONT	SECT
12-12-2011 (DS) REVISIONS	N/A	N/A
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY
01-23-2015 SECTION I. CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	N/A	TRAVIS
		SHEET NO. <b>45</b>

**A. GENERAL SITE DATA**

**1. PROJECT LIMITS: EANES CREEK LOW WATER CROSSINGS**

Begin Project Coordinates : Latitude (N) : 30° 16' 45" Longitude (W) : -97° 48' 47"  
 End Project Coordinates : Latitude (N) : 30° 16' 50" Longitude (W) : -97° 48' 42"

**2. PROJECT SITE MAPS:**

- \* Project Location Map: Project Layout (Sheet 13)
- \* Drainage Patterns: Drainage Area Maps (Sheets 31-32)
- \* Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections (Sheet 17)
- \* Location of Erosion and Sediment Controls: SW3P Site Maps (Sheets 47-48)
- \* Surface Waters and Discharge Locations: Drainage and Culvert Layouts (Sheets 37-39, 41-42)
- \* Project Specific Location(s) (PSL): To be determined by the project Construction Personnel. Location(s) shown on SW3P Site Map (if PSL location(s) is within one mile of project) and information located in project SW3P Binder (Reference Item #10 below).

**3. PROJECT DESCRIPTION:**

CONSTRUCTION OF EARTHWORK, GRADING, BASE, HMAC SURFACING, DRAINAGE STRUCTURES, SIDEWALKS, SIGNING AND PAVEMENT MARKINGS

**4. MAJOR SOIL DISTURBING ACTIVITIES:**

CLEARING AND GRUBBING DRAINAGE INFRASTRUCTURE  
 ROADWAY EXCAVATION AND EMBANKMENT  
 PLACEMENT OF TOPSOIL

**5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:**

SANDY LEAN CLAY (CL) UNDERLAIN BY LIMESTONE.

**6. TOTAL PROJECT AREA:** 3.11 Acres

**7. TOTAL AREA TO BE DISTURBED:** 3.11 Acres (100%)

**8. WEIGHTED RUNOFF COEFFICIENT**

BEFORE CONSTRUCTION: 0.62  
 AFTER CONSTRUCTION: 0.62

**9. NAME OF RECEIVING WATERS:**

EANES CREEK (SEGMENT NO.1429B)

**10. PROJECT SW3P Binder:**

A. For projects disturbing one to five acres, The Contractor will maintain a SW3P Binder at the project field office (if there is not a project field office, should be kept on the Job Site at all times) which contains the following: Index Sheet, TCEQ Signature Authority, TCEQ Small Construction Site Notice, Contractor Certification of Compliance, SW3P Inspector Qualification Statements, Inspection and Maintenance Reports (Form 2118), SW3P Sheet, Site Location Maps, Stored Material Lists specifying associated control measures and the Appendix which contains the TPDES Construction General Permit, MS4 Operator Notification(s) and the Construction PSL Permits per all applicable requirements.

B. For projects disturbing 5 acres or more, the Contractor will follow the actions listed in (10.A) above with the addition of the following: Notice Of Intent (N.O.I.) and Fee Payment Form, TCEQ Large Construction Site Notice (to be used instead of Small Site Notice), and TPDES Permit Coverage Notice.

C. For projects disturbing less than one acre, actions described in (10.A) and (10.B) above are not required. Acreage is calculated by adding Total Area To Be Disturbed Acres on project (See #7 above) and the PSL(s) acreage located within one mile of project.

**B. EROSION AND SEDIMENT CONTROLS**

**1. SOIL STABILIZATION PRACTICES:** (Select T = Temporary or P = Permanent, as applicable)

- TEMPORARY SEEDING
- MULCHING (Hay or Straw)
- BUFFER ZONES
- PLANTING
- SEEDING
- SODDING
- PRESERVATION OF NATURAL RESOURCES
- FLEXIBLE CHANNEL LINER
- RIGID CHANNEL LINER
- SOIL RETENTION BLANKET
- COMPOST MANUFACTURED TOPSOIL
- VERTICAL TRACKING
- OTHER: Disturbed areas on which construction activity has ceased, either temporarily or permanently, shall be stabilized within 14 days unless activities are scheduled to resume and do so within 21 days.

**2. STRUCTURAL PRACTICES:**

- (T = Temporary or P = Permanent)
- SILT FENCES
  - EROSION CONTROL LOGS
  - EROSION CONTROL COMPOST BERMS (Low Velocity)
  - ROCK FILTER DAMS
  - DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
  - DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
  - DIVERSION DIKE AND SWALE COMBINATIONS
  - PIPE SLOPE DRAINS
  - PAVED FLUMES
  - ROCK BEDDING AT CONSTRUCTION EXIT
  - TIMBER MATTING AT CONSTRUCTION EXIT
  - CHANNEL LINERS
  - SEDIMENT TRAPS
  - SEDIMENT BASINS
  - STORM INLET SEDIMENT TRAP
  - STONE OUTLET STRUCTURES
  - CURBS AND GUTTERS
  - STORM SEWERS
  - VELOCITY CONTROL DEVICES
  - OTHER: (Specify Practice)

NOTE: TOP OF BMP'S SHOULD NOT BE HIGHER THAN ROADWAY ELEVATION AS NOT TO FLOOD ROADWAY UNLESS PRIOR APPROVAL FROM ENGINEER IS OBTAINED.

**3. STORM WATER MANAGEMENT:**

- A. Storm water drainage will be provided by ditches, inlets, and storm water systems which carry drainage within the R.O.W. to the lows within the roadway and project site which drains to natural facilities.
- B. Non paved areas and ditches shall be stabilized with a permanent vegetative cover.
- C. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4:1 or flatter slopes with permanent vegetative cover.

**4. STORM WATER MANAGEMENT ACTIVITIES:** (Sequence of Construction)

- 1) INSTALL TEMPORARY EROSION CONTROL MEASURES
- 2) CULVERT AND STORM SEWER IMPROVEMENTS
- 3) ROADWAY CONSTRUCTION
- 4) PLACE PERMANENT SIGNING AND STRIPING
- 5) PLACE TOPSOIL, MULCH, SEEDING, AND PERMANENT EROSION CONTROLS
- 6) PROJECT CLEAN UP AND REMOVAL OF TEMPORARY EROSION CONTROLS

**5. NON-STORM WATER DISCHARGES:**

Filter non-storm water discharges, or hold in retention basins, before being allowed to mix with storm water. These discharges consist of, but not limited to, non-polluted ground water, spring water, foundation or footing drain water, water used for dust control or pavement washing and vehicle washwater containing no detergents.

**C. OTHER REQUIREMENTS & PRACTICES**

**1. MAINTENANCE:**

Maintain all erosion and sediment controls in good working order. Perform any necessary cleaning/repairs/replacements at the earliest possible date prior to next rain event, but no later than 7 calendar days. Ensure the surrounding ground has dried sufficiently to prevent damage from equipment. "Too Wet" is the only reason for not adhering to time frames described. When construction activities permanently or temporarily cease and are not expected to resume for 14 or more days on a disturbed portion of the site, stabilization measures must be initiated immediately.

**2. INSPECTION:**

A Construction Observer will perform a regularly scheduled SW3P inspection every 7 calendar days. An Inspection and Maintenance Report, signed by the Construction Observer and the Contractor, will be filed for each inspection. Revise/clean/repair/replace each BMP control device in accordance with the current Field Inspection and Maintenance Report (Form 2118) and Item 1 (Maintenance) above.

**3. WASTE MATERIALS:**

On a daily basis, or as may be directed, collect all waste materials, trash and debris from the construction site and deposit into a metal dumpster having a secure cover and which meets all state and local city solid waste management requirements. Empty the dumpster as required by regulation, or as may be directed, at a local approved landfill site. Do not bury construction waste on the construction project site.

**4. HAZARDOUS WASTE & SPILL REPORTING:**

As a minimum, any products in the following categories are considered to be hazardous: Paints, Acids, Solvents, Fuels, Asphalt Products, Chemical Additives for Soil Stabilization, and Concrete Curing Compounds or Additives. When storing hazardous material on the project site, or at a Project Specific Location, take all practicable precaution to prevent and/or contain any spillage of these materials. In the event of a spill, contact the spill coordinator immediately.

**5. SANITARY WASTE:**

Use a licensed sanitary waste management contractor to collect all sanitary waste from portable units as may be required by local regulation, or as directed.

**6. CONSTRUCTION VEHICLE TRACKING:**

On a regular basis, or as may be directed, dampen haul roads for dust control and stabilize construction entrances/exits. Provide for a motorized broom or vacuum type sweeper to be available on a daily basis, or as may be directed, to remove sediment from paved roadways abutting or traversing the project site.

**7. MANAGEMENT PRACTICES:**

- A. Construct disposal areas, stockpiles, haul roads and PSL's in a manner that will minimize and control the amount of sediment that may enter receiving waters. Do not locate disposal areas in any wetland, waterbody or streambed.
- B. Locate construction staging areas, vehicle maintenance and PSL's areas in a manner to minimize the runoff of pollutants.
- C. When working in or near a wetland, install and maintain operating soil erosion and sediment controls at all times during construction and isolate the work from the wetland.
- D. Clear all waterways as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.
- E. Procedures and/or practices should be taken to control dust.
- F. Sediment to be removed from roadways daily or when work begins after weather events if construction activities have ceased due to weather event.
- G. The Contractor will be required to contain wash water from concrete trucks in a manner that will prevent same from entering any waterway.
- H. The Contractor is responsible for insuring that all subcontractors are aware and comply with all components of the Temporary Erosion Control Plans.

DATE 7/17/2023; PROJECT: 4046; BOND PROJECTS: 300 Plans and Drawings; 330 Plan Production; 333 Plan Sheets; 02\_Eanes Creek; 0846; SHEET: SW3P; EC: dgm



**STORM WATER POLLUTION PREVENTION PLAN (SW3P)**



7/17/2023

Victoria M. Ortega, P.E.  
 Signature of Registrant & Date

DESIGN	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO.		HIGHWAY NO. NA
GRAPHICS	STATE TEXAS	DISTRICT	COUNTY TRAVIS	SHEET NO. 46
CHECK	CONTROL	SECTION	JOB	

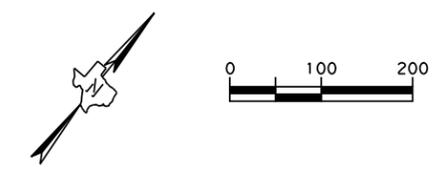
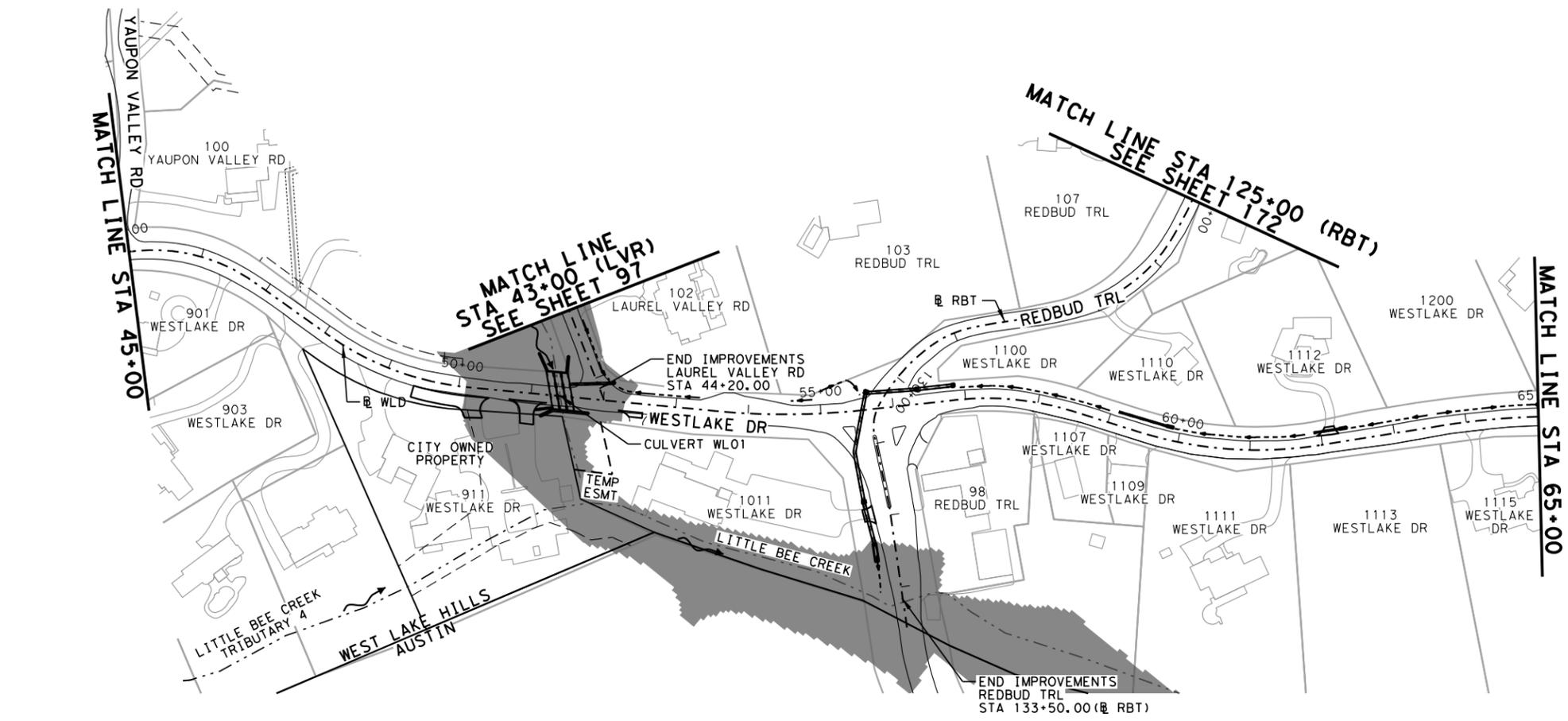






TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION
553	13" LIVE OAK	1261	24" ASHE JUNIPER (MS-11-7-7-6-6)	1384	4" LIGUSTRUM	1507	3" GRAPE MYRTLE	1629	5" LIGUSTRUM	1751	5.5" LIGUSTRUM(MS4-3)	1873	3" ASHE JUNIPER	3069	8" ASHE JUNIPER
554	14" ASHE JUNIPER	1262	3" CEDAR ELM	1385	13.5" ASHE JUNIPER(MS10-7)	1508	5" LIGUSTRUM	1630	4" ASH	1752	4" LIGUSTRUM	1874	4" ASHE JUNIPER	3070	8.5" ASHE JUNIPER (MS-7-3)
586	35" LIVE OAK(MS25-20)	1263	8" ASHE JUNIPER	1386	3" LIGUSTRUM	1509	3" LIGUSTRUM	1631	4" ASH	1753	4" LIGUSTRUM(MS3-2)	1875	9.5" ASHE JUNIPER(MS7-5)	3071	5" ASHE JUNIPER
725	30" PECAN	1264	9.5" CHINABERRY (MS-7-5)	1387	4" LIGUSTRUM	1510	5" LIGUSTRUM	1632	4" HACKBERRY	1754	7" LIGUSTRUM(MS5-4)	1876	3" ASH	3094	7" ASHE JUNIPER
760	13" HACKBERRY	1265	9" CHINABERRY	1388	4" LIGUSTRUM	1511	6" HACKBERRY	1633	22" LIGUSTRUM(MS10-9-9-7)	1755	4" LIGUSTRUM(MS3-2)	1877	6" ASH	3095	7" ASHE JUNIPER
761	9" HACKBERRY	1266	5" ASHE JUNIPER	1389	3" LIGUSTRUM	1512	17.5" WILLOW(MS12-11)	1634	7" ASH	1756	4" LIGUSTRUM	1878	5" CHINABERRY	3121	5" HACKBERRY
762	12" ASHE JUNIPER	1267	9.5" ASHE JUNIPER (MS-7-5)	1390	3" LIGUSTRUM	1513	11" WILLOW	1635	4.5" LIGUSTRUM(MS3-2)	1757	4.5" LIGUSTRUM(MS3-3)	1879	6" CHINABERRY	3122	22.5" LIVE OAK (MS-18-9)
763	18" LIGUSTRUM(MS8-6-5-4)	1268	6" ASHE JUNIPER	1391	3" LIGUSTRUM	1514	13" SYCAMORE	1636	3" LIGUSTRUM	1758	7" LIGUSTRUM(MS5-4)	1880	4" ASH	3123	12" LIVE OAK
764	13" LIGUSTRUM(MS7-7-5)	1269	5" ASHE JUNIPER	1392	3" LIGUSTRUM	1515	6" SYCAMORE	1637	3" LIGUSTRUM	1759	5" LIGUSTRUM(MS4-2)	1881	3" ASH	3124	7" LIVE OAK
765	15" CEDAR ELM(MS11-8)	1270	3" ASHE JUNIPER	1393	3" LIGUSTRUM	1516	24" PECAN	1638	4" ASHE JUNIPER	1760	5" LIGUSTRUM(MS5-4)	1882	3" ASH	3125	17.5" LIVE OAK (MS-10-9-7)
766	18" HACKBERRY	1271	8.5" ASHE JUNIPER (MS-6-5)	1394	3" LIGUSTRUM	1517	13" HACKBERRY	1639	4" LIGUSTRUM	1761	4" LIGUSTRUM	1883	5" CHINABERRY	3417	35" LIVE OAK
768	10.5" ASHE JUNIPER(MS7-7)	1272	3" CEDAR ELM	1395	19.5" ASHE JUNIPER(MS6-6-4-4-3)	1518	8" HACKBERRY	1640	5.5" LIGUSTRUM(MS3-2-1)	1762	4" LIGUSTRUM	1884	3" SYCAMORE	3645	4" ASHE JUNIPER
769	10" ASHE JUNIPER	1273	4" RED OAK	1396	7" LIGUSTRUM(MS5-4)	1519	4" HACKBERRY	1641	6" LIGUSTRUM(MS3-3-3)	1763	4" LIGUSTRUM	1885	3" ASH	3646	3" ASHE JUNIPER
770	10" LIGUSTRUM(MS8-4)	1274	4" ASHE JUNIPER	1397	4" LIGUSTRUM	1520	3" HACKBERRY	1642	4.5" LIGUSTRUM(MS3-3)	1764	4" LIGUSTRUM	1886	5" ASH	3647	8" RED OAK
771	10" ASHE JUNIPER	1275	3" PERSIMMON	1398	7" ASHE JUNIPER	1521	15" CEDAR ELM	1643	3" LIGUSTRUM	1765	4" LIGUSTRUM	1887	12" CHINABERRY	3648	6" HACKBERRY
772	11" HACKBERRY	1276	3" ASHE JUNIPER	1399	6" ASHE JUNIPER	1522	16" CEDAR ELM	1644	4" LIGUSTRUM(MS3-2)	1766	4" LIGUSTRUM(MS3-2)	1888	3" ASH	3649	4" REDBUD
773	15.5" LIGUSTRUM(MS6-5-4-4-3-3)	1277	5" ASHE JUNIPER	1400	5" LIGUSTRUM	1523	7" CEDAR ELM	1645	4" LIGUSTRUM(MS3-2)	1767	3" LIGUSTRUM	1889	15" ASH	3650	8" ASHE JUNIPER
774	16" ASHE JUNIPER	1278	5" ASHE JUNIPER	1401	6" LIGUSTRUM	1524	10" CEDAR ELM	1646	3" LIGUSTRUM	1768	7" LIGUSTRUM(MS5-4)	1890	3" CHINABERRY	3651	9" ASHE JUNIPER
775	11" ASHE JUNIPER	1279	20" ASHE JUNIPER (MS-14-12)	1402	6" LIGUSTRUM(MS4-4)	1525	8" HACKBERRY	1647	3" LIGUSTRUM	1769	4" LIGUSTRUM	1891	3" CHINABERRY	3993	20" HACKBERRY
776	15" ASHE JUNIPER(MS11-8)	1280	11" ASHE JUNIPER	1403	9" ASHE JUNIPER	1526	9" CEDAR ELM	1648	4.5" LIGUSTRUM(MS3-3)	1770	8" LIGUSTRUM(MS4-4-2)	1892	8" ASH	3994	11" HACKBERRY(MS8-6)
779	18" ASHE JUNIPER	1281	20" ASHE JUNIPER (MS-14-12)	1411	3" ASHE JUNIPER	1527	10" CEDAR ELM	1649	4" LIGUSTRUM	1771	4" LIGUSTRUM(MS3-2)	1893	5" LIGUSTRUM	3995	7" LIGUSTRUM
780	10" ASHE JUNIPER	1282	23.5" ASHE JUNIPER (MS-10-9-9-9)	1405	3" LIGUSTRUM	1528	26" PECAN	1650	4" LIGUSTRUM(MS3-2)	1772	8.5" LIGUSTRUM(MS4-4-3-2)	1894	8" ASH	3996	8" HACKBERRY
781	23.5" ASHE JUNIPER (MS-11-9-8-8)	1283	7" RED OAK	1406	5" LIGUSTRUM	1529	10" PECAN	1651	3" LIGUSTRUM	1773	4" LIGUSTRUM	1895	5" CHINABERRY	3997	5" LIGUSTRUM
782	13" ASHE JUNIPER	1284	8" RED OAK	1407	15" PECAN	1530	8" PECAN	1652	5.5" LIGUSTRUM(MS3-3-2)	1774	9" LIGUSTRUM(MS6-3-3)	1896	5" ASH	3998	7.5" LIGUSTRUM(MS4-3-2-2)
800	6" HACKBERRY	1285	3" LIGUSTRUM	1408	25" CEDAR ELM(MS15-12-8)	1531	11" ASHE JUNIPER	1653	4.5" LIGUSTRUM(MS3-3)	1775	4.5" LIGUSTRUM(MS3-3)	1897	5" ASH	3999	4" LIGUSTRUM
936	30" ASHE JUNIPER	1286	5" ASHE JUNIPER	1409	8" CEDAR ELM	1532	4" ASHE JUNIPER	1654	3" ASHE JUNIPER	1776	3" LIGUSTRUM	1898	17.5" CHINABERRY(MS9-9-8)	4000	9" LIGUSTRUM(MS6-3-3)
937	34" LIVE OAK (MS-10-9-8-7)	1287	13.5" ASHE JUNIPER (MS-11-5)	1410	12" CEDAR ELM	1533	9" CEDAR ELM	1655	4.5" LIGUSTRUM(MS3-3)	1777	7.5" LIGUSTRUM(MS4-4-3)	1899	21" LIGUSTRUM(MS15-8-4)	4001	5" LIGUSTRUM
938	13" SYCAMORE	1288	13" SYCAMORE (MS-6-4)	1411	4" LIGUSTRUM	1534	4" ASHE JUNIPER	1656	4" LIGUSTRUM	1778	8" ASHE JUNIPER(MS7-6-4)	1900	5" ASH	4002	11" ASHE JUNIPER
940	11" LIVE OAK	1289	3" PERSIMMON	1412	6" LIGUSTRUM	1535	11" ASHE JUNIPER	1657	4.5" LIGUSTRUM(MS3-3)	1779	3" ASH	1901	5" ASH	4003	11" CEDAR ELM
941	17" CEDAR ELM	1290	11.5" ASHE JUNIPER (MS-9-5)	1413	4" LIGUSTRUM	1536	6" CEDAR ELM	1658	3" LIGUSTRUM	1780	4" LIGUSTRUM	1902	5" ASH	4004	12.5" LIGUSTRUM(MS8-6-3)
942	18" CEDAR ELM	1291	13.5" ASHE JUNIPER (MS-8-6-5)	1414	5" LIGUSTRUM	1537	19" ASHE JUNIPER	1659	3" LIGUSTRUM	1781	5" LIGUSTRUM	1903	4" ASH	4005	6" ASHE JUNIPER
943	22" CEDAR ELM	1292	8" ASHE JUNIPER	1415	6" ASHE JUNIPER	1538	7" CEDAR ELM	1660	3" LIGUSTRUM	1782	4" LIGUSTRUM	1904	3" LIGUSTRUM	4006	11" ASHE JUNIPER
944	39.5" LIVE OAK (MS-18-16-16-11)	1293	6" ASHE JUNIPER	1416	19.5" ASHE JUNIPER(MS8-7-7-6-3)	1539	7.5" LIGUSTRUM(MS6-3)	1661	4" LIGUSTRUM	1783	4" LIGUSTRUM	1905	7" LIGUSTRUM(MS3-2-2-2-2)	4007	3" LIGUSTRUM
945	15" CEDAR ELM	1294	6" ASHE JUNIPER	1417	13" ASHE JUNIPER(MS9-8)	1540	17.5" ASHE JUNIPER(MS12-11)	1662	5" LIGUSTRUM	1784	4" LIGUSTRUM	1906	4" CEDAR ELM	4070	5" ASHE JUNIPER
946	13" SYCAMORE (MS-15-12)	1295	4" LIGUSTRUM (MS-2-2)	1418	4" LIGUSTRUM	1541	21" SYCAMORE	1663	5" LIGUSTRUM(MS3-2-2)	1785	10" LIGUSTRUM	1907	5" ASH	4071	5" ASH
947	21.5" LIVE OAK (MS-9-9-8-8)	1296	10" ASHE JUNIPER	1419	9" LIVE OAK	1542	9" SYCAMORE	1664	4" LIGUSTRUM	1786	3" ASH	1908	8" LIGUSTRUM(MS5-4-2)	4072	5" LIGUSTRUM(MS3-2-2)
949	15" ASHE JUNIPER	1297	3" PERSIMMON	1420	5" ASHE JUNIPER	1543	11" HACKBERRY	1665	4" LIGUSTRUM	1787	7" LIGUSTRUM(MS3-3-3-2)	1909	7" LIGUSTRUM(MS6-2)	4073	5" CHINABERRY
950	25" COTTON WOOD	1298	8" ASHE JUNIPER	1421	11.5" LIGUSTRUM(MS9-5)	1544	8" LIGUSTRUM	1666	8" LIGUSTRUM	1788	4" LIGUSTRUM(MS3-2)	1910	5" LIGUSTRUM(MS4-2)	4078	3" LIGUSTRUM
951	8" LIVE OAK	1299	26.5" ASHE JUNIPER (MS-14-12-7-6)	1422	7" ASHE JUNIPER	1545	10.5" LIGUSTRUM(MS9-3)	1667	8" LIGUSTRUM(MS6-4)	1789	6" LIGUSTRUM	1911	3" LIGUSTRUM	4114	3" HACKBERRY
952	14" CEDAR ELM	1301	4" PERSIMMON	1423	6" ASHE JUNIPER	1546	8" PECAN	1668	4" LIGUSTRUM	1790	4" LIGUSTRUM	1912	3" LIGUSTRUM	4115	3" HACKBERRY
953	18" HACKBERRY	1302	5" LIGUSTRUM	1424	3" LIGUSTRUM	1547	3" PECAN	1669	6" LIGUSTRUM	1791	3" ASHE JUNIPER	1913	6" LIGUSTRUM	4116	7" ASH
956	22" CEDAR ELM	1303	13" ASHE JUNIPER	1425	3" LIGUSTRUM	1548	4" ASHE JUNIPER	1670	6" LIGUSTRUM(MS5-2)	1792	4" ASHE JUNIPER	1914	3" LIGUSTRUM	4117	11" ASHE JUNIPER
967	22" CEDAR ELM	1304	4" LIGUSTRUM	1426	3" LIGUSTRUM	1549	4" LIGUSTRUM	1671	7" ASH	1793	7" ASH	1915	4" ASH	4121	5" ASH
968	10" LIGUSTRUM (MS-7-6)	1305	4" LIGUSTRUM (MS-3-2)	1427	5" ASHE JUNIPER	1550	7" ASH	1672	5" LIGUSTRUM	1794	13.5" LIGUSTRUM	1916	3" LIGUSTRUM	4122	5.5" ASH(MS4-3)
969	12" LIGUSTRUM	1306	4" CEDAR ELM	1428	5" LIGUSTRUM	1551	4" ASH	1673	5" LIGUSTRUM	1795	6" LIGUSTRUM	1917	6" PECAN	4127	11.5" LIGUSTRUM(MS5-4-3-3-3)
970	8" LIGUSTRUM	1307	18" ASHE JUNIPER	1429	4" LIGUSTRUM	1552	8" ASH	1674	4" LIGUSTRUM	1796	42" LIVE OAK	1918	9" PECAN	4193	10" ASHE JUNIPER
971	10" LIGUSTRUM (MS-7-6)	1308	3" LIGUSTRUM	1430	6" LIGUSTRUM	1553	4" ASH	1675	10" ASH	1797	3" ASH	1919	9" PECAN	4194	8" ASHE JUNIPER
972	22" CEDAR ELM	1309	12" ASHE JUNIPER (MS-9-6)	1431	3" LIGUSTRUM	1554	4" LIGUSTRUM	1676	17" LIGUSTRUM(MS8-8-6-4)	1798	5" HACKBERRY	1920	12" PECAN	4195	9" ASHE JUNIPER
973	13" SYCAMORE	1310	3" LIGUSTRUM (MS-2-2)	1432	4" LIGUSTRUM	1555	13" LIGUSTRUM	1677	3" LIGUSTRUM	1799	11" ASH	1921	5" PECAN	4196	11" RED OAK(MS8-5-5)
974	20" LIGUSTRUM	1311	4" LIGUSTRUM	1433	15" CEDAR ELM	1556	10" ASH	1678	15.5" LIGUSTRUM(MS5-3)	1800	6.5" LIGUSTRUM(MS5-3)	1922	6" PECAN	4200	10" ASHE JUNIPER
975	31" PECAN	1312	4" LIGUSTRUM	1434	6" LIGUSTRUM	1557	7" ASH	1679	4" LIGUSTRUM(MS3-2)	1801	33.5" ASHE JUNIPER(MS19-15-14)	1923	5" PECAN	4213	8" ASHE JUNIPER
977	14.5" HACKBERRY (MS-11-7)	1313	4" LIGUSTRUM (MS-3-2)	1435	5" LIGUSTRUM	1558	6" ASH	1680	5.5" LIGUSTRUM(MS4-3)	1802	6" ASH	1924	6" PECAN (DEAD STUMP)	4214	6" ASHE JUNIPER
978	12" HACKBERRY	1314	10.5" ASHE JUNIPER (MS-8-5)	1436	5" LIGUSTRUM	1559	4" LIGUSTRUM(MS3-2)	1681	6" LIGUSTRUM	1803	3" LIGUSTRUM	1925	4" PECAN	4215	6" LIGUSTRUM
979	13" HACKBERRY	1315	13" ASHE JUNIPER	1437	5" LIGUSTRUM	1560	5.5" LIGUSTRUM(MS4-3)	1682	4" LIGUSTRUM	1804	5" LIGUSTRUM	1926	7" PECAN	4216	12.5" ASHE JUNIPER(MS9-7)
980	15" CEDAR ELM	1316	27.5" ASHE JUNIPER(MS9-9-8-6-5-3)	1438	15" CEDAR ELM	1561	5" LIGUSTRUM(MS2-2-2-2)	1683	10" SYCAMORE	1805	3" LIGUSTRUM	1927	4" ASH	4217	6" ASHE JUNIPER
982	13" HACKBERRY	1317	7" ASHE JUNIPER	1439	4" LIGUSTRUM	1562	4" LIGUSTRUM(MS4-3-2)	1684	4" LIGUSTRUM	1806	4" LIGUSTRUM	1928	5" LIGUSTRUM(MS3-2)	4218	4" LIGUSTRUM
984	11" LIGUSTRUM (MS-7-5-3)	1318	5" HACKBERRY	1440	5" ASHE JUNIPER	1563	8.5" CHINABERRY(MS6-5)	1685	11" ASH	1807	4" LIGUSTRUM	1929	4" CEDAR ELM	4219	10" ASHE JUNIPER
985	14" HACKBERRY	1319	7.5" LIGUSTRUM (MS-5-5)	1441	3" LIGUSTRUM	1564	6" LIGUSTRUM	1686	12" ASH	1808	5" LIGUSTRUM	1930	6" CEDAR ELM	4220	5" ASHE JUNIPER
986	11" CEDAR ELM	1320	9" CEDAR ELM	1442	5" LIGUSTRUM	1565	16" LIVE OAK	1687	3" LIGUSTRUM	1809	6" LIVE OAK	1931	8" CEDAR ELM	4221	11" ASHE JUNIPER
987	10" HACKBERRY	1321	10" CEDAR ELM	1443	3" LIGUSTRUM	1566	15" LIVE OAK	1688	3" ASH	1810	4" LIGUSTRUM	1932	4" CEDAR ELM	4222	7" ASHE JUNIPER
988	11" HACKBERRY	1322	3" LIGUSTRUM	1444	3" LIGUSTRUM	1567	15" LIVE OAK	1689	7" LIGUSTRUM(MS5-2-2)	1811	4" LIGUSTRUM	1933	24" LIGUSTRUM(MS8-7-6-6-5-4-4)	4223	11.5" ASHE JUNIPER(MS8-7)
989	9" HACKBERRY	1323	3" LIGUSTRUM	1445	15" CEDAR ELM	1568	13" LIVE OAK	1690	6" LIGUSTRUM	1812	3" LIGUSTRUM	1934	10" LIGUSTRUM(MS6-4-4)	4269	7" LIVE OAK
990	9" CEDAR ELM	1324	7.5" WHITE OAK (MS-4-4-3)	1446	15" LIGUSTRUM	1569	17" LIGUSTRUM(MS5-4)	1691	7" LIGUSTRUM	1813	10" LIGUSTRUM	1935	11" ASH	4270	7" LIVE OAK
1202	35" LIVE OAK	1325	4" LIGUSTRUM	1447	15" ASHE JUNIPER	1570	24" CEDAR ELM	1692	7" ASH	1814	3" LIGUSTRUM	1936	4" LIGUSTRUM	4332	7" HACKBERRY
1203	10" LIVE OAK	1326	5" LIVE OAK	1448	9" LIGUSTRUM	1571	6" LIGUSTRUM	1693	5" ASH	1815	6.5" LIGUSTRUM(MS5-3)	1937	12.5" LIGUSTRUM(MS7-7-4)	4333	11" HACKBERRY
1204	8" LIVE OAK	1327	4" LIGUSTRUM (MS-3-2)	1449	3" LIGUSTRUM	1572	3" ASH	1694	7" ASH	1816	3" LIGUSTRUM	1938	3" CEDAR ELM	4334	6" HACKBERRY
1205	5.5"														



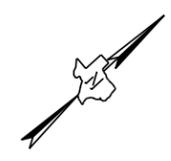
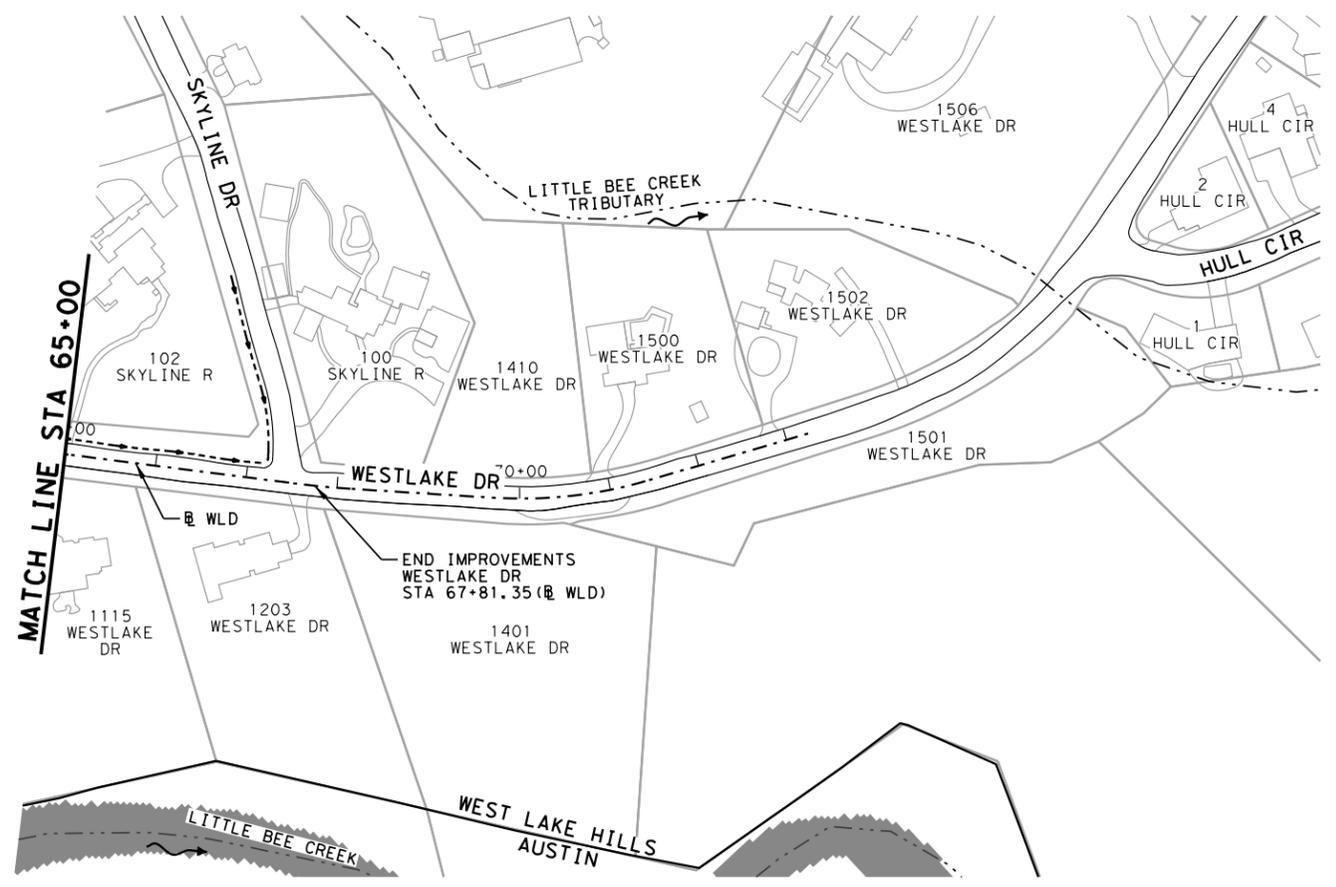


**LEGEND**

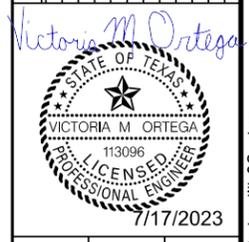
- CITY LIMITS
- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- EXIST RIGHT OF WAY/PARCELS
- - - EXIST EASEMENT
- - - PROP EASEMENT
- - - DITCH CENTERLINE
- FEMA FLOODPLAIN (JAN 22, 2020)
- FEMA FLOODPLAIN (JAN 22, 2020) & FLOODWAY

**NOTES**

1. CONTRACTOR SHALL COORDINATE WITH PROPERTY OWNERS AND/OR TENANTS IF PROPERTY ACCESS WILL BE LIMITED.



REV. NO.	BY	DATE	REVISION DESCRIPTION

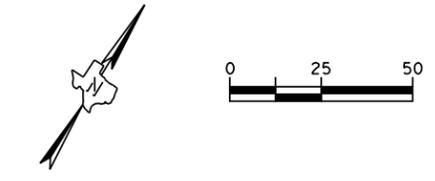
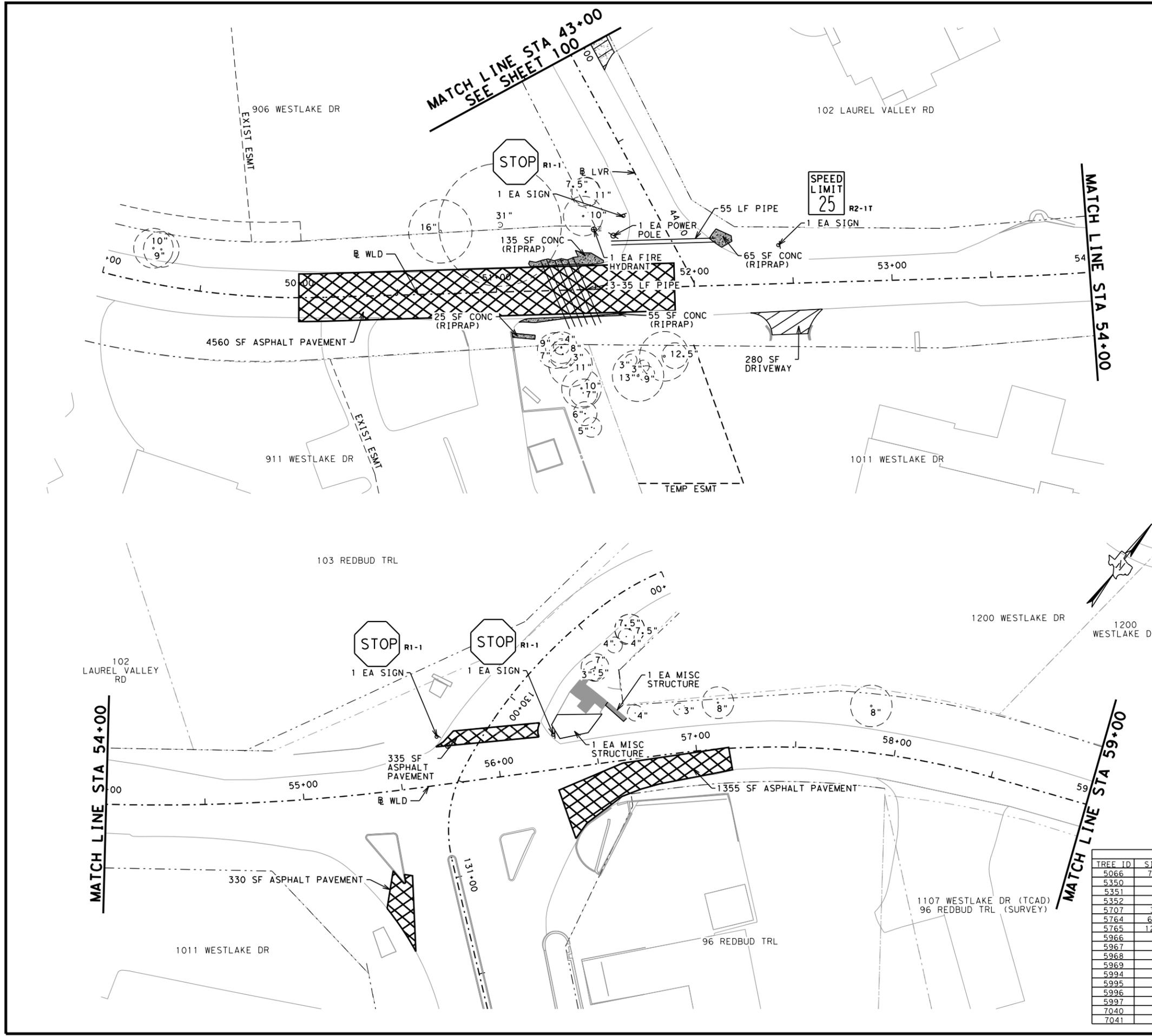


K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**PROJECT LAYOUT**  
**STA 45+00 - END**



WEST LAKE HILLS, TX	
SHEET 2 OF 2	
SCALE	1"=200'
DATE	7/17/2023
SHEET NUMBER	51 OF 388

X:\Projects\0846\_WLH\_Bond\_Programs\300\_Plans\_and\_Drawings\333\_Plan\_Sheets\03\_West\_Lake\0846ShtGNP\layWL02.dgn

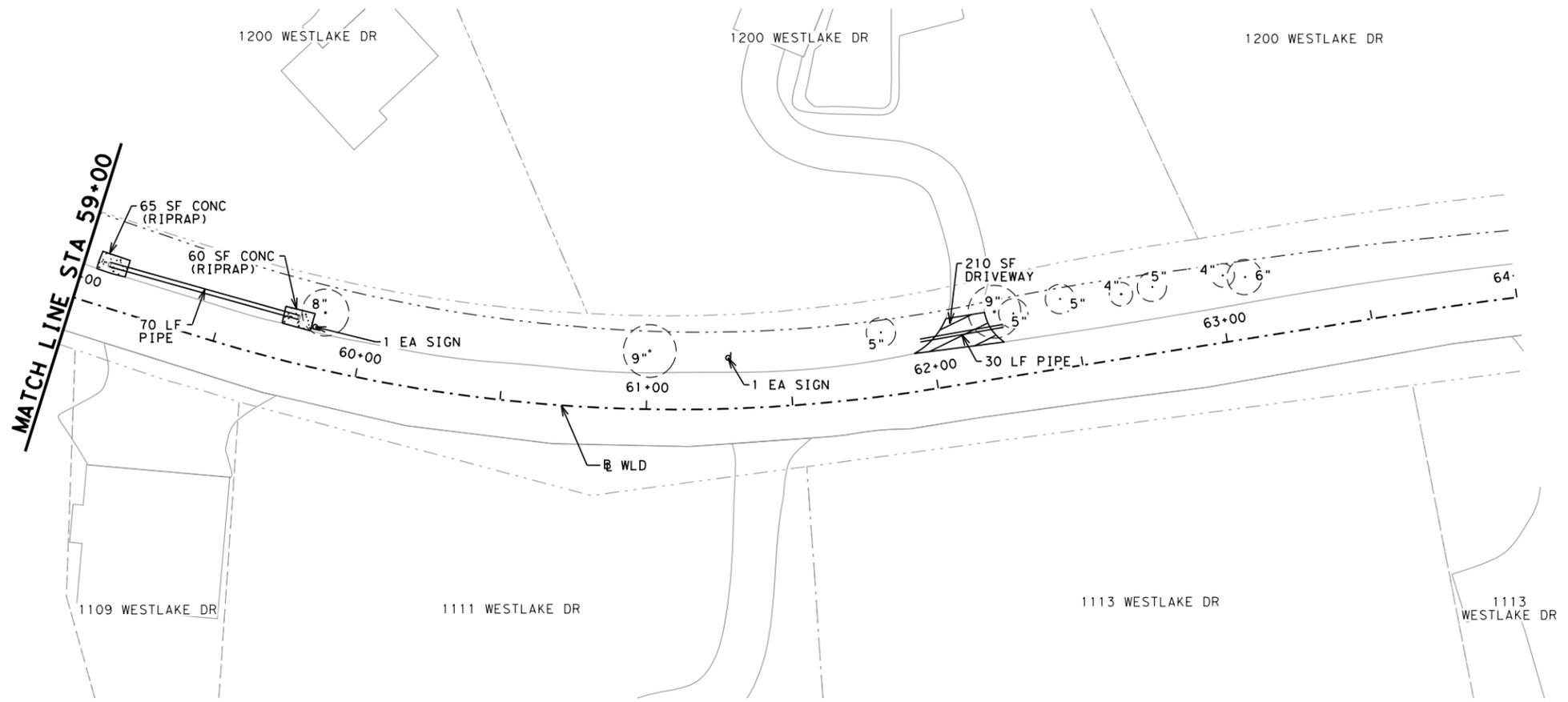


- LEGEND**
- REMOVING SIGN
  - REMOVING CONC (PAVE)
  - REMOVING CONC (RIPRAP)
  - REMOVING ASPHALT PAVEMENT
  - TREES TO BE REMOVED

- NOTES**
1. PREPARING OF RIGHT-OF-WAY (CITY OF AUSTIN BID ITEM 101S) FOR CONSTRUCTION OPERATIONS INCLUDES THE REMOVAL AND DISPOSAL OF ALL OBSTRUCTIONS FROM THE RIGHT-OF-WAY AND FROM DESIGNATED EASEMENTS, WHERE REMOVAL OF SUCH OBSTRUCTIONS IS NOT OTHERWISE INDICATED AS A SEPARATE PAY ITEM.
  2. CITY OF AUSTIN BID ITEM 101S SHALL INCLUDE, BUT NOT BE LIMITED TO, THE REMOVAL OF TREES, STUMPS, ROOTS, BUSHES, SHRUBS, CURB AND GUTTER, DRIVEWAYS, PAVED PARKING AREAS, MISCELLANEOUS STONE, BRICK, SIDEWALKS, DRAINAGE STRUCTURES, MANHOLES, INLETS, ABANDONED RAILROAD TRACKS, SCRAP IRON, AND ALL RUBBISH AND DEBRIS WHETHER ABOVE OR BELOW GROUND. CARE SHOULD BE TAKEN TO IDENTIFY AND PROTECT EXISTING INFRASTRUCTURE.
  3. REMOVAL OF THE EXISTING ROADWAY FOR RECONSTRUCTION SHALL BE SUBSIDIARY TO STREET EXCAVATION, BID ITEM 110S-A.
  4. ONLY SIGNS IMPACTED SHALL BE REMOVED AND REPLACED, AS INDICATED. SIGN PLAQUES IN GOOD CONDITION CAN BE STORED AND REINSTALLED ON NEW POSTS. ENGINEER WILL MAKE FINAL DETERMINANT OF APPROVED SIGNS.

TREE REMOVAL					
TREE ID	SIZE	TYPE	TREE ID	SIZE	TYPE
5066	7.5"	LIVE OAK	7044	7"	ASHE JUNIPER
5350	3"	WHITE OAK	7046	10"	CHINABERRY
5351	5"	WHITE OAK	7047	11"	LIVE OAK
5352	7"	LIGUSTRUM	7101	7.5"	HACKBERRY
5707	31"	CEDAR ELM	7212	4"	ASHE JUNIPER
5764	6.5"	ASHE JUNIPER	7213	4"	ASHE JUNIPER
5765	12.5"	LIGUSTRUM	7215	4"	CRAPE MYRTLE
5966	9"	CHINABERRY	7216	7.5"	LIVE OAK
5967	4"	CEDAR ELM	7499	3"	HACKBERRY
5968	8"	ASH	7500	8"	LIVE OAK
5969	7"	ASH	7509	10.5"	REDBUD
5994	7"	HACKBERRY	8081	16"	CEDAR ELM
5995	9"	LIGUSTRUM	8119	9"	CEDAR ELM
5996	3"	ASHE JUNIPER	8120	10"	CEDAR ELM
5997	3"	ASHE JUNIPER	20079	11"	LIVE OAK
7040	5"	HACKBERRY	20083	7"	HACKBERRY
7041	6"	ASHE JUNIPER	20086	8"	LIGUSTRUM

REVISION DESCRIPTION DATE BY REV. NO.	<div style="text-align: right; margin-bottom: 10px;"> </div> <div style="text-align: center;"> <p><b>K FRIESE &amp; ASSOCIATES, INC.</b>        1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746</p> <p><b>WEST LAKE HILLS BOND PROGRAM</b>        WESTLAKE DR DRNG &amp; PVMT IMPROV        REMOVAL LAYOUT        STA 49+00 - STA 59+00</p> </div> <div style="text-align: center; margin-top: 10px;"> <p>(FIRM # 6535)</p> </div> <div style="text-align: center; margin-top: 10px;"> </div> <div style="text-align: center; margin-top: 10px;"> <p>WEST LAKE HILLS, TX</p> <p>SHEET 1 OF 2</p> <p>SCALE: 1"=50'</p> <p>DATE: 7/17/2023</p> <p>SHEET NUMBER: <b>52</b> OF 388</p> </div>
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**LEGEND**

- REMOVING SIGN
- REMOVING CONC (PAVE)
- REMOVING CONC (RIPRAP)
- REMOVING ASPHALT PAVEMENT
- TREES TO BE REMOVED

**NOTES**

1. PREPARING OF RIGHT-OF-WAY (CITY OF AUSTIN BID ITEM 101S) FOR CONSTRUCTION OPERATIONS INCLUDES THE REMOVAL AND DISPOSAL OF ALL OBSTRUCTIONS FROM THE RIGHT-OF-WAY AND FROM DESIGNATED EASEMENTS, WHERE REMOVAL OF SUCH OBSTRUCTIONS IS NOT OTHERWISE INDICATED AS A SEPARATE PAY ITEM.
2. CITY OF AUSTIN BID ITEM 101S SHALL INCLUDE, BUT NOT BE LIMITED TO, THE REMOVAL OF TREES, STUMPS, ROOTS, BUSHES, SHRUBS, CURB AND GUTTER, DRIVEWAYS, PAVED PARKING AREAS, MISCELLANEOUS STONE, BRICK, SIDEWALKS, DRAINAGE STRUCTURES, MANHOLES, INLETS, ABANDONED RAILROAD TRACKS, SCRAP IRON, AND ALL RUBBISH AND DEBRIS WHETHER ABOVE OR BELOW GROUND. CARE SHOULD BE TAKEN TO IDENTIFY AND PROTECT EXISTING INFRASTRUCTURE.
3. REMOVAL OF THE EXISTING ROADWAY FOR RECONSTRUCTION SHALL BE SUBSIDIARY TO STREET EXCAVATION, BID ITEM 110S-A.
4. ONLY SIGNS IMPACTED SHALL BE REMOVED AND REPLACED, AS INDICATED. SIGN PLAQUES IN GOOD CONDITION CAN BE STORED AND REINSTALLED ON NEW POSTS. ENGINEER WILL MAKE FINAL DETERMINANT OF APPROVED SIGNS.

TREE REMOVAL		
TREE ID	SIZE	TYPE
7581	8"	HACKBERRY
7627	9"	CEDAR ELM
7645	5"	CEDAR ELM
7667	9"	LIVE OAK
7668	5"	CEDAR ELM
7676	5"	CEDAR ELM
7687	4"	CEDAR ELM
7688	5"	CEDAR ELM
7696	4"	CEDAR ELM
7697	6"	CEDAR ELM

REV. NO.	BY	DATE	REVISION DESCRIPTION

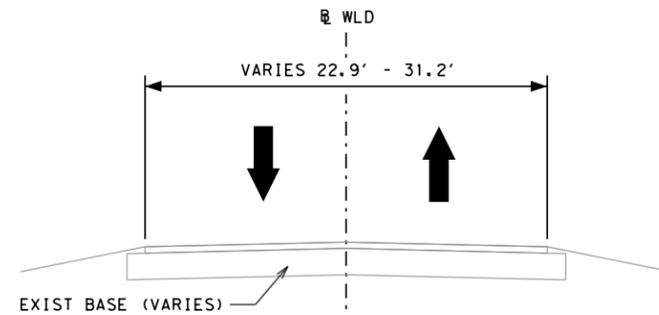
*Victoria M. Ortega*

**K FRIESE & ASSOCIATES, INC.**  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**REMOVAL LAYOUT**  
**STA 59+00 - END**

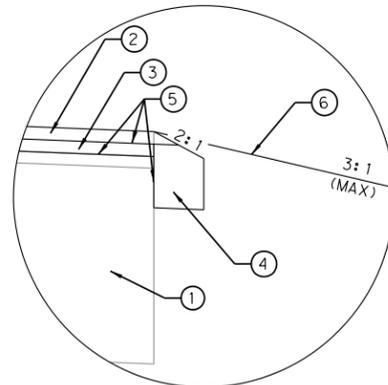
WEST LAKE HILLS, TX

SHEET 2 OF 2	
SCALE	1"=50'
DATE	7/17/2023
SHEET NUMBER	53 OF 388

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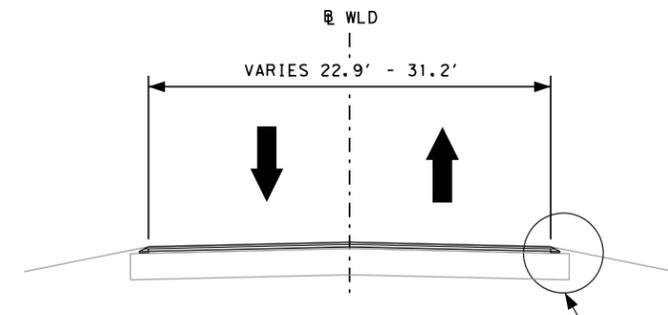


WESTLAKE DRIVE  
EXIST TYPICAL SECTION  
STA 2+10.00 TO STA 67+81.35

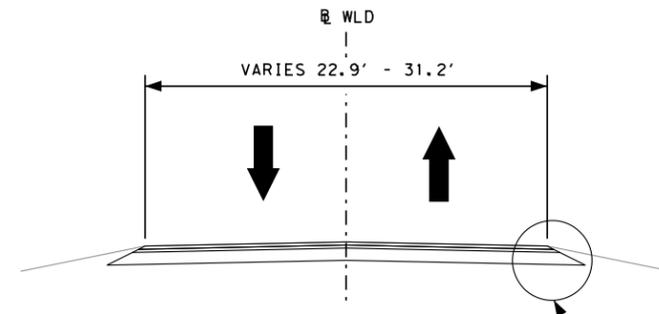


DETAIL "A"  
N. T. S.

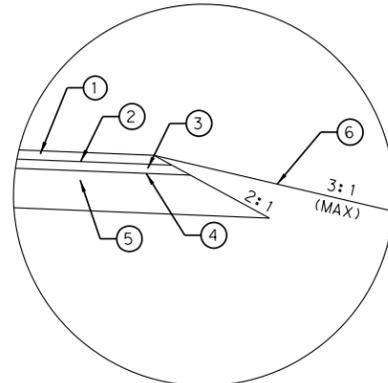
- ① EXIST PAVEMENT
- ② 1.5" HMAC TYPE D (340S)
- ③ 2" HMAC TYPE D (340S)
- ④ 4" HMAC TYPE D (340S)
- ⑤ TACK COAT (307S)
- ⑥ 4" TOPSOIL (604S) AND SEEDING (604S)



WESTLAKE DRIVE  
PROP TYPICAL SECTION  
(PFC RECONSTRUCTION)  
STA 60+60.00 TO STA 61+60.00

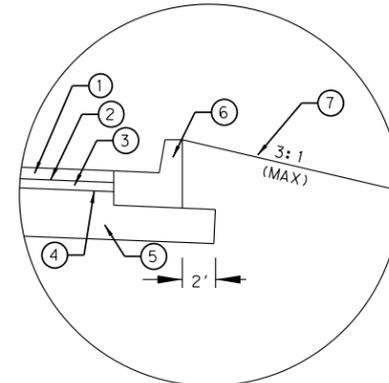


WESTLAKE DRIVE  
PROP TYPICAL SECTION  
(FULL DEPTH RECONSTRUCTION)  
STA 50+00.00 TO STA 50+48.51



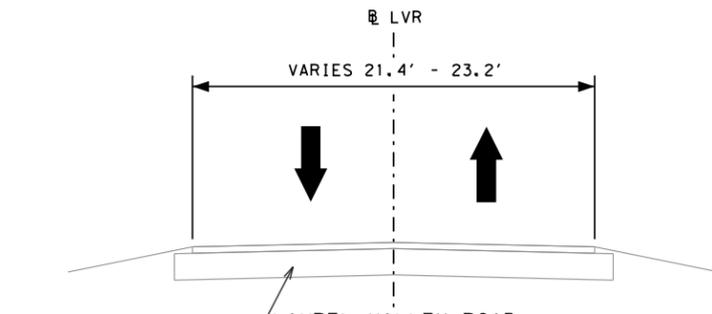
DETAIL "B"  
N. T. S.

- ① 1.5" HMAC TYPE D (340S)
- ② TACK COAT (307S)
- ③ 2" HMAC TYPE D (340S)
- ④ PRIME COAT (306S)
- ⑤ 10" FLEXIBLE BASE
- ⑥ 4" TOPSOIL (604S) AND SEEDING (604S)

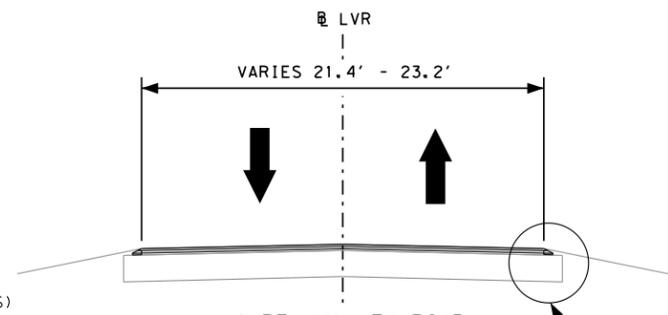


DETAIL "D"  
N. T. S.

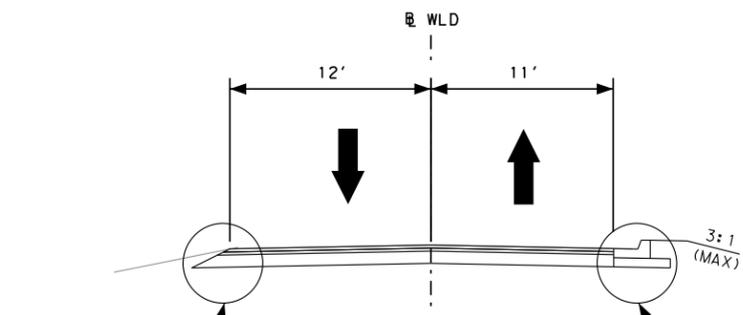
- ① 1.5" HMAC TYPE D (340S)
- ② TACK COAT (307S)
- ③ 2" HMAC TYPE D (340S)
- ④ PRIME COAT (306S)
- ⑤ 10" FLEXIBLE BASE
- ⑥ CURB AND GUTTER TYPE II P.C. (430S)
- ⑦ 4" TOPSOIL (604S) AND SEEDING (604S)



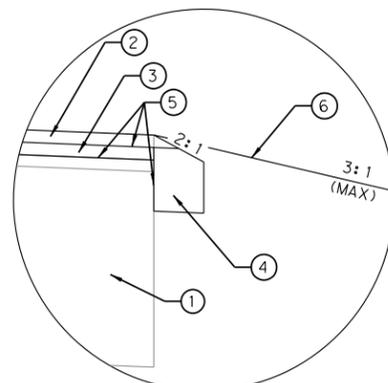
LAUREL VALLEY ROAD  
EXIST TYPICAL SECTION  
STA 43+00.00 TO STA 44+20.00



LAUREL VALLEY ROAD  
PROP TYPICAL SECTION  
(MILL AND OVERLAY)  
STA 43+00.00 TO STA 43+40.00

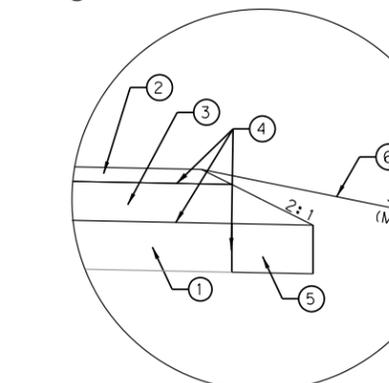


WESTLAKE DRIVE  
PROP TYPICAL SECTION  
(FULL DEPTH RECONSTRUCTION)  
STA 50+48.51 TO STA 51+90.00



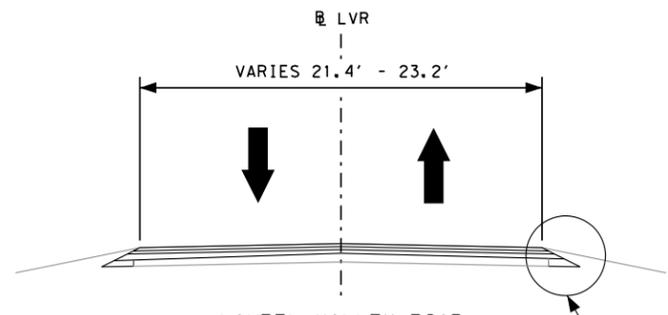
DETAIL "C"  
N. T. S.

- ① EXIST PAVEMENT
- ② 1.5" PFC
- ③ 2" HMAC TYPE D (340S)
- ④ 4" HMAC TYPE D (340S)
- ⑤ TACK COAT (307S)
- ⑥ 4" TOPSOIL (604S) AND SEEDING (604S)



DETAIL "E"  
N. T. S.

- ① EXIST PAVEMENT
- ② 1.5" HMAC TYPE D (340S)
- ③ 2"-10" (VARIES) HMAC TYPE D (340S)
- ④ TACK COAT (307S)
- ⑤ 4" HMAC TYPE D (340S)
- ⑥ 4" TOPSOIL (604S) AND SEEDING (604S)



LAUREL VALLEY ROAD  
PROP TYPICAL SECTION  
(FULL DEPTH RECONSTRUCTION)  
STA 43+40.00 TO STA 44+20.00

NOTE:  
ALL PROPOSED CROSS SLOPES TO MATCH EXISTING CROSS SLOPES

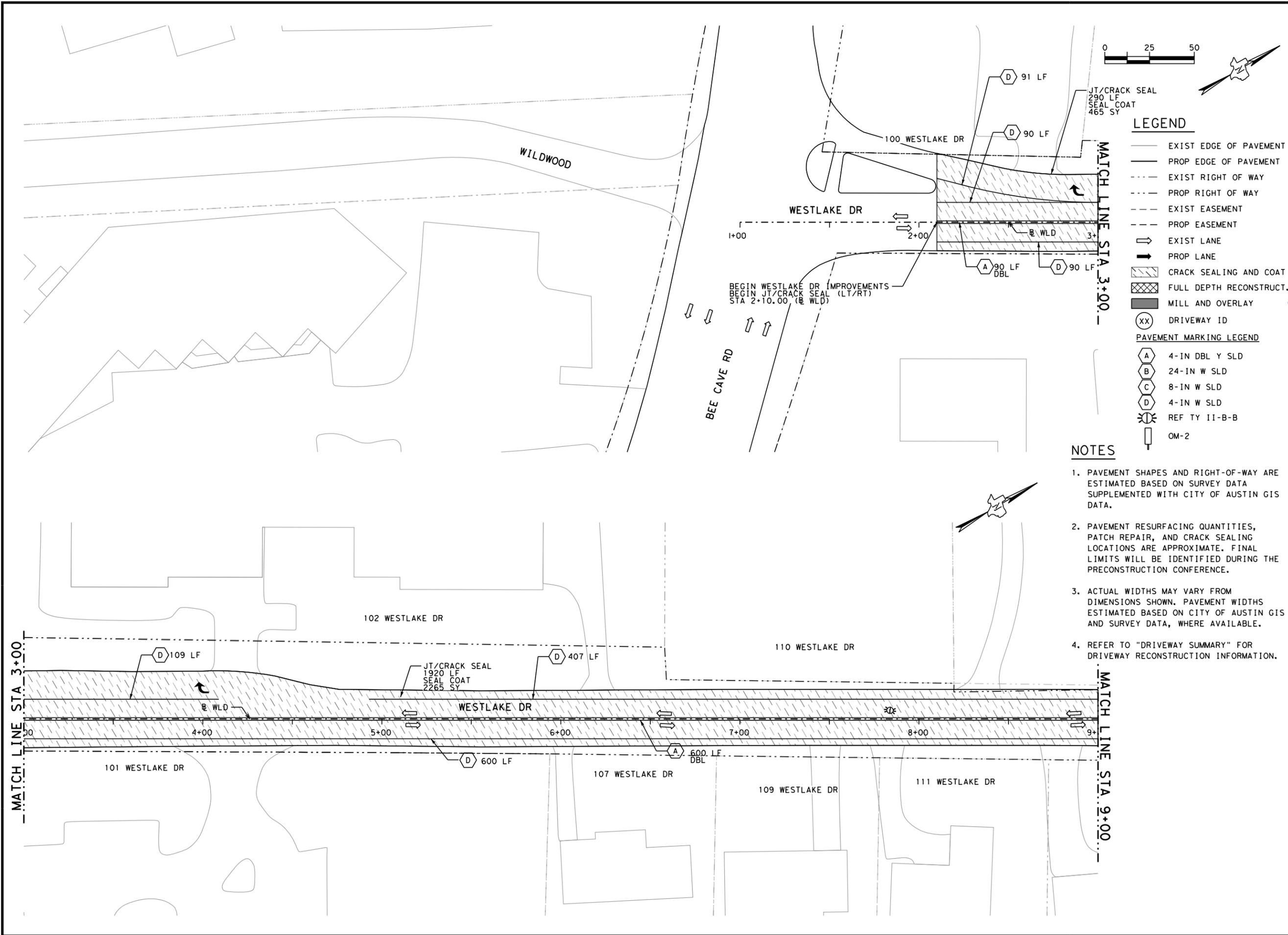
REV. NO.	DATE	BY	DESCRIPTION



K FRIESE & ASSOCIATES, INC.  
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
WEST LAKE HILLS BOND PROGRAM  
WESTLAKE DR DRNG & PVMT IMPROV  
TYPICAL SECTIONS



WEST LAKE HILLS, TX	
SHEET 1 OF 1	
SCALE	NTS
DATE	7/17/2023
SHEET NUMBER	55 OF 388



**LEGEND**

- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - - - EXIST EASEMENT
  - - - PROP EASEMENT
  - ⇨ EXIST LANE
  - ⇨ PROP LANE
  - ▨ CRACK SEALING AND COAT
  - ▩ FULL DEPTH RECONSTRUCT.
  - MILL AND OVERLAY
  - ⊗ DRIVEWAY ID
- PAVEMENT MARKING LEGEND**
- ⊗ A 4-IN DBL Y SLD
  - ⊗ B 24-IN W SLD
  - ⊗ C 8-IN W SLD
  - ⊗ D 4-IN W SLD
  - ⊗ REF TY II-B-B
  - ⊗ OM-2

**NOTES**

1. PAVEMENT SHAPES AND RIGHT-OF-WAY ARE ESTIMATED BASED ON SURVEY DATA SUPPLEMENTED WITH CITY OF AUSTIN GIS DATA.
2. PAVEMENT RESURFACING QUANTITIES, PATCH REPAIR, AND CRACK SEALING LOCATIONS ARE APPROXIMATE. FINAL LIMITS WILL BE IDENTIFIED DURING THE PRECONSTRUCTION CONFERENCE.
3. ACTUAL WIDTHS MAY VARY FROM DIMENSIONS SHOWN. PAVEMENT WIDTHS ESTIMATED BASED ON CITY OF AUSTIN GIS AND SURVEY DATA, WHERE AVAILABLE.
4. REFER TO "DRIVEWAY SUMMARY" FOR DRIVEWAY RECONSTRUCTION INFORMATION.

REV. NO.	BY	DATE	REVISION DESCRIPTION

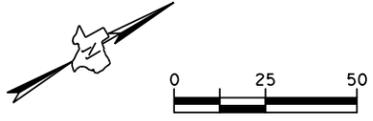
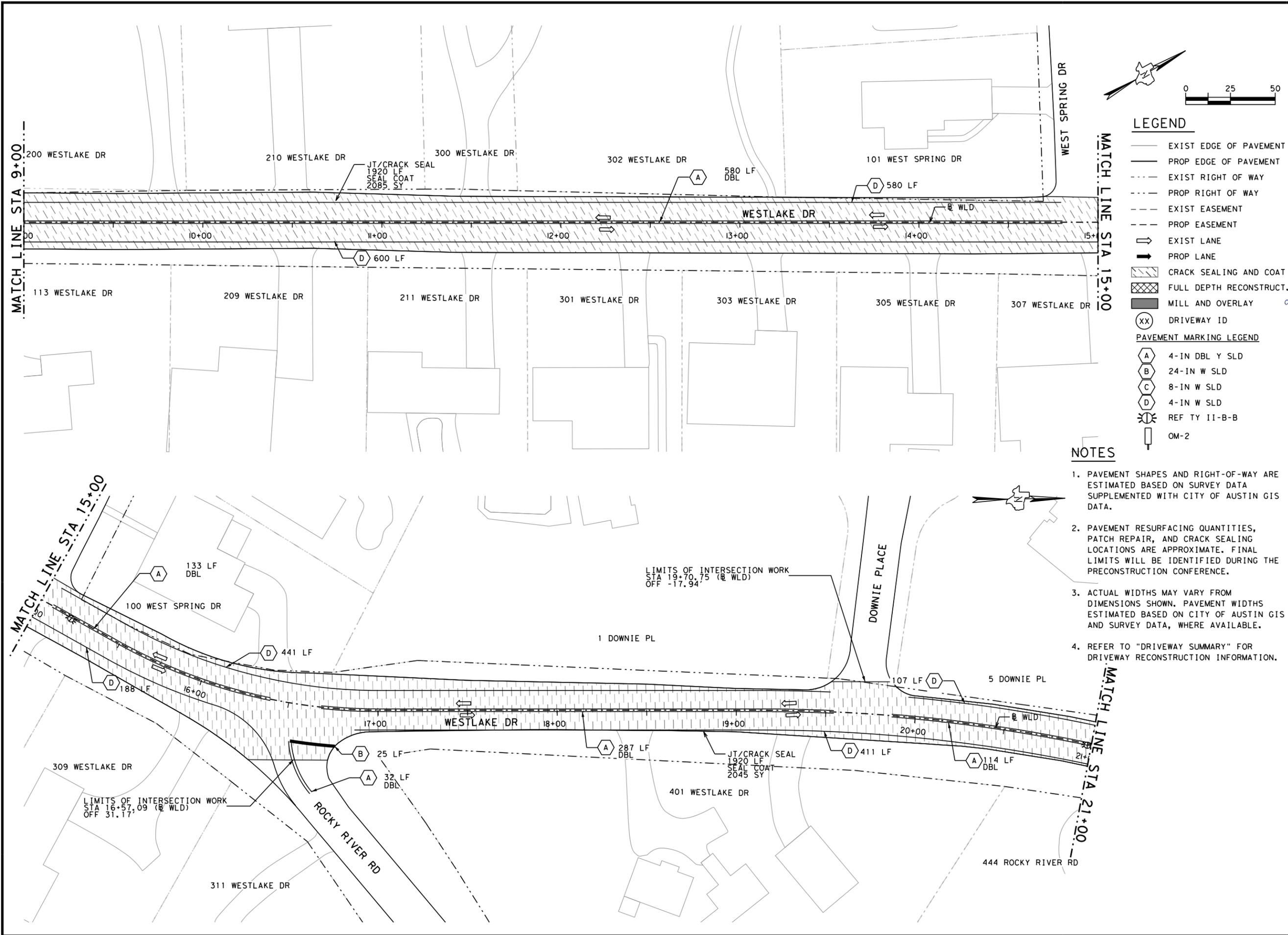


K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**ROADWAY LAYOUT**  
**WESTLAKE DR BEGIN - STA 9+00**



WEST LAKE HILLS, TX	
SHEET 1 OF 8	
SCALE	1"=50'
DATE	7/17/2023
SHEET NUMBER	70 OF 388



- LEGEND**
- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - - - EXIST EASEMENT
  - - - PROP EASEMENT
  - ⇨ EXIST LANE
  - ⇨ PROP LANE
  - ▨ CRACK SEALING AND COAT
  - ▩ FULL DEPTH RECONSTRUCT.
  - MILL AND OVERLAY
  - ⊗ DRIVEWAY ID
- PAVEMENT MARKING LEGEND**
- ⊗ A 4-IN DBL Y SLD
  - ⊗ B 24-IN W SLD
  - ⊗ C 8-IN W SLD
  - ⊗ D 4-IN W SLD
  - ⊗ REF TY II-B-B
  - ⊗ OM-2

- NOTES**
1. PAVEMENT SHAPES AND RIGHT-OF-WAY ARE ESTIMATED BASED ON SURVEY DATA SUPPLEMENTED WITH CITY OF AUSTIN GIS DATA.
  2. PAVEMENT RESURFACING QUANTITIES, PATCH REPAIR, AND CRACK SEALING LOCATIONS ARE APPROXIMATE. FINAL LIMITS WILL BE IDENTIFIED DURING THE PRECONSTRUCTION CONFERENCE.
  3. ACTUAL WIDTHS MAY VARY FROM DIMENSIONS SHOWN. PAVEMENT WIDTHS ESTIMATED BASED ON CITY OF AUSTIN GIS AND SURVEY DATA, WHERE AVAILABLE.
  4. REFER TO "DRIVEWAY SUMMARY" FOR DRIVEWAY RECONSTRUCTION INFORMATION.

REV. NO.	DATE	REVISION DESCRIPTION

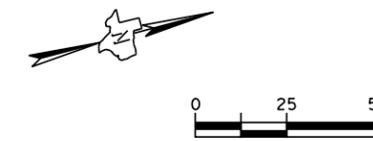
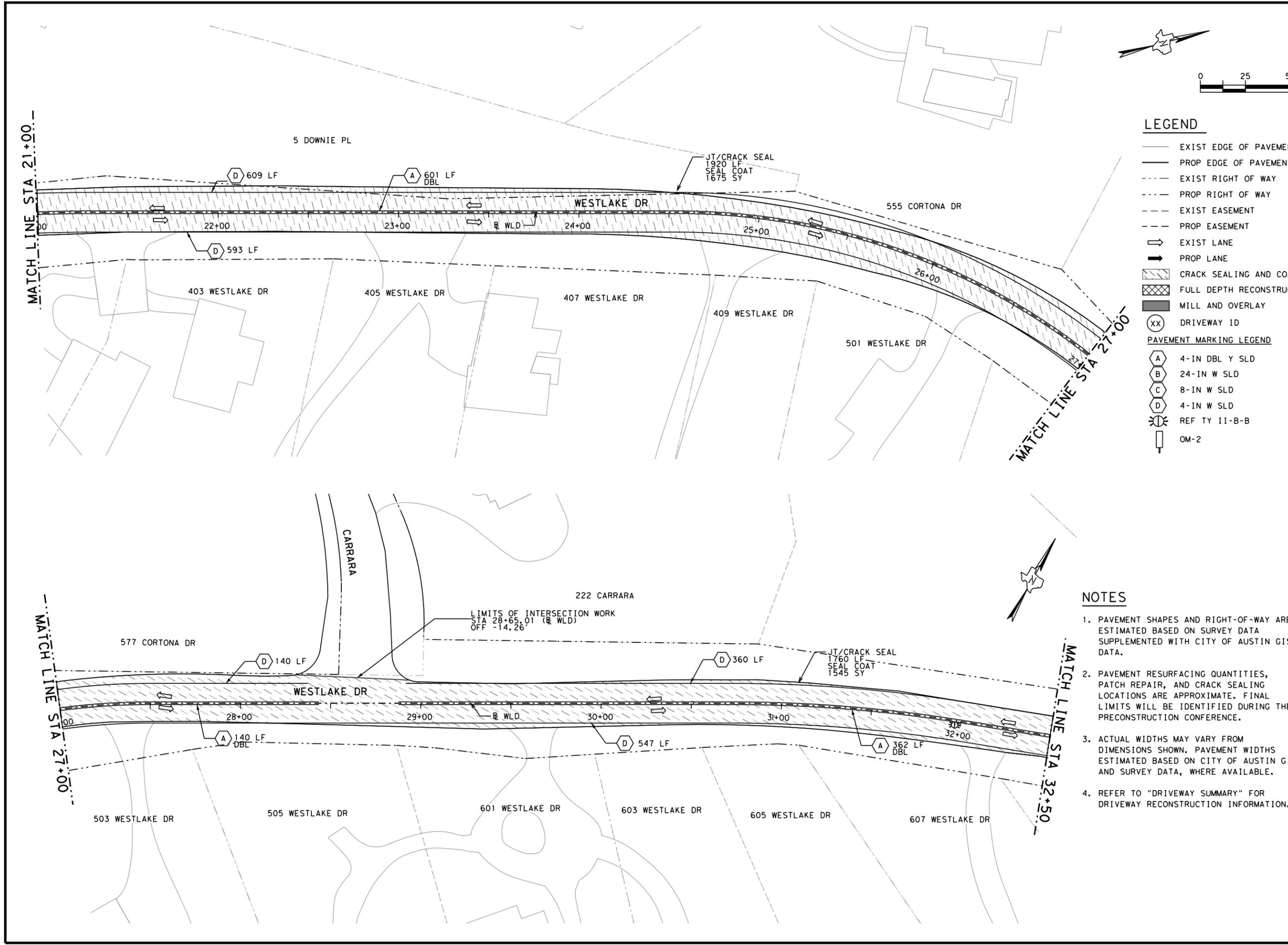


K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**ROADWAY LAYOUT**  
**WESTLAKE DR STA 9+00 - STA 21+00**



WEST LAKE HILLS, TX	
SHEET 2 OF 8	
SCALE	1"=50'
DATE	7/17/2023
SHEET NUMBER	71 OF 388



**LEGEND**

- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - - - EXIST EASEMENT
  - - - PROP EASEMENT
  - ⇨ EXIST LANE
  - ⇨ PROP LANE
  - ▨ CRACK SEALING AND COAT
  - ▩ FULL DEPTH RECONSTRUCT.
  - MILL AND OVERLAY
  - ⊗ DRIVEWAY ID
- PAVEMENT MARKING LEGEND**
- ⬡ A 4-IN DBL Y SLD
  - ⬡ B 24-IN W SLD
  - ⬡ C 8-IN W SLD
  - ⬡ D 4-IN W SLD
  - ⊗ REF TY II-B-B
  - ⊞ OM-2

**NOTES**

1. PAVEMENT SHAPES AND RIGHT-OF-WAY ARE ESTIMATED BASED ON SURVEY DATA SUPPLEMENTED WITH CITY OF AUSTIN GIS DATA.
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3. ACTUAL WIDTHS MAY VARY FROM DIMENSIONS SHOWN. PAVEMENT WIDTHS ESTIMATED BASED ON CITY OF AUSTIN GIS AND SURVEY DATA, WHERE AVAILABLE.
4. REFER TO "DRIVEWAY SUMMARY" FOR DRIVEWAY RECONSTRUCTION INFORMATION.

REV. NO.	DATE	REVISION DESCRIPTION

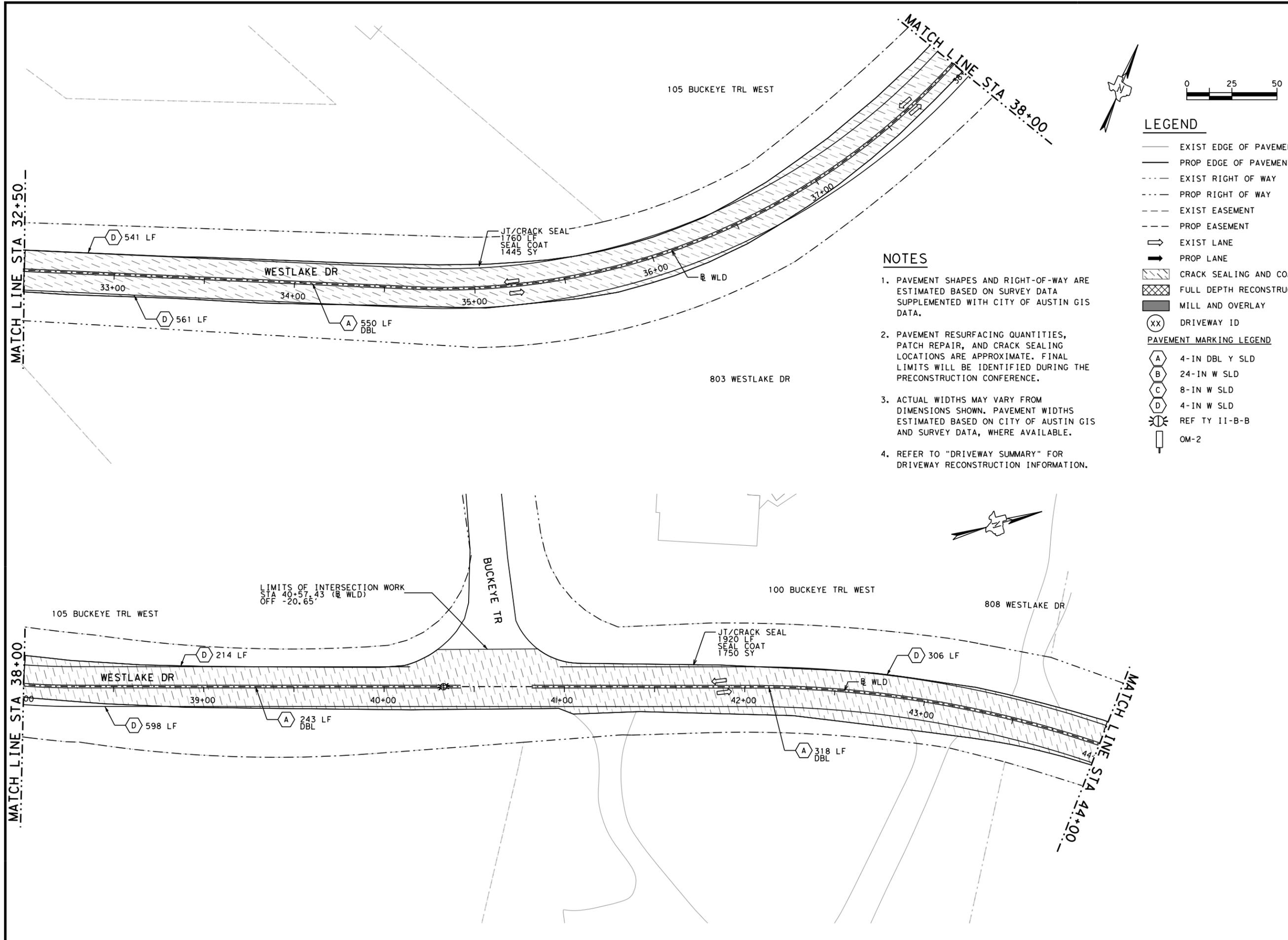


K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**ROADWAY LAYOUT**  
**WESTLAKE DR STA 21+00 - STA 32+50**



WEST LAKE HILLS, TX	
SHEET 3 OF 8	
SCALE	1"=50'
DATE	7/17/2023
SHEET NUMBER	72 OF 388

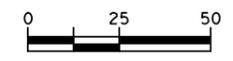


**NOTES**

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4. REFER TO "DRIVEWAY SUMMARY" FOR DRIVEWAY RECONSTRUCTION INFORMATION.

**LEGEND**

- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - - - EXIST EASEMENT
  - - - PROP EASEMENT
  - ⇨ EXIST LANE
  - ⇨ PROP LANE
  - ▨ CRACK SEALING AND COAT
  - ▩ FULL DEPTH RECONSTRUCT.
  - MILL AND OVERLAY
  - ⊗ DRIVEWAY ID
- PAVEMENT MARKING LEGEND**
- A 4-IN DBL Y SLD
  - B 24-IN W SLD
  - C 8-IN W SLD
  - D 4-IN W SLD
  - REF TY II-B-B
  - OM-2



REV. NO.	BY	DATE	REVISION DESCRIPTION



K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WEST LAKE HILLS BOND PROGRAM  
 WESTLAKE DR DRNG & PVMT IMPROV  
 ROADWAY LAYOUT  
 WESTLAKE DR STA 32+50 - STA 44+00

Danielle Skidmore Consulting  
 CIVIL ENGINEERING  
 (FIRM # 20279)



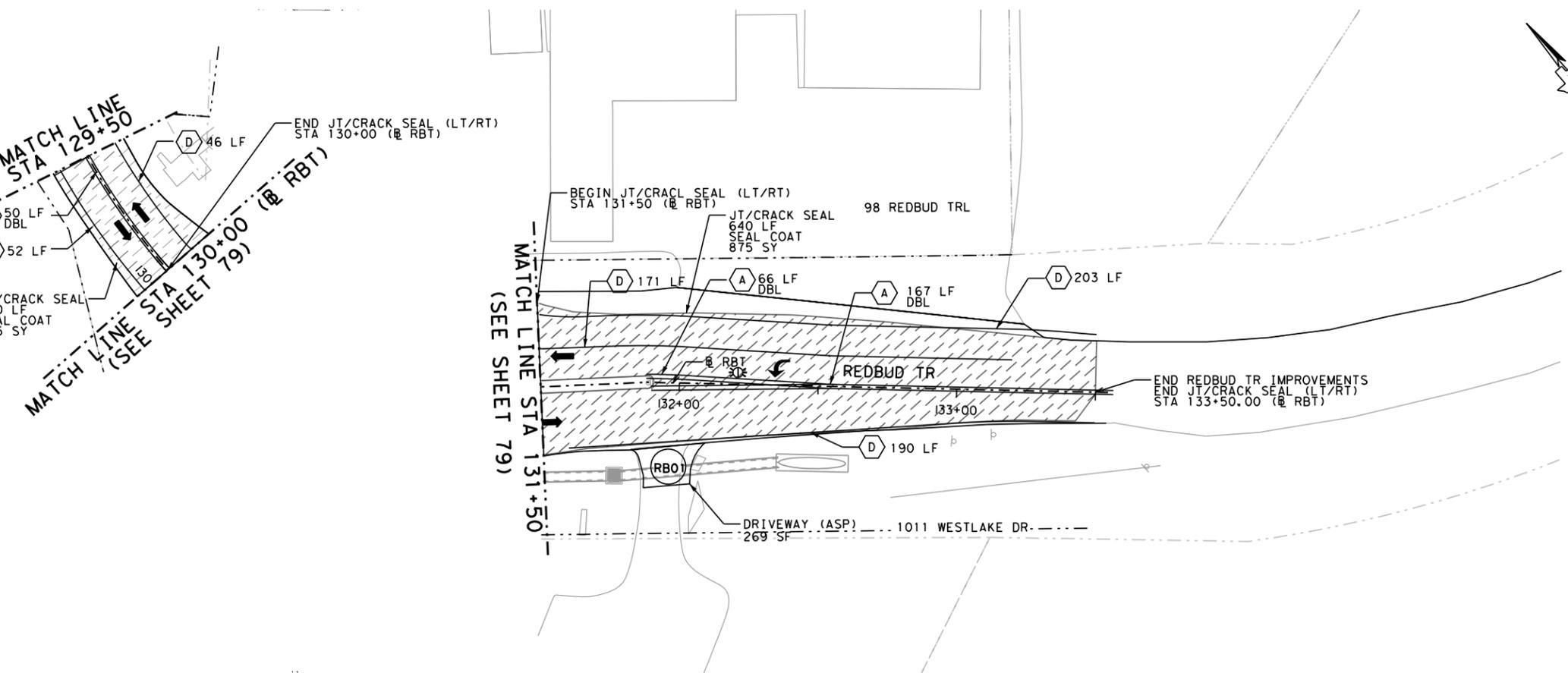
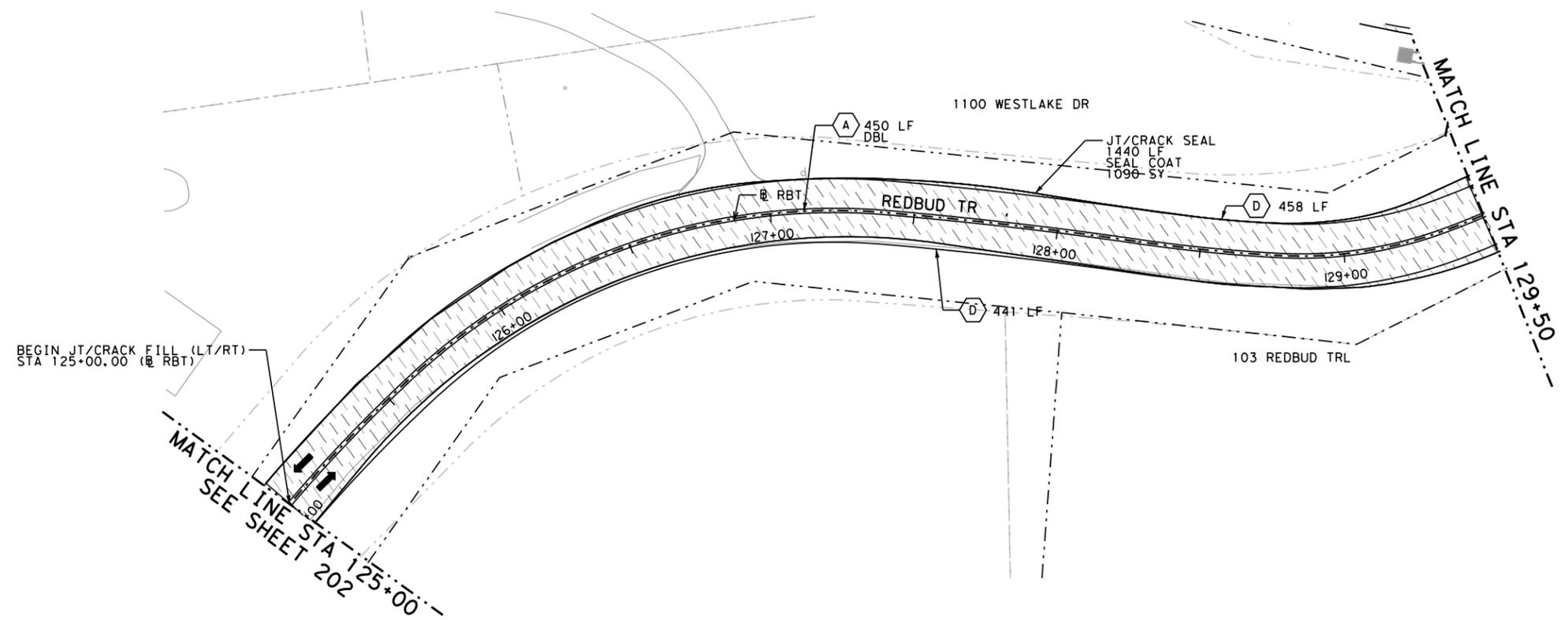
WEST LAKE HILLS, TX	
SHEET 4 OF 8	
SCALE	1"=50'
DATE	7/17/2023
SHEET NUMBER	73 OF 388

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**LEGEND**

- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - - - EXIST EASEMENT
  - - - PROP EASEMENT
  - ⇨ EXIST LANE
  - ⇨ PROP LANE
  - ▨ CRACK SEALING AND COAT
  - ▩ FULL DEPTH RECONSTRUCT.
  - MILL AND OVERLAY
  - ⊙ XX DRIVEWAY ID
- PAVEMENT MARKING LEGEND**
- ⊙ A 4-IN DBL Y SLD
  - ⊙ B 24-IN W SLD
  - ⊙ C 8-IN W SLD
  - ⊙ D 4-IN W SLD
  - ⊙ REF TY II-B-B
  - ⊙ OM-2

**NOTES**

1. PAVEMENT SHAPES AND RIGHT-OF-WAY ARE ESTIMATED BASED ON SURVEY DATA SUPPLEMENTED WITH CITY OF AUSTIN GIS DATA.
2. PAVEMENT RESURFACING QUANTITIES, PATCH REPAIR, AND CRACK SEALING LOCATIONS ARE APPROXIMATE. FINAL LIMITS WILL BE IDENTIFIED DURING THE PRECONSTRUCTION CONFERENCE.
3. ACTUAL WIDTHS MAY VARY FROM DIMENSIONS SHOWN. PAVEMENT WIDTHS ESTIMATED BASED ON CITY OF AUSTIN GIS AND SURVEY DATA, WHERE AVAILABLE.
4. REFER TO "DRIVEWAY SUMMARY" FOR DRIVEWAY RECONSTRUCTION INFORMATION.

REV. NO.	BY	DATE	REVISION DESCRIPTION

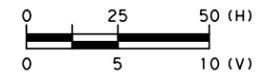
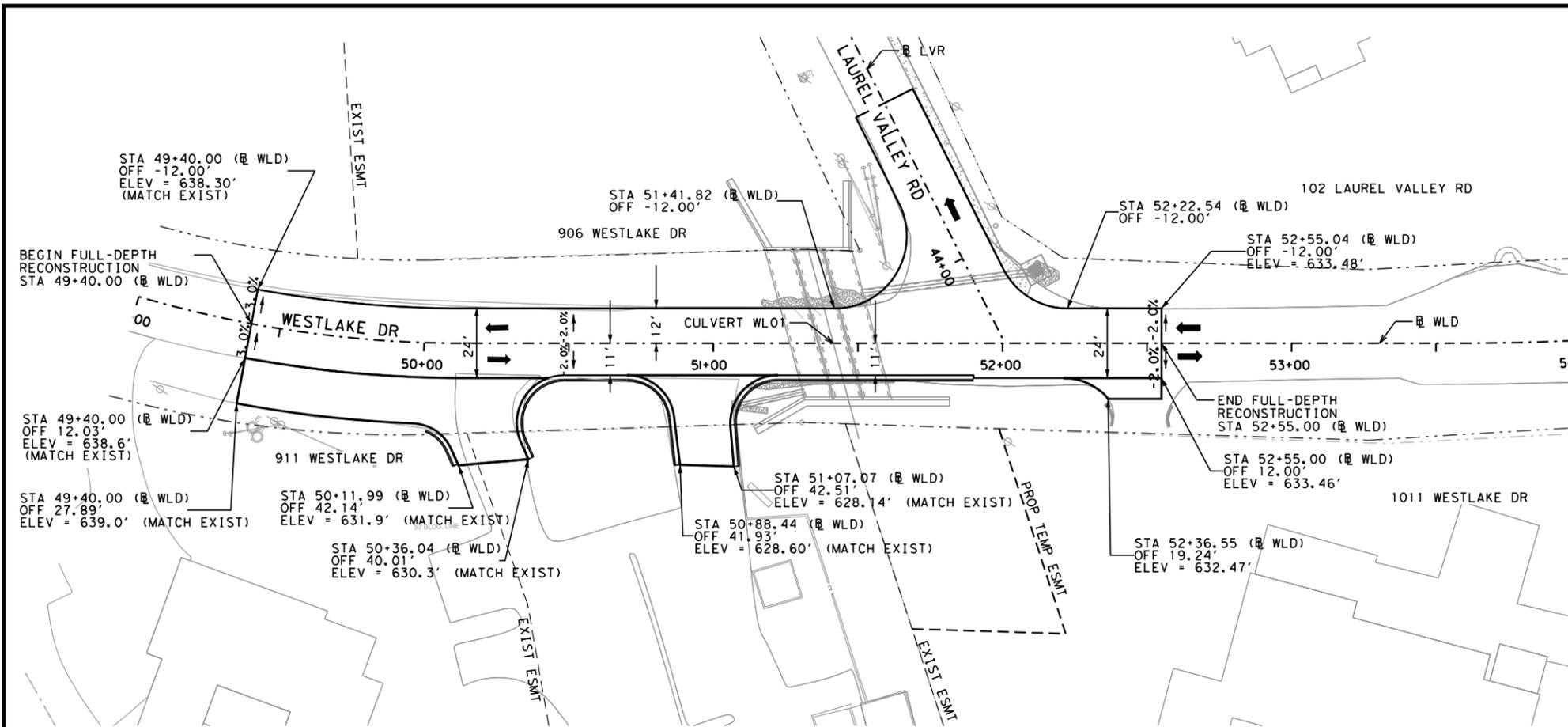


K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WEST LAKE HILLS BOND PROGRAM  
 WESTLAKE DR DRNG & PVMT IMPROV  
 ROADWAY LAYOUT  
 REDBUD TRAIL STA 125+00 - END



WEST LAKE HILLS, TX	
SHEET 8 OF 8	
SCALE	1"=50'
DATE	7/17/2023
SHEET NUMBER	77 OF 388



**LEGEND**

- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- - - EXIST EASEMENT
- - - PROP EASEMENT
- ➔ EXIST LANE

**NOTES**

1. SAWCUT EXISTING PAVEMENT TO ESTABLISH STRAIGHT LINE. SAWCUTTING SHALL BE SUBSIDIARY TO ALL OTHER BID ITEMS.
2. DIMENSIONS SHOWN ARE TO FACE OF CURB UNLESS OTHERWISE NOTED.
3. ONLY SIGNS IMPACTED SHALL BE REMOVED AND REPLACED, AS INDICATED. SIGN PLAQUES IN GOOD CONDITION CAN BE STORED AND REINSTALLED ON NEW POSTS. ENGINEER WILL MAKE FINAL DETERMINANT OF APPROVED SIGNS.

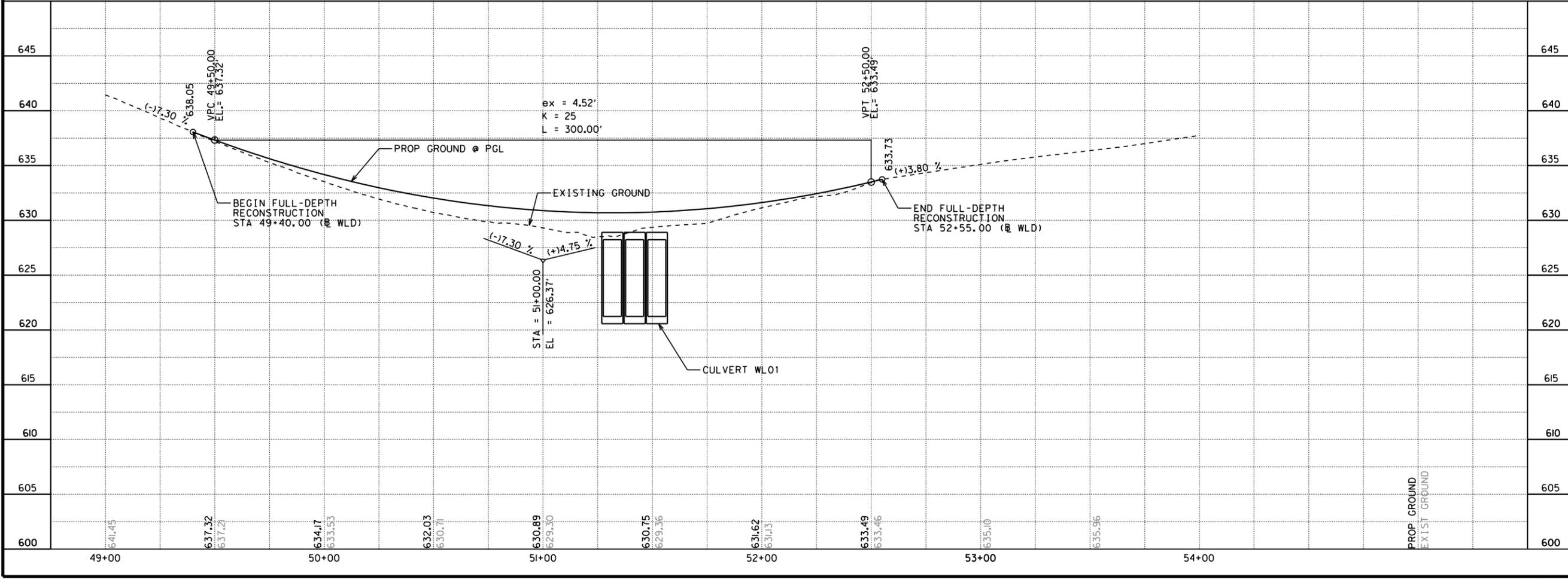
REV. NO.	DATE	REVISION DESCRIPTION



K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**ROADWAY PLAN & PROFILE**  
**WESTLAKE DR STA 49+00 - STA 54+00**

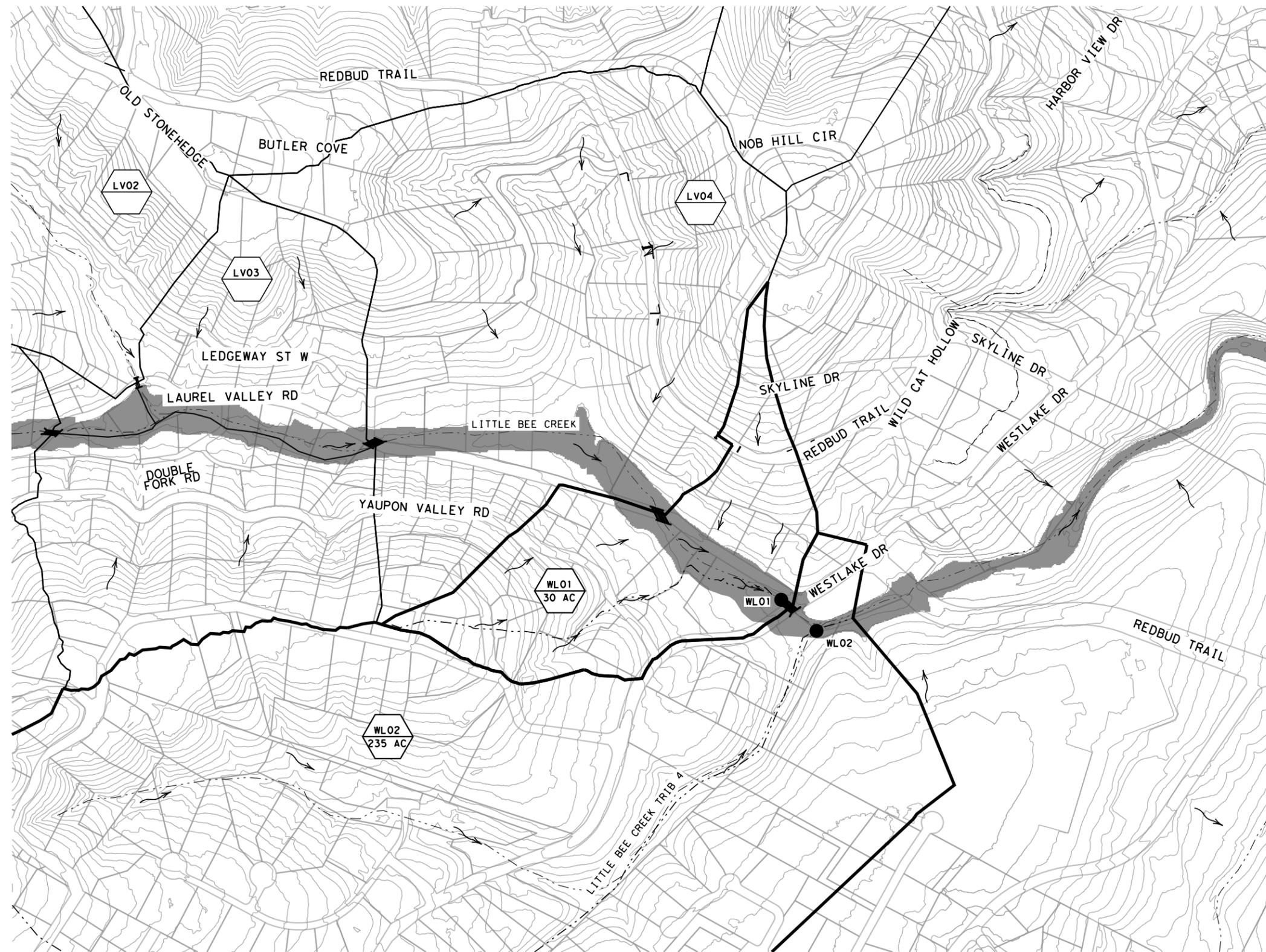


WEST LAKE HILLS, TX	
SHEET 1 OF 2	
SCALE	1"=50' H; 1"=10' V
DATE	7/17/2023
SHEET NUMBER	78 OF 388



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**LEGEND**

- PARCEL
- - - STREAM CENTERLINE
- ▨ FEMA FLOODPLAIN ZONE A WITH FLOODWAY
- ▩ FEMA FLOODPLAIN ZONE AE WITH FLOODWAY
- ▭ DRAINAGE BOUNDARY
- XX DRAINAGE AREA ID
- XX AC DRAINAGE AREA
- - - FLOW PATH
- FLOW DIRECTION
- XX## POINT OF INTEREST

**NOTES**

1. THE FLOODPLAIN SHOWN IS ZONE AE WITH FLOODWAY ACCORDING TO TRAVIS COUNTY FIRM PANELS 48453C0440J AND 48453C0445K EFFECTIVE JANUARY 22, 2020.
2. PEAK FLOWS WERE COMPUTED FROM THE SCS UNIT HYDROGRAPH FOR EACH SUBBASIN WITH AN SCS CURVE NUMBER LOSS METHOD.
3. PRECIPITATION DEPTHS WERE OBTAINED FROM THE CITY OF WEST LAKE HILLS DRAINAGE AND EROSION CONTROL CRITERIA MANUAL. FLOWS ARE REPRESENTATIVE OF ATLAS 14.
4. REFER TO LAUREL VALLEY DRNG & PVMT IMPROV PROJECT DRAINAGE AREA MAP FOR INFORMATION ON SUBBASINS SHOWN WITHOUT AREAS IN ACRES.

OVERALL CONTRIBUTING DRAINAGE AREAS GREATER THAN 200-ACRES										
DRAINAGE AREA ID	SCS UNIT HYDROGRAPH PARAMETERS			SCS COMPUTED FLOW RATES						
	AREA (AC)	AREA (SQ MI)	CN	Tc (MIN)	LAG TIME (MIN)	Q2 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
WLO1	30	0.046	80	14.5	8.7	71	138	183	218	256
WLO2	235	0.366	80	22.8	13.7	464	904	1204	1438	1690

POINT OF INTEREST	SCS COMPUTED FLOW RATES				
	Q2 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
WLO1	862	1719	2295	2747	3233
WLO2	1311	2586	3445	4119	4842

REV. NO.	BY	DATE	REVISION DESCRIPTION



K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**DRAINAGE AREA MAP**  
**CROSS STRUCTURES**



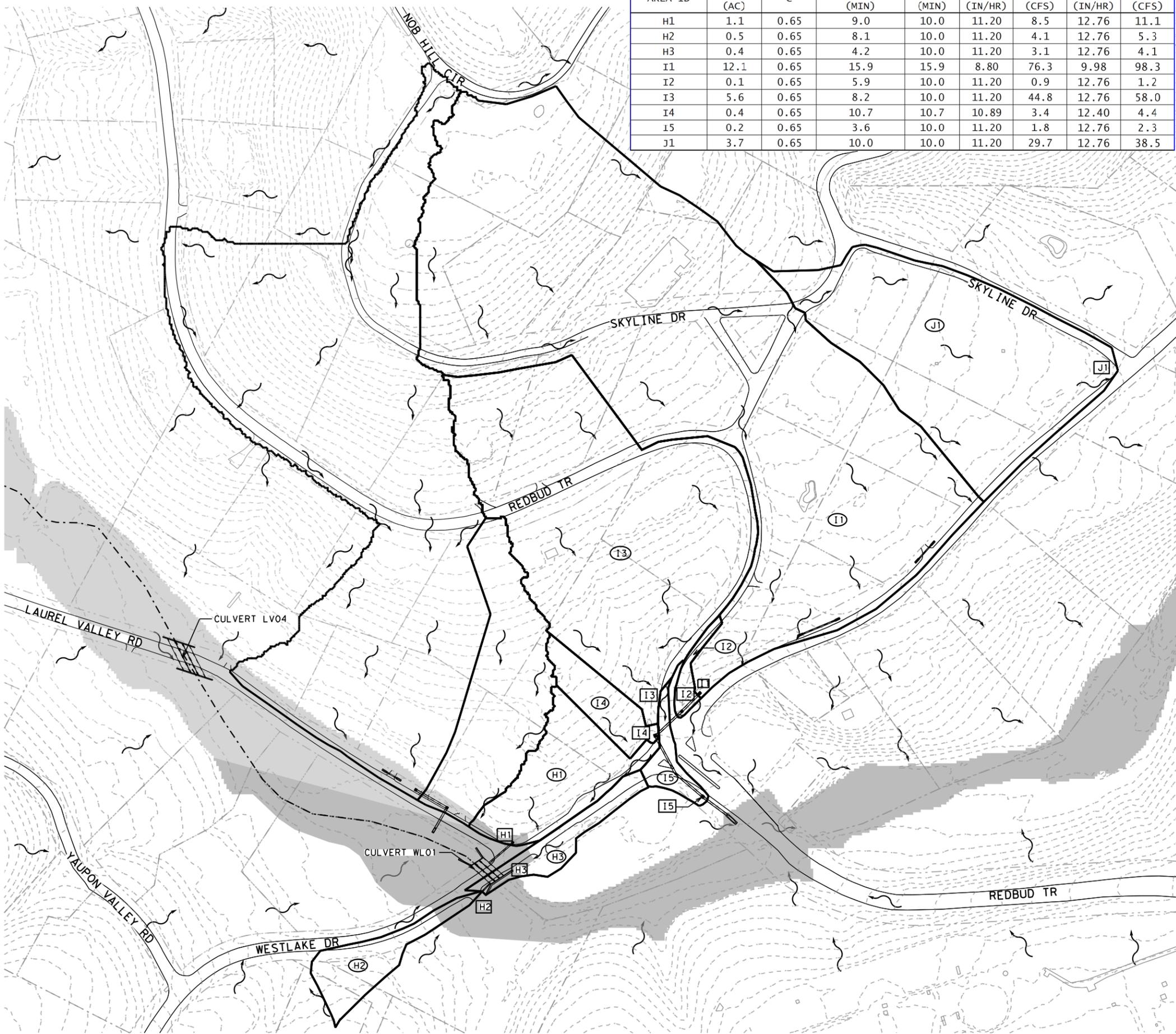
WEST LAKE HILLS, TX	
SHEET 1 OF 2	
SCALE	1"=500'
DATE	7/17/2023
SHEET NUMBER	80 OF 388

AREA ID	AREA (AC)	C	Tc CALCULATED (MIN)	Tc USED (MIN)	I <sub>25</sub> (IN/HR)	Q <sub>25</sub> (CFS)	I <sub>100</sub> (IN/HR)	Q <sub>100</sub> (CFS)
H1	1.1	0.65	9.0	10.0	11.20	8.5	12.76	11.1
H2	0.5	0.65	8.1	10.0	11.20	4.1	12.76	5.3
H3	0.4	0.65	4.2	10.0	11.20	3.1	12.76	4.1
I1	12.1	0.65	15.9	15.9	8.80	76.3	9.98	98.3
I2	0.1	0.65	5.9	10.0	11.20	0.9	12.76	1.2
I3	5.6	0.65	8.2	10.0	11.20	44.8	12.76	58.0
I4	0.4	0.65	10.7	10.7	10.89	3.4	12.40	4.4
I5	0.2	0.65	3.6	10.0	11.20	1.8	12.76	2.3
J1	3.7	0.65	10.0	10.0	11.20	29.7	12.76	38.5



**LEGEND**

- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- - - STREAM CENTERLINE
- FEMA FLOODPLAIN WITH FLOODWAY
- DRAINAGE BOUNDARY
- (XX) DRAINAGE AREA ID
- [XX] DRAINAGE NODE
- ~> FLOW DIRECTION



REV. NO.	BY	DATE	REVISION DESCRIPTION

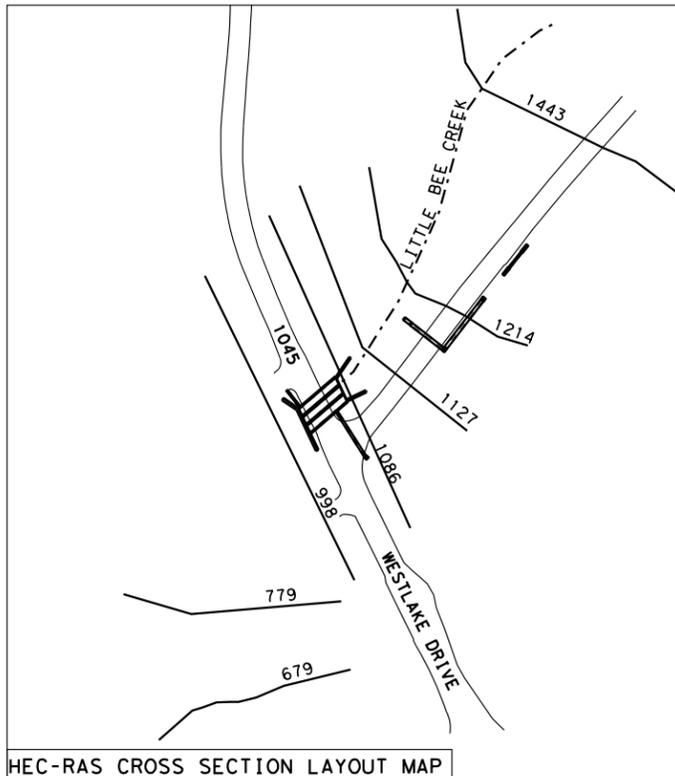


K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**DRAINAGE AREA MAP**



WEST LAKE HILLS, TX	
SHEET 2 OF 2	
SCALE	1"=200'
DATE	7/17/2023
SHEET NUMBER	81 OF 388

1. THE FLOODPLAIN SHOWN IS ZONE AE WITH FLOODWAY ACCORDING TO TRAVIS COUNTY FIRM PANEL 48453C0445K EFFECTIVE JANUARY 22, 2020.
2. PEAK FLOWS WERE COMPUTED USING THE RATIONAL METHOD PER CITY OF WEST LAKE HILLS DRAINAGE CRITERIA MANUAL WITH A MINIMUM TIME OF CONCENTRATION OF 10 MINUTES.
3. PRECIPITATION DEPTHS WERE OBTAINED FROM THE CITY OF WEST LAKE HILLS DRAINAGE AND EROSION CONTROL CRITERIA MANUAL. FLOWS ARE REPRESENTATIVE OF ATLAS 14.



HEC-RAS CROSS SECTION LAYOUT MAP

**HYDROLOGIC METHOD:**

- ANALYSIS OF THE PEAK FLOWS FOR THE EXISTING AND PROPOSED STRUCTURES WAS PERFORMED USING THE SCS UNIT HYDROGRAPH METHOD. THE SCS UNIT HYDROGRAPH PEAK FLOWS FOR THE DRAINAGE AREAS WERE COMPUTED USING HEC-HMS VER 4.9.0.

**HYDRAULIC METHOD:**

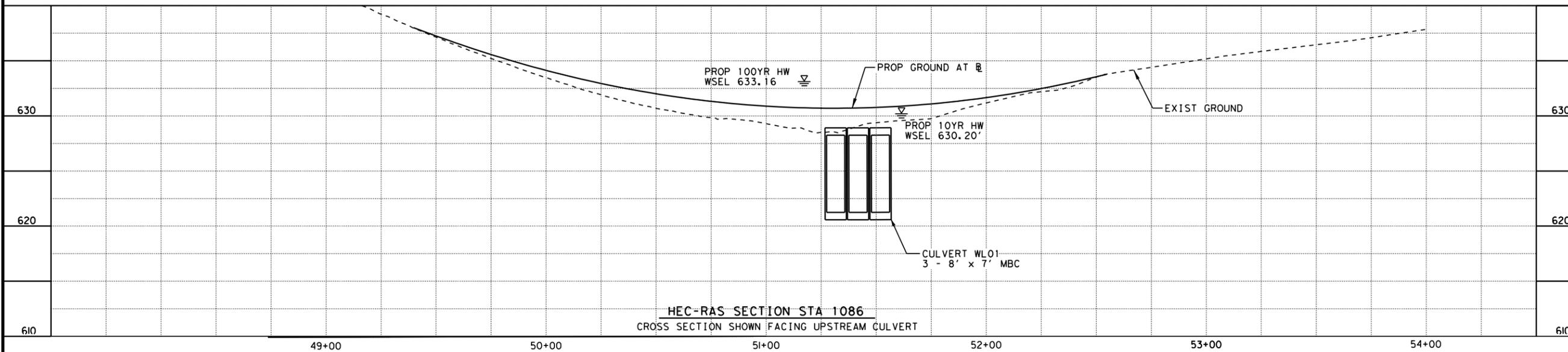
- HEC-RAS (VER 6.1.0) WAS USED TO COMPUTE EXISTING AND PROPOSED CONDITION WATER SURFACE ELEVATIONS. CHANNEL CROSS SECTIONS WERE OBTAINED FROM TOPOGRAPHIC SURVEY DATA. CROSS SECTION DATA WAS ALSO SUPPLEMENTED WITH LIDAR DATA.
- NORMAL DEPTH WAS USED AS THE DOWNSTREAM BOUNDARY CONDITION FOR LITTLE BEE CREEK. A SLOPE OF 0.005 WAS USED FOR THE EXISTING AND PROPOSED CONDITION.
- DESIGN STORM: 10-YR (DESIGN) 100-YR (CHECK)

**FLOOD HAZARD AREA:**

- WESTLAKE DRIVE IS LOCATED WITHIN THE FEMA SPECIAL FLOOD HAZARD ZONE "AE" WITH FLOODWAY ACCORDING TO FEMA FIRM PANEL 48453C0445K EFFECTIVE 1/22/2020

HEC-RAS RIVER STA	DOWNSTREAM REACH LENGTH (FT)	FLOWS (CFS)	DESIGN FREQUENCY 10-YR					CHECK FREQUENCY 100-YR					
			COMPUTED WATER SURFACE			VELOCITIES (FPS)		FLOWS (CFS)	COMPUTED WATER SURFACE			VELOCITIES (FPS)	
			EXIST (FT)	PROP (FT)	DIFFERENCE (FT)	EXIST (FT)	PROP (FT)		EXIST (FT)	PROP (FT)	DIFFERENCE (FT)	EXIST (FT)	PROP (FT)
1594	151	1641	639.77	639.77	0.00	7.86	7.86	3041	640.93	640.93	0.00	10.13	10.13
1443	229	1641	637.66	637.66	0.00	9.07	9.07	3041	638.91	638.91	0.00	10.89	10.89
1214	87	1641	631.94	631.83	-0.11	7.44	7.67	3041	633.07	633.30	0.23	10.43	9.89
1127	41	1719	631.52	630.25	-1.27	6.63	9.76	3233	632.57	633.02	0.45	9.29	8.31
1086	88	1719	631.39	630.20	-1.19	6.10	4.68	3233	632.38	633.16	0.78	8.58	4.89
<b>WESTLAKE DRIVE (WL01)</b>													
998	219	1719	628.57	628.42	-0.15	10.92	7.44	3233	631.95	632.07	0.12	9.48	6.58
779	100	2586	626.52	626.52	0.00	8.78	8.78	4842	627.74	627.64	-0.10	13.66	13.86
679	99	2586	626.37	626.36	-0.01	7.12	7.13	4842	627.64	627.49	-0.15	11.02	11.26

DESCRIPTION	DIST. TO UPSTREAM XS (FT)	ENT LOSS COEFF.	EXIT LOSS COEFF.	CULV MANNING'S "n"	UPSTREAM INVERT ELEV (FT)	DOWNSTREAM INVERT ELEV (FT)	DOWNSTREAM BOUNDARY CONDITIONS	MANNING'S "n" VALUE		
								LOB	CHANNEL	ROB
								(EXIST) 3 - 36" X 58" X 37' CMPA	16	0.7
(PROP) 3 - 8' X 7' X 54' MBC	5	0.2	1.0	0.012	621.20	621.04	DOWNSTREAM OF RED BUD TRAIL	0.100	0.045	0.100



REVISION DESCRIPTION

REV. NO.	DATE	BY	DESCRIPTION

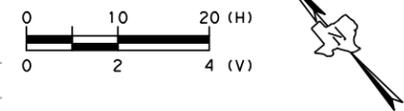
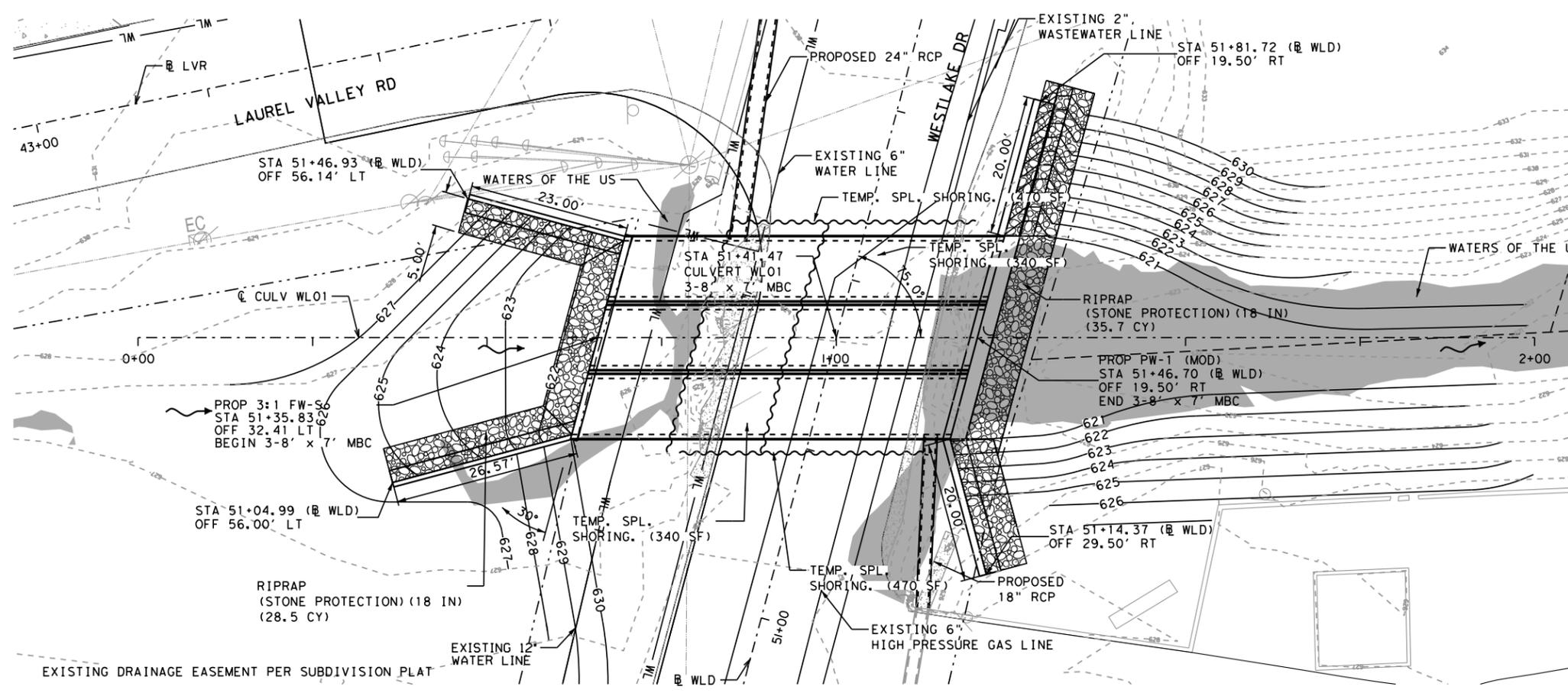
Danielle Skidmore  
85592  
LICENSED PROFESSIONAL ENGINEER

**K FRIESE & ASSOCIATES, INC.**  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
**WEST LAKE HILLS BOND PROGRAM**  
**WESTLAKE DR DRNG & PVMT IMPROV**  
**CULVERT HYDRAULIC DATA**  
**CULVERT WL01**

WEST LAKE HILLS, TX

SHEET 1 OF 1

SCALE	NTS
DATE	7/17/2023
SHEET NUMBER	82 OF 388

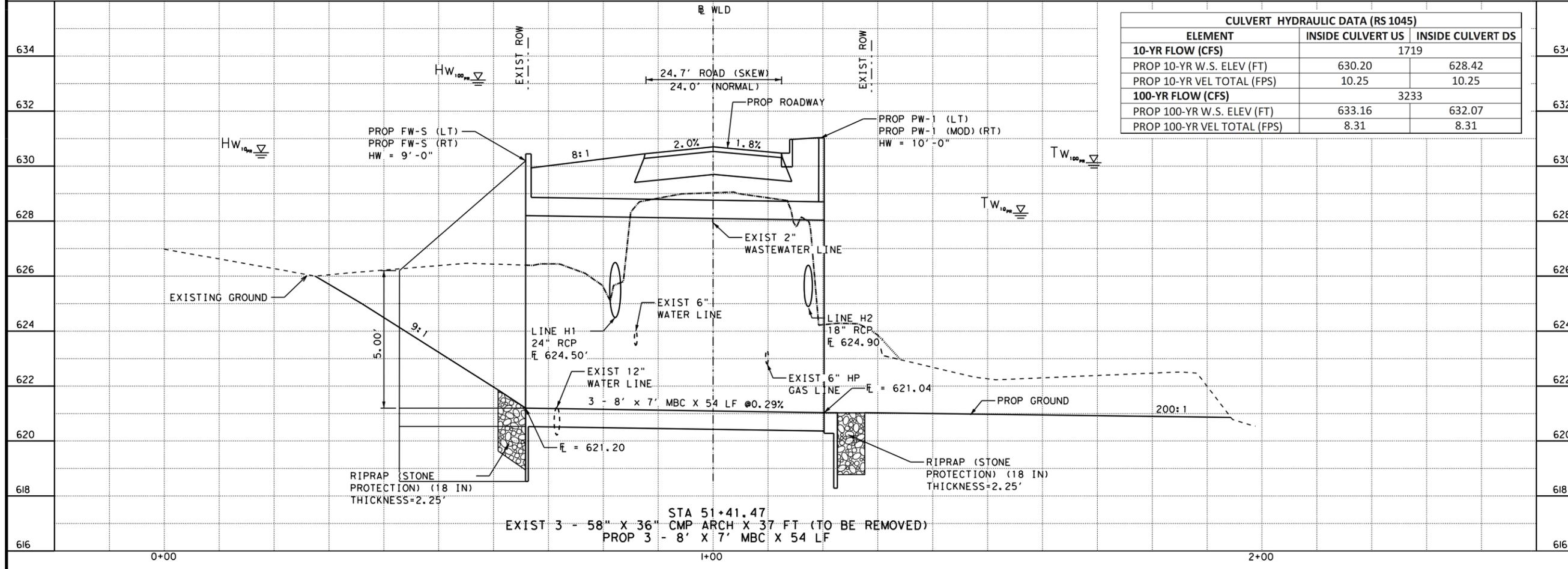


- LEGEND**
- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - - - EXIST EASEMENT
  - - - PROP EASEMENT
  - FLOW DIRECTION
  - DITCH CENTERLINE

- NOTES**
1. UTILITY INFORMATION IS PARTIAL AND PROVIDED BY OTHERS. CONTRACT TO FIELD DETERMINE/VERIFY LOCATION AND ELEVATION OF UTILITIES. ADJUSTMENTS SHALL BE COORDINATED WITH THE ENGINEER AND IN ACCORDANCE WITH "UTILITY ADJUSTMENTS" DETAILS.
  2. REFER TO "GRADING DETAILS" AND THE "BCS" FOR WINGWALL DESIGN, GABIONS, AND GRADING.
  3. REFER TO "RIPRAP DETAILS" FOR RIPRAP DIMENSIONS.



CULVERT HYDRAULIC DATA (RS 1045)		
ELEMENT	INSIDE CULVERT US	INSIDE CULVERT DS
1719		
10-YR FLOW (CFS)		
PROP 10-YR W.S. ELEV (FT)	630.20	628.42
PROP 10-YR VEL TOTAL (FPS)	10.25	10.25
100-YR FLOW (CFS)	3233	
PROP 100-YR W.S. ELEV (FT)	633.16	632.07
PROP 100-YR VEL TOTAL (FPS)	8.31	8.31

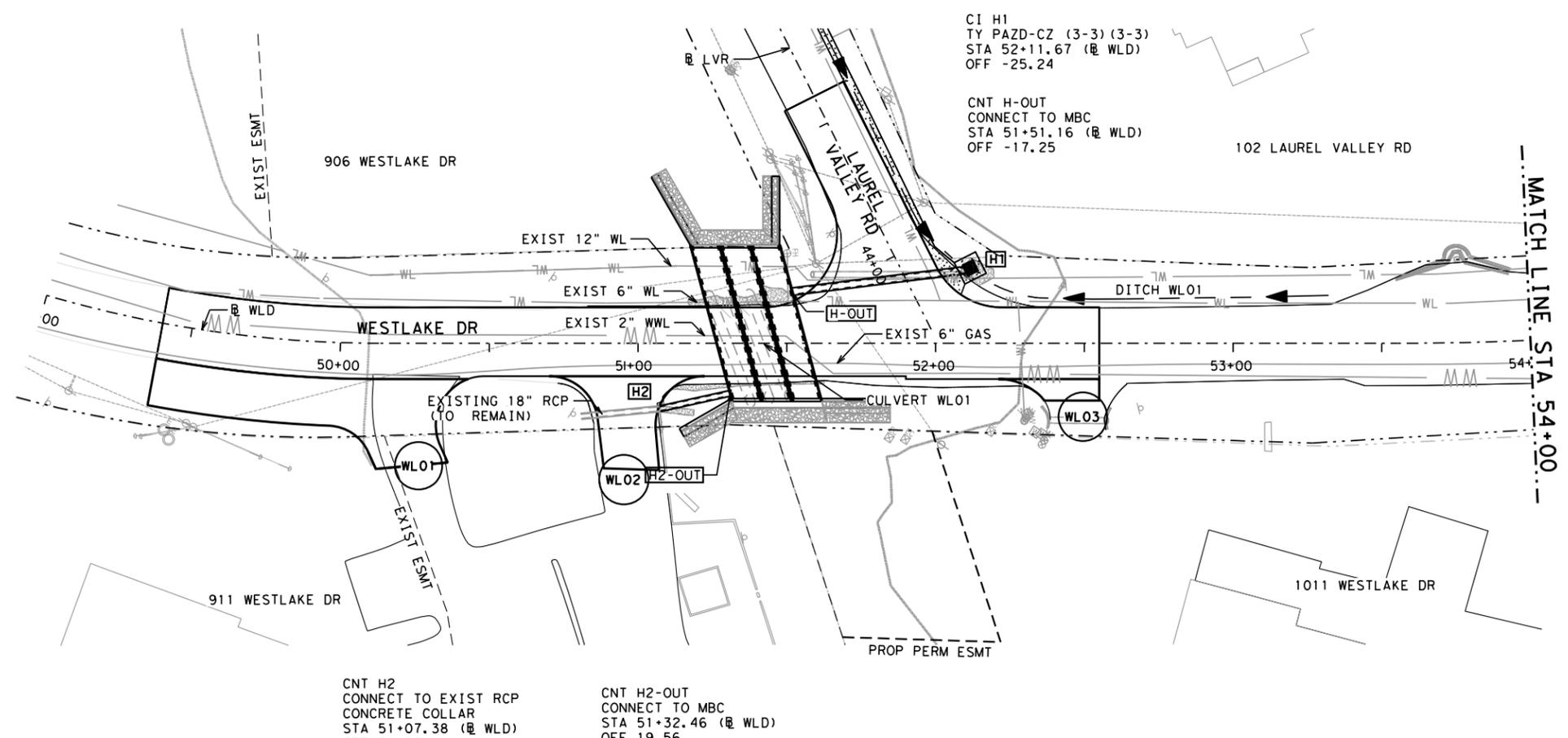


K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
 WEST LAKE HILLS BOND PROGRAM  
 WESTLAKE DR DRNG & PVMT IMPROV  
 CULVERT LAYOUT  
 CULVERT WL01



WEST LAKE HILLS, TX	
SHEET 1 OF 1	
SCALE	1"=20'
DATE	7/17/2023
SHEET NUMBER	83 OF 388



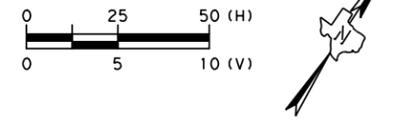


CI H1  
TY PAZD-CZ (3-3) (3-3)  
STA 52+11.67 (ℳ WLD)  
OFF -25.24

CNT H-OUT  
CONNECT TO MBC  
STA 51+51.16 (ℳ WLD)  
OFF -17.25

CNT H2  
CONNECT TO EXIST RCP  
CONCRETE COLLAR  
STA 51+07.38 (ℳ WLD)  
OFF 21.96

CNT H2-OUT  
CONNECT TO MBC  
STA 51+32.46 (ℳ WLD)  
OFF 19.56



- LEGEND**
- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - ← DITCH CENTERLINE
  - ⊠ DRAINAGE NODE
  - ⊞ SYSTEM ID
  - ⊞ DRIVEWAY ID

- NOTES**
- UTILITY INFORMATION IS PARTIAL AND PROVIDED BY OTHERS. CONTRACT TO FIELD DETERMINE/VERIFY LOCATION AND ELEVATION OF UTILITIES. ADJUSTMENTS SHALL BE COORDINATED WITH THE ENGINEER AND IN ACCORDANCE WITH "UTILITY ADJUSTMENTS" DETAILS.
  - REFER TO "INLET POINT CONTROL" DETAILS STRUCTURE CONTROL LOCATIONS.
  - CONNECTIONS TO STRUCTURES SHALL FOLLOW TXDOT STANDARDS. PIPE DEFLECTIONS NOT SHOWN FOR CLARITY.
  - LINK NAMES ARE CONSISTENT WITH THE UPSTREAM NODE NAMES.

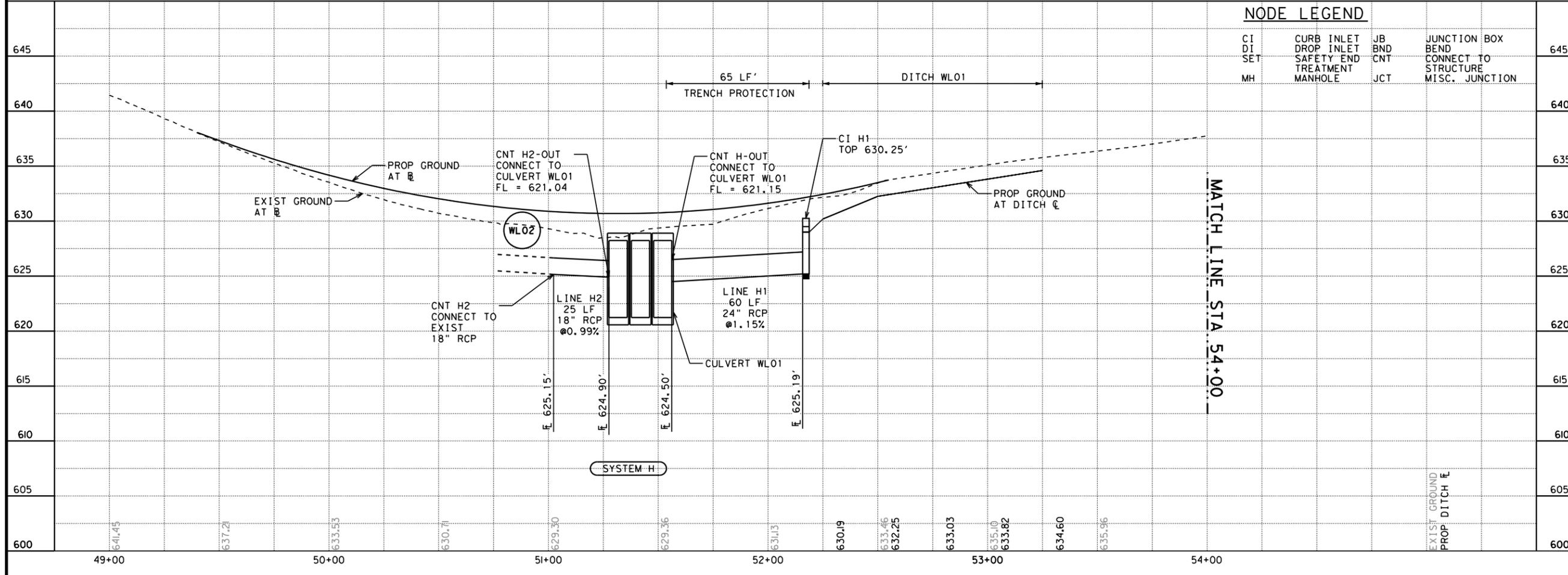


K FRIESE & ASSOCIATES, INC.  
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WEST LAKE HILLS BOND PROGRAM  
WESTLAKE DR DRNG & PVMT IMPROV  
DRAINAGE PLAN & PROFILE  
WESTLAKE DR STA 49+00 - STA 54+00

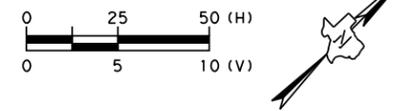
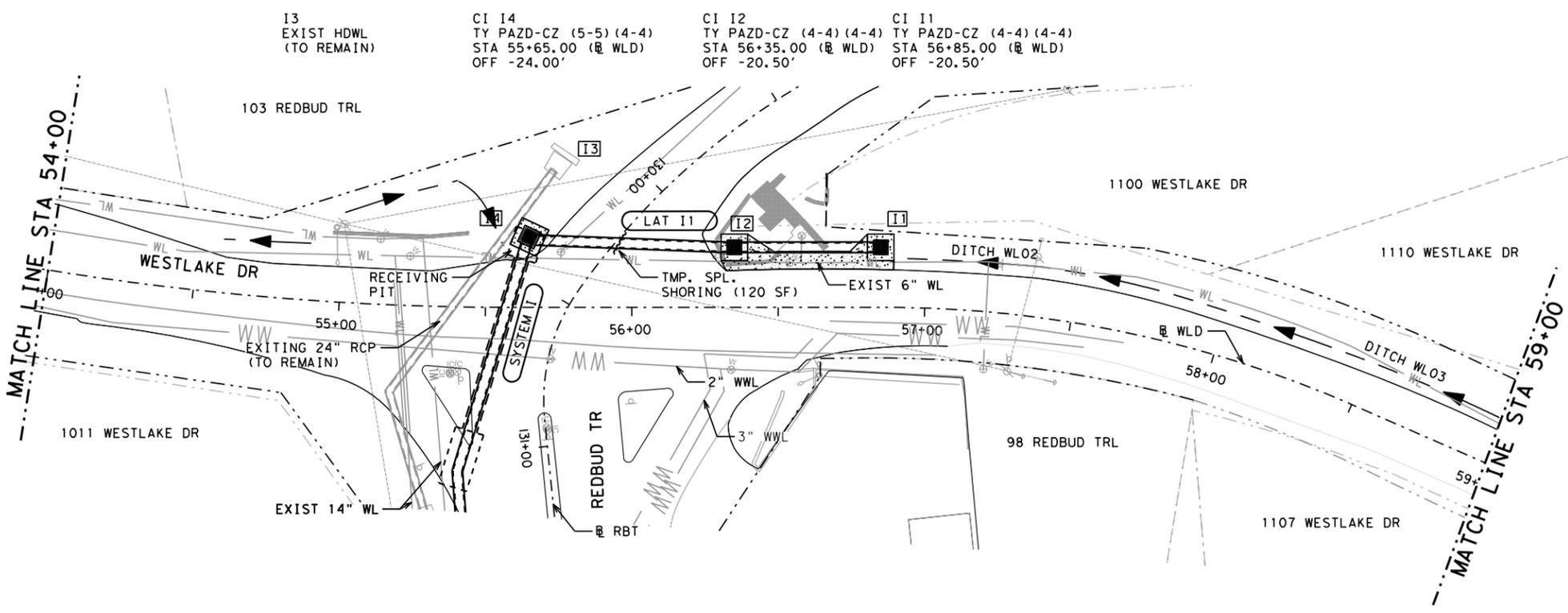


WEST LAKE HILLS, TX	
SHEET 1 OF 7	
SCALE	1"=50' H; 1"=10' V
DATE	7/17/2023
SHEET NUMBER	85 OF 388



**NODE LEGEND**

CI	CURB INLET	JB	JUNCTION BOX	
DI	DROP INLET	BND	BEND	
SET	SAFETY END TREATMENT MANHOLE	CNT	CONNECT TO STRUCTURE	
MH		JCT	MISC. JUNCTION	



- LEGEND**
- EXIST EDGE OF PAVEMENT
  - - - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - ← DITCH CENTERLINE
  - XX DRAINAGE NODE
  - XX SYSTEM ID
  - XX DRIVEWAY ID

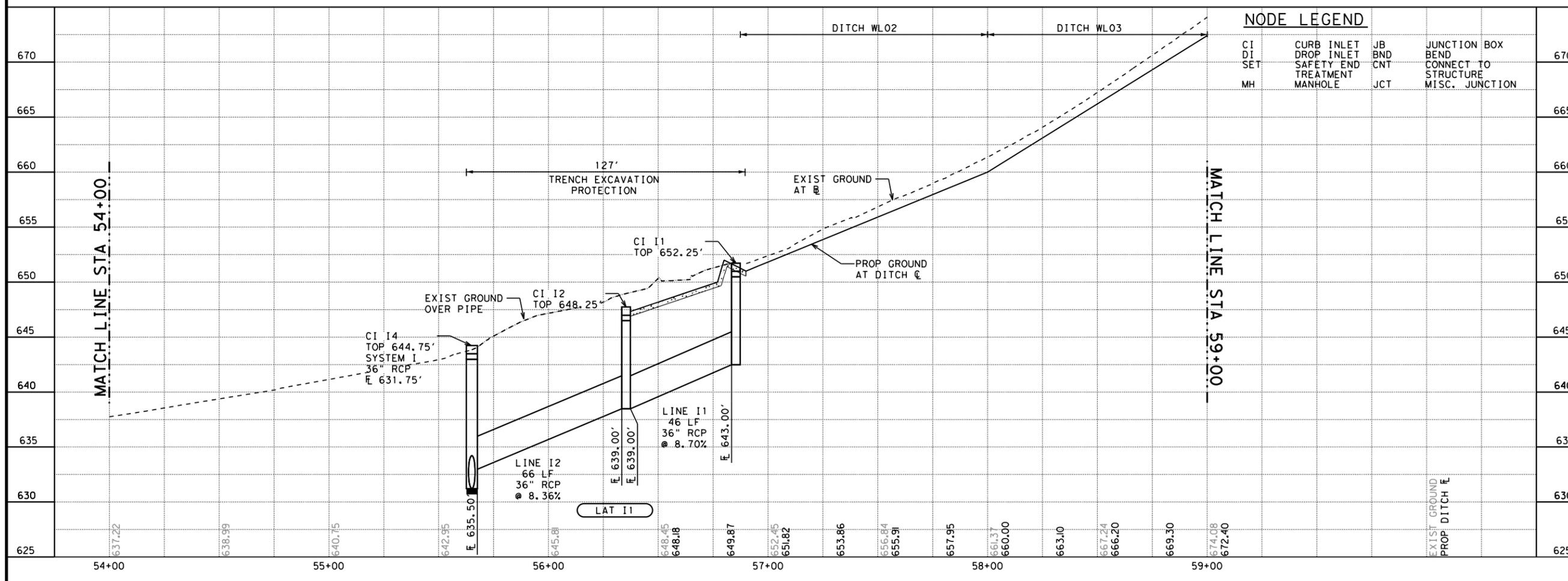
- NOTES**
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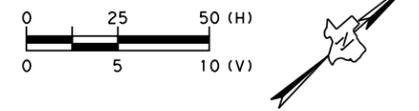
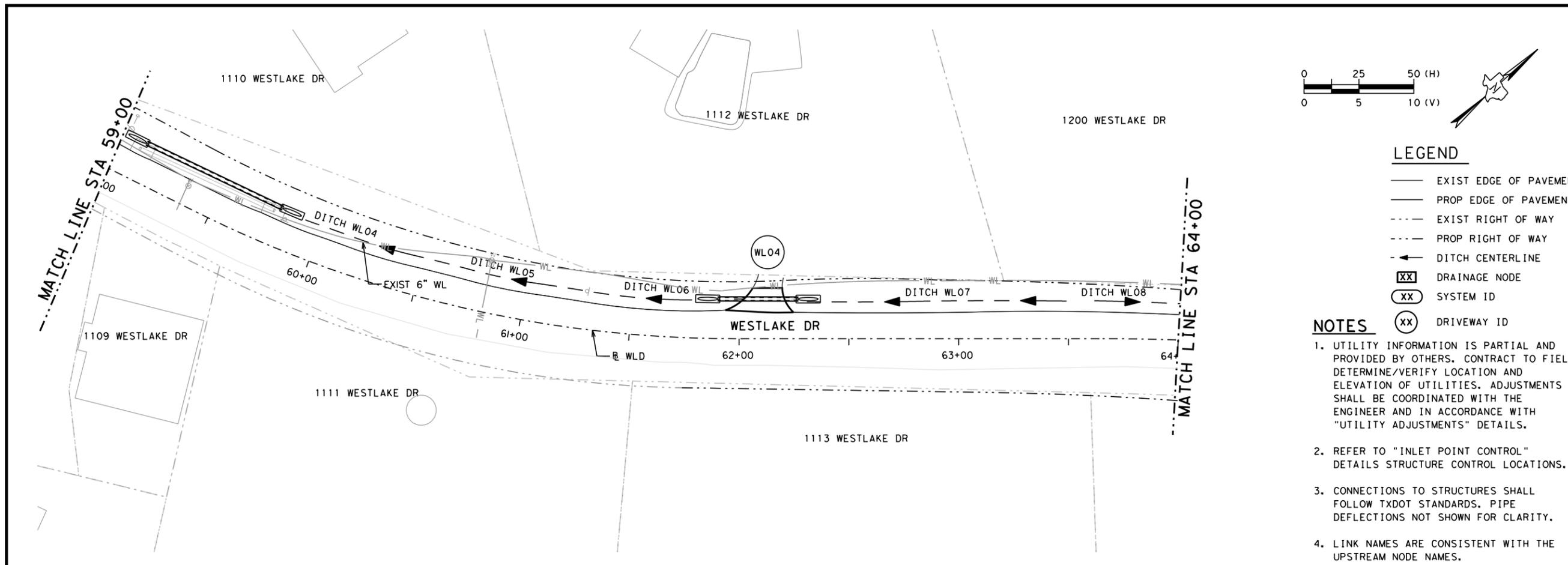
K FRIESE & ASSOCIATES, INC.  
 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
 WEST LAKE HILLS BOND PROGRAM  
 WESTLAKE DR DRNG & PVMT IMPROV  
 DRAINAGE PLAN & PROFILE  
 WESTLAKE DR STA 54+00 - STA 59+00



WEST LAKE HILLS, TX	
SHEET 2 OF 7	
SCALE	1"=50' H; 1"=10' V
DATE	7/17/2023
SHEET NUMBER	86 OF 388



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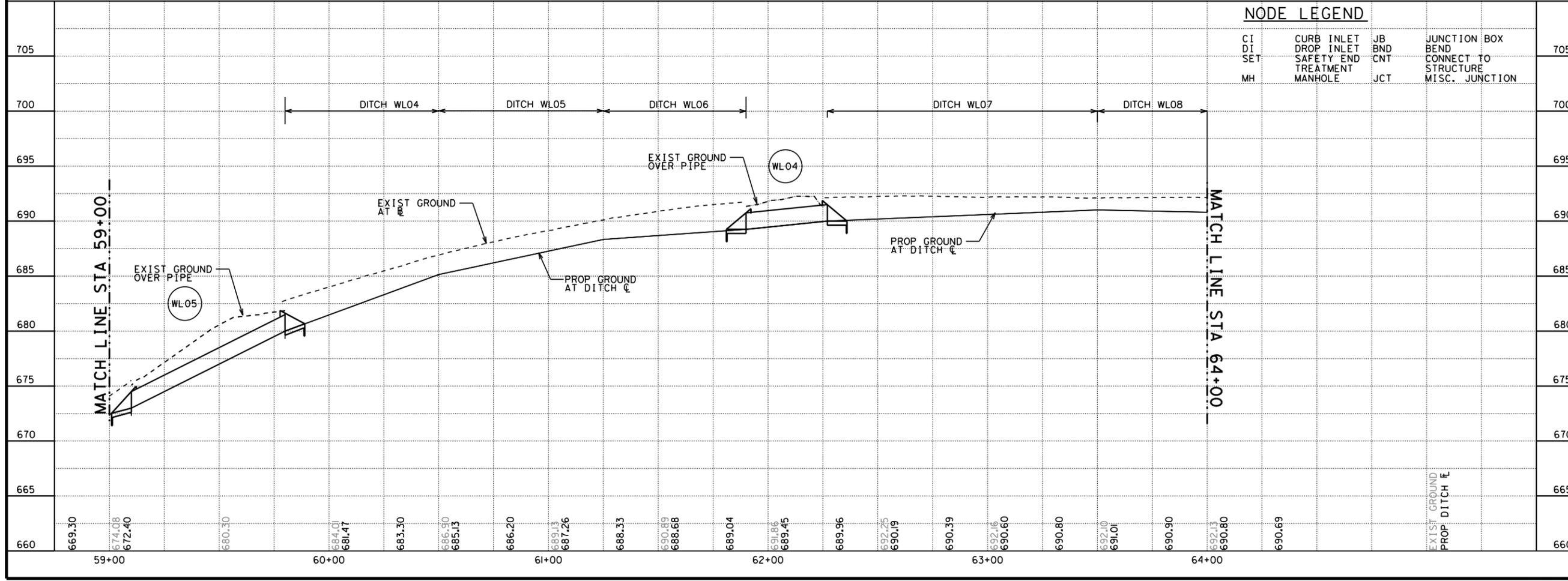
- ### LEGEND
- EXIST EDGE OF PAVEMENT
  - PROP EDGE OF PAVEMENT
  - - - EXIST RIGHT OF WAY
  - - - PROP RIGHT OF WAY
  - ← DITCH CENTERLINE
  - XX DRAINAGE NODE
  - XX SYSTEM ID
  - XX DRIVEWAY ID

- ### NOTES
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K FRIESE & ASSOCIATES, INC.  
1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746

WEST LAKE HILLS BOND PROGRAM  
WESTLAKE DR DRNG & PVMT IMPROV  
DRAINAGE PLAN & PROFILE  
WESTLAKE DR STA 59+00 - STA 64+00

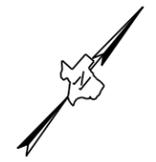
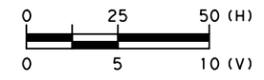
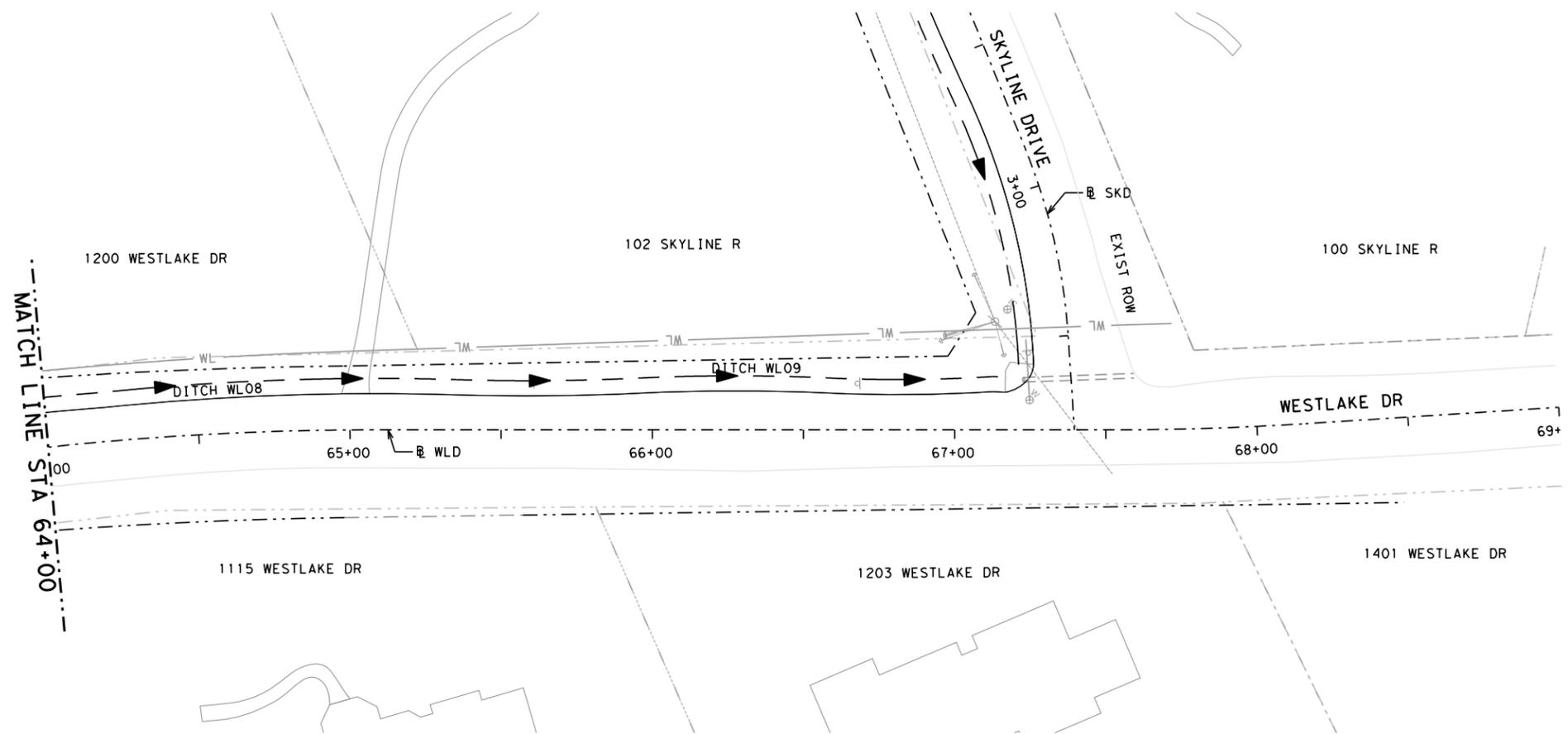


### NODE LEGEND

CI	CURB INLET	JB	JUNCTION BOX
DI	DROP INLET	BND	BEND
SET	SAFETY END TREATMENT	CNT	CONNECT TO STRUCTURE
MH	MANHOLE	JCT	MISC. JUNCTION



WEST LAKE HILLS, TX	
SHEET 3 OF 7	
SCALE	1"=50' H; 1"=10' V
DATE	7/17/2023
SHEET NUMBER	87 OF 388



**LEGEND**

- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- ← DITCH CENTERLINE
- XX DRAINAGE NODE
- XX SYSTEM ID
- XX DRIVEWAY ID

**NOTES**

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 WEST LAKE HILLS BOND PROGRAM  
 WESTLAKE DR DRNG & PVMT IMPROV  
 DRAINAGE PLAN & PROFILE  
 WESTLAKE DR STA 64+00 - END

Danielle Skidmore Consulting  
 CIVIL ENGINEERING  
 (FIRM # 20279)



WEST LAKE HILLS, TX

SHEET 4 OF 7

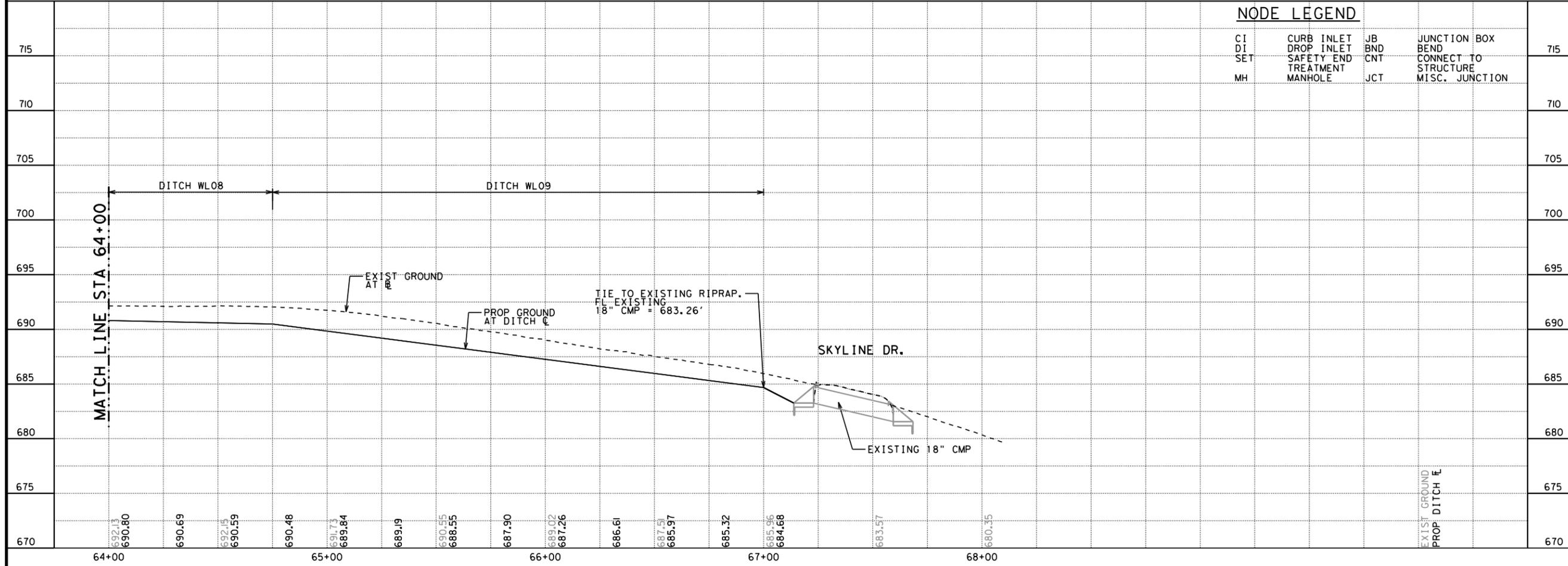
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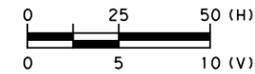
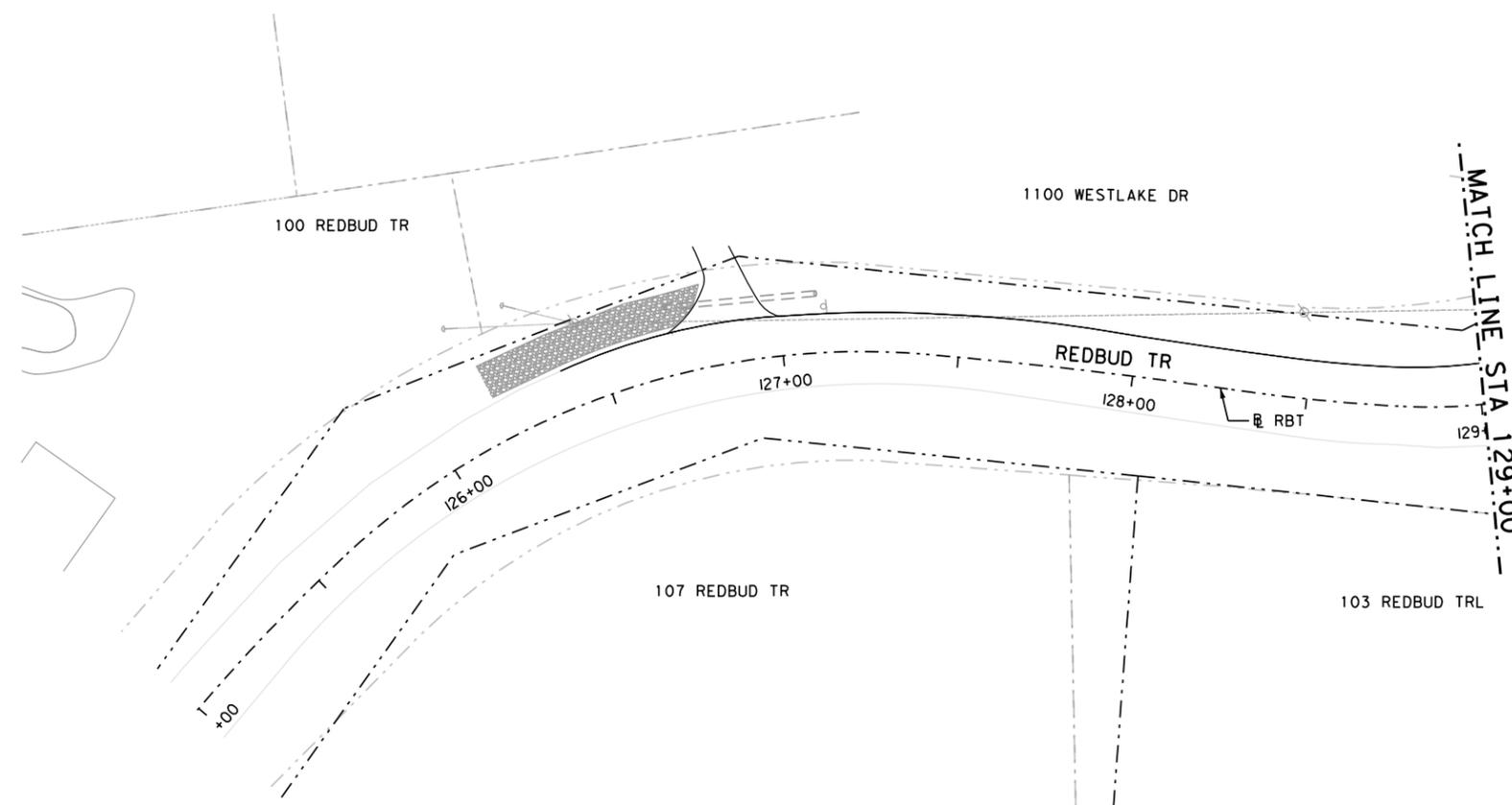
DATE 7/17/2023

SHEET NUMBER 88 OF 388

**NODE LEGEND**

CI	CURB INLET	JB	JUNCTION BOX	715
DI	DROP INLET	BND	BEND	710
SET	SAFETY END TREATMENT MANHOLE	CNT	CONNECT TO STRUCTURE	705
MH		JCT	MISC. JUNCTION	700





**LEGEND**

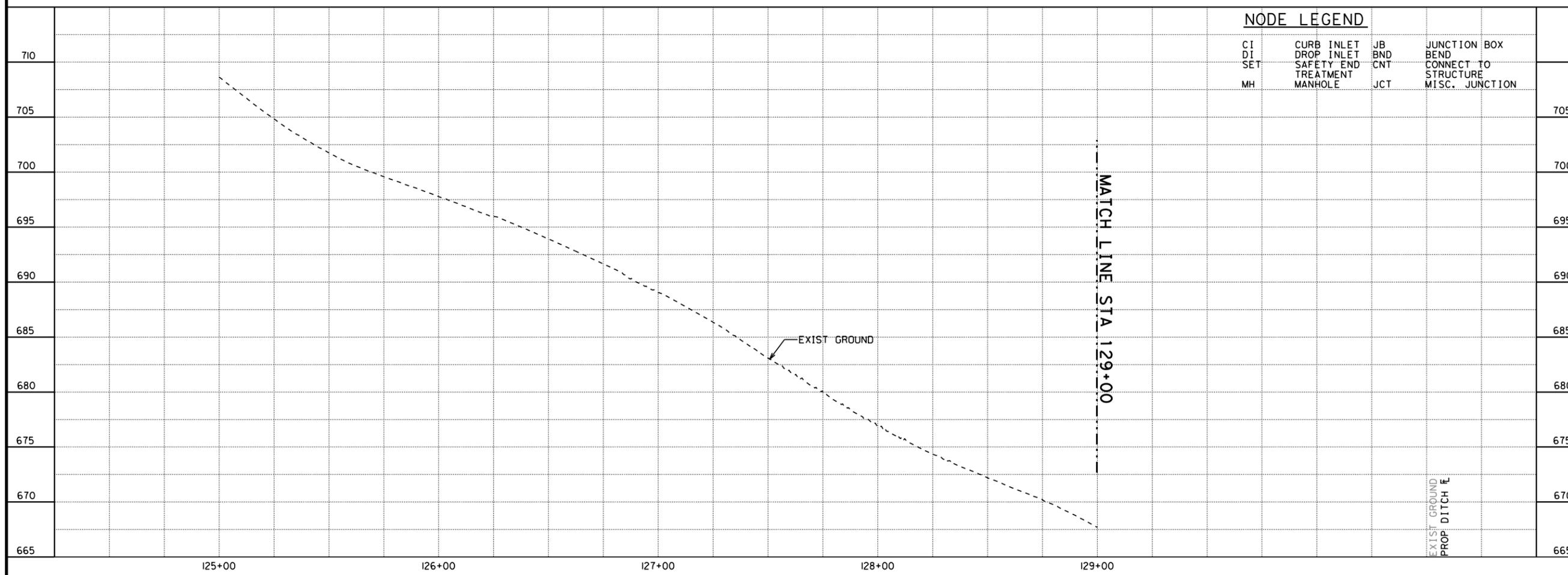
- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- ← DITCH CENTERLINE
- ⊠ DRAINAGE NODE
- ⊞ SYSTEM ID
- ⊝ DRIVEWAY ID

**NOTES**

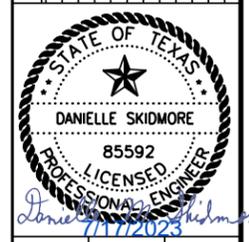
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**NODE LEGEND**

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DI	DROP INLET	BND	BEND
SET	SAFETY END TREATMENT	CNT	CONNECT TO STRUCTURE
MH	MANHOLE	JCT	MISC. JUNCTION



REV. NO.	BY	DATE	REVISION DESCRIPTION

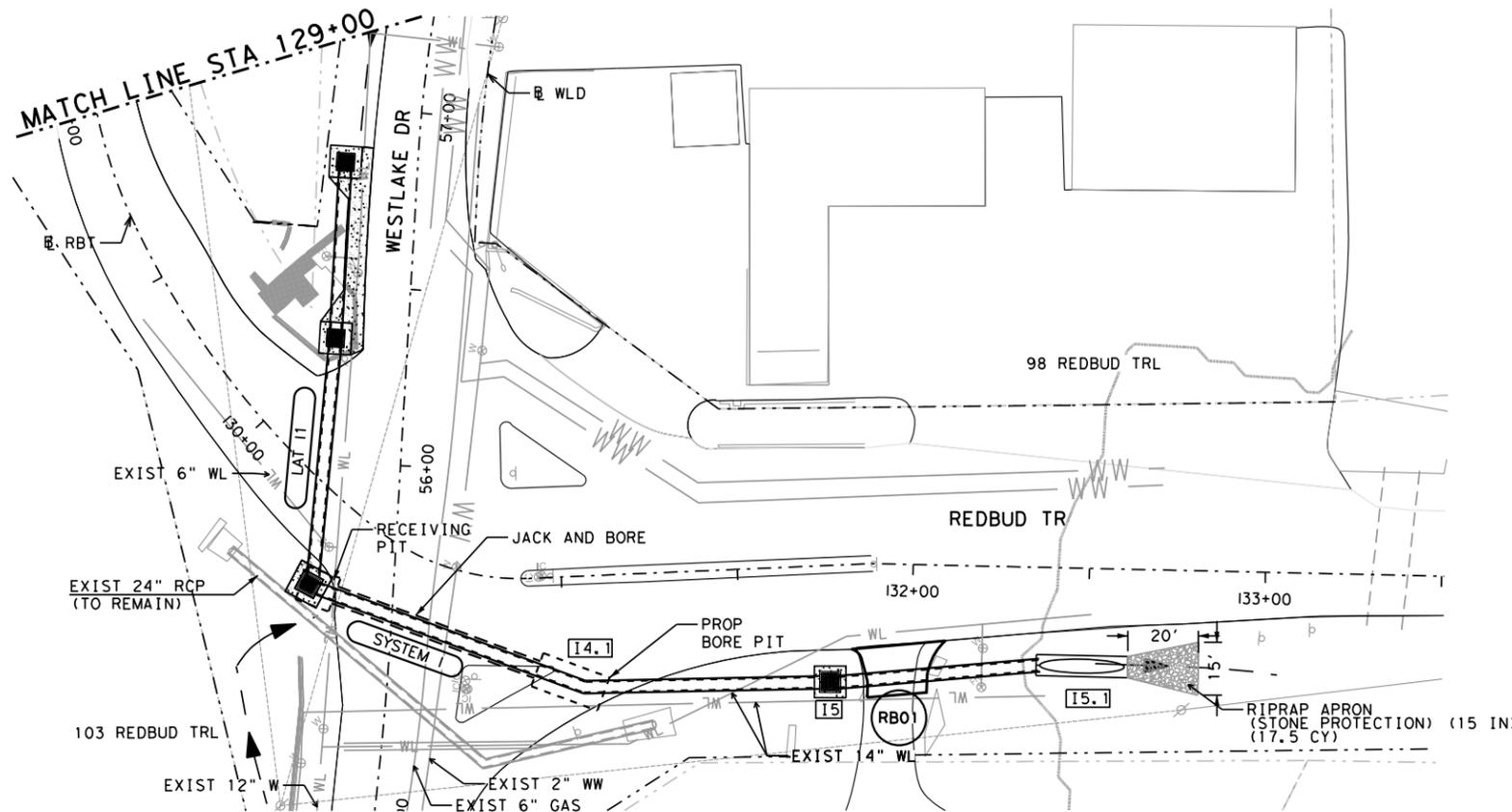


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 WEST LAKE HILLS BOND PROGRAM  
 WESTLAKE DR DRNG & PVMT IMPROV  
 DRAINAGE PLAN & PROFILE  
 REDBUD TRAIL STA 125+00 - STA 129+50



WEST LAKE HILLS, TX	
SHEET NUMBER	89 OF 388
SCALE	1"=50' H; 1"=10' V
DATE	7/17/2023
SHEET NUMBER	89 OF 388

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**LEGEND**

- EXIST EDGE OF PAVEMENT
- PROP EDGE OF PAVEMENT
- - - EXIST RIGHT OF WAY
- - - PROP RIGHT OF WAY
- ← DITCH CENTERLINE
- ⊠ DRAINAGE NODE
- ⊘ SYSTEM ID
- ⊙ DRIVEWAY ID

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JCT I4.1  
PIPE BEND  
STA 131+05.29 (RBT)  
OFF 31.46'

CI I5  
TY PAZD-CZ (5-5) (4-4)  
STA 131+75.00 (RBT)  
OFF 33.00'

SET I5.1  
SET-48" 6:1  
STA 132+36.49 (RBT)  
OFF 27.72'



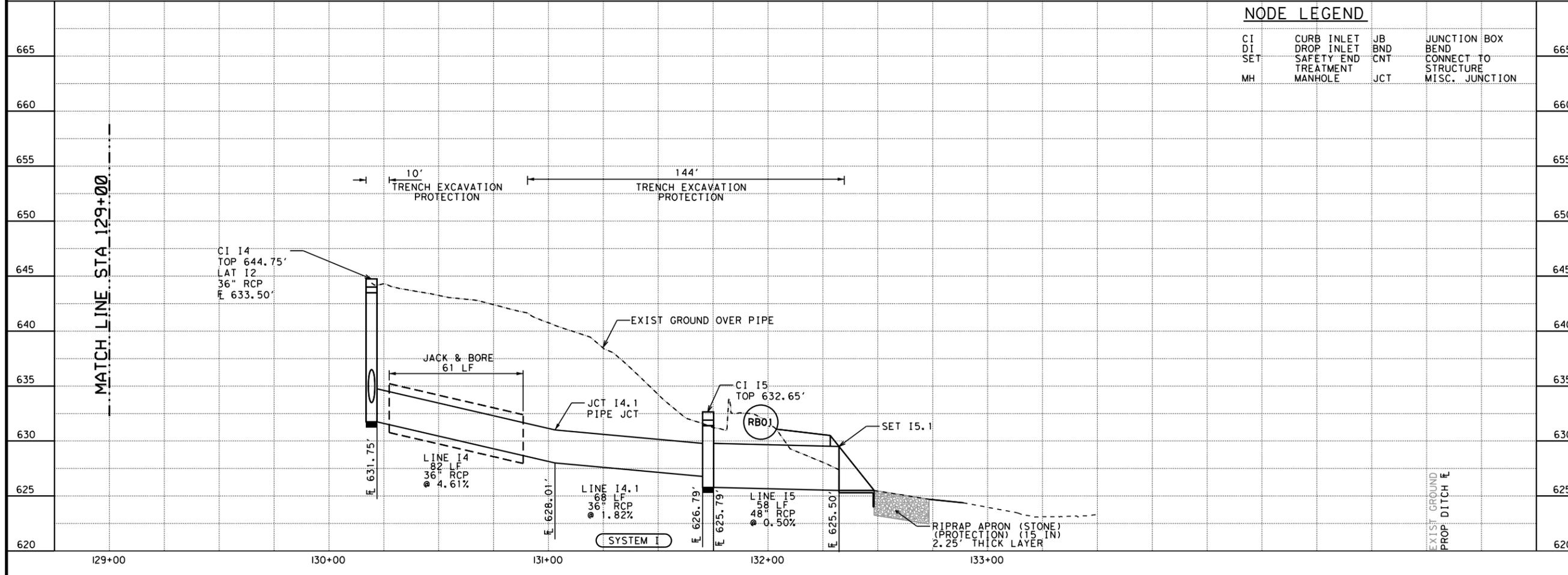
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 1120 S. CAPITAL OF TEXAS HWY, II-100, AUSTIN, TX 78746  
 WEST LAKE HILLS BOND PROGRAM  
 WESTLAKE DR DRNG & PVMT IMPROV  
 DRAINAGE PLAN & PROFILE  
 REDBUD TRAIL STA 129+50 - END



WEST LAKE HILLS, TX	
SHEET	90 OF 388
SCALE	1"=50' H; 1"=10' V
DATE	7/17/2023

**NODE LEGEND**

CI	CURB INLET	JB	JUNCTION BOX	
DI	DROP INLET	BND	BEND	
SET	SAFETY END TREATMENT MANHOLE	CNT	CONNECT TO STRUCTURE	
MH		JCT	MISC. JUNCTION	





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: 7/17/2023  
 FILE: X:\Projects\0846\_WLH\_Bond Projects\300 Plans and Drawings\333 Plan Production\03\_West Lake\0846ShtEvep1cWL01.dgn

**I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402**

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

- CITY OF WEST LAKE HILLS
- No Action Required     Required Action

Action No.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

**II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404**

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
- Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# \_\_\_\_\_

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

- LITTLE BEE CREEK
- 
- 
- 

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

**Best Management Practices:**

Erosion	Sedimentation	Post-Construction TSS
<input checked="" type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input checked="" type="checkbox"/> Blankets/Matting	<input checked="" type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input checked="" type="checkbox"/> Mulch Filter Berm and Socks
<input checked="" type="checkbox"/> Mulch Filter Berm and Socks	<input checked="" type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Grassy Swales

**III. CULTURAL RESOURCES**

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

- No Action Required     Required Action

Action No.

- AN ARCHAEOLOGIST MUST BE ONSITE TO MONITOR CONSTRUCTION ACTIVITIES WITHIN THE 100-YR FLOODPLAIN.
- 
- 
- 

**IV. VEGETATION RESOURCES**

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

- No Action Required     Required Action

Action No.

- ESTABLISH VEGETATION IN ALL DISTURBED AREAS AS DETAILED IN THE EROSION CONTROL PLAN.
- 
- 
- 

**V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.**

- No Action Required     Required Action

Action No.

- BEFORE REMOVING ANY TREES, CONFIRM NO NESTS ARE PRESENT.
- 
- 
- 

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

**LIST OF ABBREVIATIONS**

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOT: Notice of Termination	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- \* Dead or distressed vegetation (not identified as normal)
- \* Trash piles, drums, canister, barrels, etc.
- \* Undesirable smells or odors
- \* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

- Yes     No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

- Yes     No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

- No Action Required     Required Action

Action No.

- ASPHALT PRODUCTS
- FUELS
- 

**VII. OTHER ENVIRONMENTAL ISSUES**

(includes regional issues such as Edwards Aquifer District, etc.)

- No Action Required     Required Action

Action No.

- TCEQ EDWARDS AQUIFER RECHARGE ZONE
- 
- 

		<b>Design Division Standard</b>		
<h2>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</h2> <h1>EPIC</h1>				
FILE: epic.dgn	DN: TxDOT	CK: RG	DN: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
12-12-2011 (DS) REVISIONS	N/A	N/A	N/A	N/A
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	N/A	TRAVIS	92	

**A. GENERAL SITE DATA**

**1. PROJECT LIMITS: WESTLAKE DR DRNG & PVMNT IMPROV**

Begin Project Coordinates : Latitude (N) : 30° 16' 55" Longitude (W) : -97° 48' 30"  
 End Project Coordinates : Latitude (N) : 30° 17' 40" Longitude (W) : -97° 47' 44"

**2. PROJECT SITE MAPS:**

- \* Project Location Map: Project Layout (Sheets 50-51)
- \* Drainage Patterns: Drainage Area Maps (Sheets 78-79)
- \* Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections (Sheet 55)
- \* Location of Erosion and Sediment Controls: Erosion Control Layouts (Sheets 93-95)
- \* Surface Waters and Discharge Locations: Drainage and Culvert Layouts (Sheets 81,83-89)
- \* Project Specific Location(s) (PSL): To be determined by the project Construction Personnel. Location(s) shown on SW3P Site Map (if PSL location(s) is within one mile of project) and information located in project SW3P Binder (Reference Item \*10 below).

**3. PROJECT DESCRIPTION:**

CONSTRUCTION OF EARTHWORK, GRADING, BASE, HMAC SURFACING, DRAINAGE STRUCTURES, SIGNING AND PAVEMENT MARKINGS

**4. MAJOR SOIL DISTURBING ACTIVITIES:**

CLEARING AND GRUBBING DRAINAGE INFRASTRUCTURE  
 ROADWAY EXCAVATION AND EMBANKMENT  
 PLACEMENT OF TOPSOIL

**5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:**

LEAN CLAY (CL) UNDERLAIN BY LIMESTONE.

**6. TOTAL PROJECT AREA:** 9.76 Acres

**7. TOTAL AREA TO BE DISTURBED:** 5.37 Acres ( 55 %)

**8. WEIGHTED RUNOFF COEFFICIENT**

BEFORE CONSTRUCTION: 0.62  
 AFTER CONSTRUCTION: 0.62

**9. NAME OF RECEIVING WATERS:**

LITTLE BEE CREEK  
 LADY BIRD LAKE (SEGMENT NO.1403)

**10. PROJECT SW3P Binder:**

A. For projects disturbing one to five acres, The Contractor will maintain a SW3P Binder at the project field office (if there is not a project field office, should be kept on the Job Site at all times) which contains the following: Index Sheet, TCEQ Signature Authority, TCEQ Small Construction Site Notice, Contractor Certification of Compliance, SW3P Inspector Qualification Statements, Inspection and Maintenance Reports (Form 2118), SW3P Sheet, Site Location Maps, Stored Material Lists specifying associated control measures and the Appendix which contains the TPDES Construction General Permit, MS4 Operator Notification(s) and the Construction PSL Permits per all applicable requirements.

B. For projects disturbing 5 acres or more, the Contractor will follow the actions listed in (10.A) above with the addition of the following: Notice Of Intent (N.O.I.) and Fee Payment Form, TCEQ Large Construction Site Notice (to be used instead of Small Site Notice), and TPDES Permit Coverage Notice.

C. For projects disturbing less than one acre, actions described in (10.A) and (10.B) above are not required. Acreage is calculated by adding Total Area To Be Disturbed Acres on project (See \*7 above) and the PSL(s) acreage located within one mile of project.

**B. EROSION AND SEDIMENT CONTROLS**

**1. SOIL STABILIZATION PRACTICES:** (Select T = Temporary or P = Permanent, as applicable)

- TEMPORARY SEEDING
- MULCHING (Hay or Straw)
- BUFFER ZONES
- PLANTING
- SEEDING
- SODDING
- PRESERVATION OF NATURAL RESOURCES
- FLEXIBLE CHANNEL LINER
- RIGID CHANNEL LINER
- SOIL RETENTION BLANKET
- COMPOST MANUFACTURED TOPSOIL
- VERTICAL TRACKING
- OTHER: Disturbed areas on which construction activity has ceased, either temporarily or permanently, shall be stabilized within 14 days unless activities are scheduled to resume and do so within 21 days.

**2. STRUCTURAL PRACTICES:**

- (T = Temporary or P = Permanent)
- SILT FENCES
  - EROSION CONTROL LOGS
  - EROSION CONTROL COMPOST BERMS (Low Velocity)
  - ROCK FILTER DAMS
  - DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
  - DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
  - DIVERSION DIKE AND SWALE COMBINATIONS
  - PIPE SLOPE DRAINS
  - PAVED FLUMES
  - ROCK BEDDING AT CONSTRUCTION EXIT
  - TIMBER MATTING AT CONSTRUCTION EXIT
  - CHANNEL LINERS
  - SEDIMENT TRAPS
  - SEDIMENT BASINS
  - STORM INLET SEDIMENT TRAP
  - STONE OUTLET STRUCTURES
  - CURBS AND GUTTERS
  - STORM SEWERS
  - VELOCITY CONTROL DEVICES
  - OTHER: (Specify Practice)

NOTE: TOP OF BMP'S SHOULD NOT BE HIGHER THAN ROADWAY ELEVATION AS NOT TO FLOOD ROADWAY UNLESS PRIOR APPROVAL FROM ENGINEER IS OBTAINED.

**3. STORM WATER MANAGEMENT:**

- A. Storm water drainage will be provided by ditches, inlets, and storm water systems which carry drainage within the R.O.W. to the lows within the roadway and project site which drains to natural facilities.
- B. Non paved areas and ditches shall be stabilized with a permanent vegetative cover.
- C. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4 : 1 or flatter slopes with permanent vegetative cover.

**4. STORM WATER MANAGEMENT ACTIVITIES:** (Sequence of Construction)

- 1) INSTALL TEMPORARY EROSION CONTROL MEASURES
- 2) CULVERT AND STORM SEWER IMPROVEMENTS
- 3) ROADWAY CONSTRUCTION
- 4) PLACE PERMANENT SIGNING AND STRIPING
- 5) PLACE TOPSOIL, MULCH, SEEDING, AND PERMANENT EROSION CONTROLS
- 6) PROJECT CLEAN UP AND REMOVAL OF TEMPORARY EROSION CONTROLS

**5. NON-STORM WATER DISCHARGES:**

Filter non-storm water discharges, or hold in retention basins, before being allowed to mix with storm water. These discharges consist of, but not limited to, non-polluted ground water, spring water, foundation or footing drain water, water used for dust control or pavement washing and vehicle washwater containing no detergents.

**C. OTHER REQUIREMENTS & PRACTICES**

**1. MAINTENANCE:**

Maintain all erosion and sediment controls in good working order. Perform any necessary cleaning/repairs/replacements at the earliest possible date prior to next rain event, but no later than 7 calendar days. Ensure the surrounding ground has dried sufficiently to prevent damage from equipment. "Too Wet" is the only reason for not adhering to time frames described. When construction activities permanently or temporarily cease and are not expected to resume for 14 or more days on a disturbed portion of the site, stabilization measures must be initiated immediately.

**2. INSPECTION:**

A Construction Observer will perform a regularly scheduled SW3P inspection every 7 calendar days. An Inspection and Maintenance Report, signed by the Construction Observer and the Contractor, will be filed for each inspection. Revise/clean/repair/replace each BMP control device in accordance with the current Field Inspection and Maintenance Report (Form 2118) and Item 1 (Maintenance) above.

**3. WASTE MATERIALS:**

On a daily basis, or as may be directed, collect all waste materials, trash and debris from the construction site and deposit into a metal dumpster having a secure cover and which meets all state and local city solid waste management requirements. Empty the dumpster as required by regulation, or as may be directed, at a local approved landfill site. Do not bury construction waste on the construction project site.

**4. HAZARDOUS WASTE & SPILL REPORTING:**

As a minimum, any products in the following categories are considered to be hazardous: Paints, Acids, Solvents, Fuels, Asphalt Products, Chemical Additives for Soil Stabilization, and Concrete Curing Compounds or Additives. When storing hazardous material on the project site, or at a Project Specific Location, take all practicable precaution to prevent and/or contain any spillage of these materials. In the event of a spill, contact the spill coordinator immediately.

**5. SANITARY WASTE:**

Use a licensed sanitary waste management contractor to collect all sanitary waste from portable units as may be required by local regulation, or as directed.

**6. CONSTRUCTION VEHICLE TRACKING:**

On a regular basis, or as may be directed, dampen haul roads for dust control and stabilize construction entrances/exits. Provide for a motorized broom or vacuum type sweeper to be available on a daily basis, or as may be directed, to remove sediment from paved roadways abutting or traversing the project site.

**7. MANAGEMENT PRACTICES:**

- A. Construct disposal areas, stockpiles, haul roads and PSL's in a manner that will minimize and control the amount of sediment that may enter receiving waters. Do not locate disposal areas in any wetland, waterbody or streambed.
- B. Locate construction staging areas, vehicle maintenance and PSL's areas in a manner to minimize the runoff of pollutants.
- C. When working in or near a wetland, install and maintain operating soil erosion and sediment controls at all times during construction and isolate the work from the wetland.
- D. Clear all waterways as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.
- E. Procedures and/or practices should be taken to control dust.
- F. Sediment to be removed from roadways daily or when work begins after weather events if construction activities have ceased due to weather event.
- G. The Contractor will be required to contain wash water from concrete trucks in a manner that will prevent same from entering any waterway.
- H. The Contractor is responsible for insuring that all subcontractors are aware and comply with all components of the Temporary Erosion Control Plans.

DATE 7/17/2023 X:\Projects\0646\WH Bond Projects\300 Plans and Drawings\330 Plan Production\333 Plan Sheets\03 West Lake\0646\SW3P\3WL.dgn



7/17/2023

Victoria M. Ortega, P.E.  
 Signature of Registrant & Date

**STORM WATER POLLUTION PREVENTION PLAN (SW3P)**

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6			NA
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS		TRAVIS	93
CHECK	CONTROL	SECTION	JOB	







**TREE LIST**

APPROXIMATE TREE CRITICAL ROOT ZONE TREE DIAMETER & TAG NUMBER - CIRCLES DO NOT REPRESENT THE SIZE OR SHAPE OF TREE CANOPY EXAMPLE: 3"R=3" CRITICAL ROOT ZONE MS = MULTI-STEM MTN=MOUNTAIN TX=TEXAS

TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION	TAG#	SIZE/DESCRIPTION
5066	7.5" LIVE OAK(MS5-5)	7101	7.5" HACKBERRY(MS5-5)	7270	4" ASHE JUNIPER	7603	7" ASHE JUNIPER	7783	6" LIVE OAK
5140	26" HACKBERRY	7105	9" ASHE JUNIPER	7271	7" ASHE JUNIPER	7604	14.5" ASHE JUNIPER(MS9-6-5)	7789	12" CEDAR ELM
5161	19" COTTONWOOD	7106	4" SYCAMORE	7272	5" ASHE JUNIPER(MS4-2)	7605	5" ASHE JUNIPER	7814	13.5" CRAPE MYRTLE(MS4-4-4-4-3)
5195	21" COTTONWOOD	7107	8" ASHE JUNIPER	7273	8" ASHE JUNIPER(MS6-4)	7607	8" ASHE JUNIPER	7816	10" ASHE JUNIPER
5243	21" HACKBERRY	7108	6" ASHE JUNIPER	7274	4.5" ASHE JUNIPER(MS3-3)	7608	4.5" ASHE JUNIPER(MS6-6)	7822	9" CEDAR ELM
5244	5" ASH	7109	11" ASHE JUNIPER	7275	LIVE OAK	7609	8" ASHE JUNIPER	7823	5" MOUNTAIN LAUREL
5245	8" HACKBERRY	7111	7" ASHE JUNIPER	7276	9" LIVE OAK	7610	4" ASHE JUNIPER	7824	4" CRAPE MYRTLE
5246	4" CRAPE MYRTLE(MS3-2)	7113	8" ASHE JUNIPER	7277	4.5" CRAPE MYRTLE(MS3-3)	7611	7.5" ASHE JUNIPER(MS5-5)	7825	12" ASHE JUNIPER
5247	19" HACKBERRY(MS13-12)	7114	7" ASHE JUNIPER	7278	4" RED OAK	7612	10" ASHE JUNIPER	7826	13" ASHE JUNIPER
5248	6" CRAPE MYRTLE(MS4-4)	7115	5" ASHE JUNIPER	7279	6" ASHE JUNIPER	7613	9" LIVE OAK	7827	12" CEDAR ELM
5249	4" CRAPE MYRTLE	7116	15" ASHE JUNIPER	7280	6" ASHE JUNIPER	7614	8" LIVE OAK	7828	6" ASHE JUNIPER
5250	4" CRAPE MYRTLE	7117	5" ASHE JUNIPER	7281	7" ASHE JUNIPER	7617	6" CEDAR ELM	7829	4" CEDAR ELM
5251	10" CRAPE MYRTLE(MS4-3-3)	7120	6" ASHE JUNIPER	7282	4" ASHE JUNIPER	7624	6" ASHE JUNIPER	7830	10" ASHE JUNIPER
5252	3" CRAPE MYRTLE	7121	4" ASHE JUNIPER	7283	6" ASHE JUNIPER	7625	7" ASHE JUNIPER	7831	4" CEDAR ELM
5253	4" CRAPE MYRTLE	7122	5" ASHE JUNIPER	7284	10" ASHE JUNIPER(MS7-6)	7626	5" HACKBERRY	7832	6" CEDAR ELM
5255	5" CRAPE MYRTLE	7123	12" ASHE JUNIPER	7285	7" HACKBERRY	7627	9" CEDAR ELM	7833	9" CEDAR ELM(MS5-4-4)
5256	14.5" CRAPE MYRTLE(MS8-5-5-3)	7124	6" ASHE JUNIPER	7286	10" ASHE JUNIPER	7628	25" ASHE JUNIPER(MS11-11-9-8)	7834	10" CEDAR ELM
5257	8.5" CRAPE MYRTLE(MS6-5)	7125	22" ASHE JUNIPER(MS7-6-6-5-5-4)	7287	6" LIVE OAK	7629	6" ASHE JUNIPER	7839	23" CHINABERRY(MS12-11-11)
5258	7" CRAPE MYRTLE	7126	21" ASHE JUNIPER(MS9-7-6-6-5)	7288	6" LIVE OAK	7630	4" ASHE JUNIPER	7840	7" ASHE JUNIPER
5259	5" CRAPE MYRTLE	7128	23" LIVE OAK	7289	6" LIVE OAK	7636	9" LIVE OAK	7841	6" CEDAR ELM
5271	16.5" LIVE OAK(MS11-6-5)	7129	4" LIGUSTRUM	7290	7" LIVE OAK	7637	10" ASHE JUNIPER	7842	7" ASHE JUNIPER
5272	7" LIVE OAK	7130	7" ASH	7291	6" LIVE OAK	7638	10" ASHE JUNIPER(MS7-6)	7843	7" CEDAR ELM
5273	9" ASHE JUNIPER	7131	16" ASHE JUNIPER	7292	10.5" LIVE OAK(MS8-5)	7639	7" ASHE JUNIPER	7844	6" CEDAR ELM
5324	9" CEDAR ELM	7132	3" SYCAMORE	7312	4" LIGUSTRUM	7640	8" ASHE JUNIPER	7845	6" PALM
5350	3" WHITE OAK	7133	5" ASHE JUNIPER	7315	3" LIGUSTRUM	7641	9" ASHE JUNIPER	7846	5" CEDAR ELM
5351	5" WHITE OAK	7134	9" LIVE OAK	7316	5.5" LIGUSTRUM(MS4-3)	7642	12.5" LIVE OAK(MS9-7)	7847	12" LIVE OAK
5352	7" LIGUSTRUM(MS3-3-3-2)	7135	4" ASHE JUNIPER	7317	10" LIGUSTRUM(MS5-5-5)	7643	9" ASHE JUNIPER(MS6-6)	7848	8" CEDAR ELM
5376	5.5" WHITE OAK(MS4-3)	7136	20.5" ASHE JUNIPER(MS9-8-8-7)	7318	10" LIGUSTRUM(MS5-5-5)	7644	9" ASHE JUNIPER(MS7-4)	7849	5" CEDAR ELM
5378	5.5" WHITE OAK(MS4-3)	7138	13" ASHE JUNIPER	7320	3" LIGUSTRUM	7645	5" CEDAR ELM	7856	7" CEDAR ELM
5492	12.5" MOUNTAIN LAUREL(MS5-5-4-3-3)144	7144	10" LIVE OAK	7321	3" LIGUSTRUM	7646	8" ASHE JUNIPER	7857	10" HACKBERRY
5493	23.5" LIVE OAK(MS16-15)	7145	13.5" ASHE JUNIPER(MS6-6-5-4)	7322	5" ASHE JUNIPER	7647	10" CEDAR ELM	7858	6" CEDAR ELM
5499	7" MOUNTAIN LAUREL(MS5-4)	7146	8" ASHE JUNIPER	7323	34" COTTONWOOD	7648	4" CEDAR ELM	7859	10" ASHE JUNIPER
5500	10" MOUNTAIN LAUREL(MS6-4-4)	7147	9" LIVE OAK(MS5-4-4)	7324	29" COTTONWOOD	7667	9" LIVE OAK	7860	16" ASHE JUNIPER(MS12-8)
5501	7" MOUNTAIN LAUREL	7148	5" LIVE OAK	7329	24.5" LIGUSTRUM(MS11-9-9-9)	7668	5" CEDAR ELM	7861	10" ASHE JUNIPER
5514	6" TEXAS PERSIMMON	7149	10" LIVE OAK	7330	9.5" CRAPE MYRTLE(MS7-5)	7669	5.5" CRAPE MYRTLE(MS4-3)	7862	8" PALM
5515	5" TEXAS PERSIMMON	7150	7" ASHE JUNIPER	7331	10" LIGUSTRUM	7670	8" CEDAR ELM	7867	18" LIVE OAK
5516	7" TEXAS PERSIMMON(MS5-4)	7151	7" ASHE JUNIPER	7332	10" HACKBERRY	7671	7" ASHE JUNIPER	7941	8.5" ASHE JUNIPER(MS6-5)
5517	5" TEXAS PERSIMMON	7152	14.5" ASHE JUNIPER(MS9-5-4)	7337	6" CHINABERRY	7672	6" ASHE JUNIPER	7942	9" ASHE JUNIPER(MS5-5-3)
5518	8" TEXAS PERSIMMON(MS4-3-3-2)	7153	10" LIVE OAK	7343	10" CHINABERRY	7674	6" LIVE OAK	7963	8" ASHE JUNIPER
5519	4" TEXAS PERSIMMON	7155	8" ASHE JUNIPER	7344	20" SYCAMORE	7676	5" CEDAR ELM	8011	16" CEDAR ELM
5520	11" TEXAS PERSIMMON(MS5-5-4-3)	7156	7" ASHE JUNIPER(MS5-4)	7345	19.5" LIGUSTRUM(MS14-7-4)	7685	17.5" CEDAR ELM(MS15-5)	8012	11" ASHE JUNIPER
5521	5" TEXAS PERSIMMON	7157	8.5" ASHE JUNIPER(MS6-5)	7359	24" CEDAR ELM	7686	7" ASHE JUNIPER	8034	15" ASHE JUNIPER
5522	10" TEXAS PERSIMMON(MS7-6)	7158	4" LIVE OAK	7363	6" PECAN	7687	4" CEDAR ELM	8035	26" ASHE JUNIPER
5523	9.5" TEXAS PERSIMMON(MS6-4-3)	7159	6" ASHE JUNIPER	7462	37" CEDAR ELM(MS27-20)	7688	5" CEDAR ELM	8064	11" ASHE JUNIPER
5524	7.5" TEXAS PERSIMMON(MS5-5)	7160	9" ASHE JUNIPER	7480	3" HACKBERRY	7689	11" LIVE OAK	8073	16" RED OAK
5540	8" LIGUSTRUM(MS3-3-3-2-2)	7161	7" LIVE OAK	7481	6" HUISACHE(MS4-4)	7690	5" CEDAR ELM	8081	16" CEDAR ELM
5553	33" POST OAK	7162	13" ASHE JUNIPER	7482	7" HUISACHE(MS3-3-2-2-1)	7691	4" CEDAR ELM	8096	35" CEDAR ELM
5707	31" CEDAR ELM	7163	4" ASHE JUNIPER	7494	4" ASHE JUNIPER	7692	11" LIVE OAK	8107	5" ASHE JUNIPER
5747	4" LIGUSTRUM	7164	4" ASHE JUNIPER	7495	14" ASHE JUNIPER	7693	7" LIVE OAK	8108	11" ASHE JUNIPER
5748	6" LIGUSTRUM(MS3-3-3)	7165	5" HACKBERRY	7496	4" ASHE JUNIPER	7694	7" LIGUSTRUM	8109	10" ASHE JUNIPER
5750	22" COTTONWOOD	7166	4" HACKBERRY	7497	8" ASHE JUNIPER	7695	9" LIVE OAK	8119	9" CEDAR ELM
5764	6.5" ASHE JUNIPER(MS3-3-2-2)	7167	40" LIVE OAK(MS22-18-18)	7498	28.5" WHITE OAK(MS7-7-6-6-6-5-4-3)7696	7696	4" CEDAR ELM	8120	10" CEDAR ELM
5765	12.5" LIGUSTRUM(MS6-5-4-4)	7184	3" ASHE JUNIPER	7499	3" HACKBERRY	7697	6" CEDAR ELM	8121	9" ASHE JUNIPER
5805	9" LIVE OAK	7187	11.5" LIVE OAK(MS8-7)	7500	8" LIVE OAK	7698	4" CEDAR ELM	8122	28" LIVE OAK
5806	16" ASHE JUNIPER	7188	8" ASHE JUNIPER	7502	4" CHINABERRY	7699	18" LIVE OAK	8142	9" ASHE JUNIPER
5807	16.5" CRAPE MYRTLE(MS6-5-4-4-4-4)	7201	14" LIVE OAK	7503	3" LIGUSTRUM	7700	3" CEDAR ELM	8143	14" ASHE JUNIPER
5833	11" ASHE JUNIPER	7207	9" LIVE OAK	7504	5" WHITE OAK	7701	4" CEDAR ELM	8149	16.5" ASHE JUNIPER(MS12-9)
5835	10" RED OAK	7208	4" MOUNTAIN LAUREL	7505	6.5" ASHE JUNIPER(MS5-3)	7702	3" CEDAR ELM	8170	4" ASHE JUNIPER(MS3-2)
5863	13" CEDAR ELM	7209	7" HACKBERRY	7509	10.5" REDBUD(MS3-3-2-2-2-2-2)	7703	3" CEDAR ELM	8171	16.5" RED OAK(MS7-7-6-6)
5878	21" LIVE OAK	7210	5" HACKBERRY	7511	10" ASHE JUNIPER	7704	8" CEDAR ELM	8193	4" CEDAR ELM
5966	9" CHINABERRY	7211	20" LIVE OAK	7512	17.5" ASHE JUNIPER(MS10-8-7)	7705	11.5" ASHE JUNIPER(MS8-7)	8194	4" HACKBERRY
5967	4" CEDAR ELM	7212	4" ASHE JUNIPER	7513	4" ASHE JUNIPER	7706	3" LIVE OAK	8196	7" CEDAR ELM
5968	8" ASH	7213	4" ASHE JUNIPER	7514	5" ASHE JUNIPER	7707	3" CEDAR ELM	8197	9" CEDAR ELM
5969	7" ASH	7214	5.5" CRAPE MYRTLE(MS4-3)	7515	7" ASHE JUNIPER(MS4-3-3)	7716	8" ASHE JUNIPER	20036	15" CRAPE MYRTLE
5970	7" HACKBERRY	7215	4" CRAPE MYRTLE(MS3-2)	7516	10" ASHE JUNIPER(MS8-4)	7709	8" LIVE OAK	20037	9" CRAPE MYRTLE
5994	9" LIGUSTRUM(MS4-3-3-2-2)	7216	7.5" LIVE OAK(MS5-5)	7517	9" LIVE OAK	7710	4" CEDAR ELM	20038	5" CEDAR ELM
5995	3" ASHE JUNIPER	7217	6" ASHE JUNIPER	7518	16" ASHE JUNIPER(MS13-6)	7711	7" ASHE JUNIPER	20039	9" ASHE JUNIPER
5996	3" ASHE JUNIPER	7219	15" LIVE OAK(MS10-10)	7520	4" ASHE JUNIPER	7712	7" ASHE JUNIPER	20040	10" CEDAR ELM
5997	13" PECAN	7220	4" HACKBERRY	7521	5" ASHE JUNIPER	7714	5" ASHE JUNIPER	20041	6" ASHE JUNIPER (MS-4-4)
5999	7" LIGUSTRUM(MS4-3-3)	7221	18.5" LIVE OAK(MS13-11)	7522	3" MOUNTAIN LAUREL	7715	6" ASHE JUNIPER	20042	10" ASHE JUNIPER
7000	16" CHINABERRY(MS9-9-5)	7222	5" ASHE JUNIPER	7523	5" MOUNTAIN LAUREL	7716	6" ASHE JUNIPER	20043	8" ASHE JUNIPER
7002	17.5" CHINABERRY(MS12-11)	7223	16" LIVE OAK	7524	11" ASHE JUNIPER	7717	5" ASHE JUNIPER	20044	4" LIGUSTRUM
7003	17" COTTONWOOD	7224	4" LIVE OAK	7525	5" LIVE OAK	7718	5" ASHE JUNIPER	20045	7" ASHE JUNIPER
7008	18.5" LIGUSTRUM(MS12-9-4)	7225	7" ASHE JUNIPER(MS5-4)	7526	9" LIVE OAK	7719	9.5" ASHE JUNIPER(MS7-5)	20046	11" CEDAR ELM
7010	18" LIGUSTRUM(MS15-6)	7226	7" HACKBERRY	7527	3" MOUNTAIN LAUREL	7723	7" ASHE JUNIPER	20047	10" CEDAR ELM
7012	13" LIGUSTRUM(MS7-4-4-4)	7227	5" ASHE JUNIPER	7528	11" ASHE JUNIPER	7724	8" ASHE JUNIPER	20048	12.5" ASHE JUNIPER (MS-9-7)
7013	6" CHINABERRY	7228	9" LIGUSTRUM(MS6-6)	7529	9" ASHE JUNIPER	7725	6" ASHE JUNIPER	20049	11" ASHE JUNIPER
7014	15" LIGUSTRUM(MS12-6)	7230	4" ASHE JUNIPER	7530	3" MOUNTAIN LAUREL	7726	19.5" CEDAR ELM(MS8-8-4-4-7)	20050	11" LIGUSTRUM (MS-9-6)
7020	7" HACKBERRY	7231	7" ASHE JUNIPER	7531	13" ASHE JUNIPER(MS10-6)	7727	10" ASHE JUNIPER(MS6-4-4)	20051	16.5" ASHE JUNIPER (MS-9-8-7)
7022	6" CHINABERRY	7232	3" ASHE JUNIPER	7541	6" ASHE JUNIPER(MS5-2)	7728	5" ASHE JUNIPER	20052	10" HACKBERRY
7023	13" ASHE JUNIPER	7233	11" ASHE JUNIPER	7542	5.5" ASHE JUNIPER(MS4-3)	7729	7" ASHE JUNIPER	20053	11" ASHE JUNIPER
7030	4" LIGUSTRUM	7234	7.5" ASHE JUNIPER(MS5-5)	7544	11" ASHE JUNIPER	7730	11" ASHE JUNIPER	20065	8.5" LIGUSTRUM(MS4-3-2-2-2)
7031	4" CEDAR ELM	7235	8" ASHE JUNIPER	7545	10" ASHE JUNIPER	7731	6.5" ASHE JUNIPER(MS5-3)	20068	8" LIVE OAK
7032	4" LIGUSTRUM	7236	3" ASHE JUNIPER	7561	8" ASHE JUNIPER	7732	13" CEDAR ELM	20069	12" ASHE JUNIPER
7033	9.5" LIGUSTRUM(MS4-3-3-3-2)	7237	9" ASHE JUNIPER	7562	11" LIVE OAK	7733	9" ASHE JUNIPER(MS6-6)	20070	23" LIVE OAK
7034	3" CEDAR ELM	7238	6" ASHE JUNIPER	7563	8" HACKBERRY	7735	11" ASHE JUNIPER	20071	6" LIVE OAK
7035	5.5" LIGUSTRUM(MS3-3-2)	7239	8" ASHE JUNIPER	7564	6" ASHE JUNIPER	7736	4" CEDAR ELM	20072	22" LIVE OAK
7036	8" ASHE JUNIPER	7240	3" ASHE JUNIPER	7565	8.5" ASHE JUNIPER(MS7-3)	7741	12" CEDAR ELM	20073	4" LIVE OAK
7037	6" SYCAMORE	7241	4" LIVE OAK	7566	8" ASHE JUNIPER	7742	7" CEDAR ELM	20074	10" ASHE JUNIPER
7038	5.5" LIGUSTRUM(MS4-3)	7242	8.5" LIVE OAK(MS6-5)	7567	5" ASHE JUNIPER	7744	5" ASHE JUNIPER	20075	8" HACKBERRY
7039	4" CHINABERRY	7244	10.5" LIVE OAK(MS6-6-3)	7568	10" ASHE JUNIPER	7749	10" PERSIMMON(MS7-6)	20076	7" HACKBERRY
7040	5" HACKBERRY	7245	6" ASHE JUNIPER	7569	6" ASHE JUNIPER	7750	9" CEDAR ELM	20077	21" ASHE JUNIPER (MS-15-12)
7041	6" ASHE JUNIPER	7246	3" ASHE JUNIPER	7570	8" ASHE JUNIPER	7751	8" LIVE OAK	20078	14" LIVE OAK
7042	17.5" ASHE JUNIPER(MS12-11)	7247	5" ASHE JUNIPER	7571	11.5" ASHE JUNIPER(MS9-5)	7757	6" CEDAR ELM	20079	11" LIVE OAK
7044	7" ASHE JUNIPER	7248	5" ASHE JUNIPER	7572	7" LIVE OAK	7758	17" ASHE JUNIPER(MS13-8)	20080	13" LIVE OAK
7046	10" CHINABERRY(MS5-4-3-3)	7249	10.5" ASHE JUNIPER(MS6-5-4)	7573	7" ASHE JUNIPER	7760	10.5" CRAPE MYRTLE(MS5-4-4-3)	20082	13" LIVE OAK
7047	11" LIVE OAK	7250	7" ASHE JUNIPER(MS4-3-3)	7575	5" ASHE JUNIPER	7761	12.5" CRAPE MYRTLE(MS5-4-4-4-3)	20083	7" HACKBERRY (MS-5-4)
7084	10" LIGUSTRUM	7251	4" CRAPE MYRTLE(MS3-2)	7576	5" ASHE JUNIPER	7762	9.5" CRAPE MYRTLE(MS4-4-4-3)	20084	8.5" LIGUSTRUM(MS4-3-3-3)
7085	16.5" ASHE JUNIPER(MS9-8-7)	7252	5" ASHE JUNIPER	7577	21" LIVE OAK(MS15-12)	7768	7" CEDAR ELM	20085	12" LIGUSTRUM(MS5-4-3-3-2-2)
7086	8" ASHE JUNIPER(MS6-4)	7253	11" ASHE JUNIPER	7578	7" ASHE JUNIPER	7769	13" LIVE OAK	20086	8" LIGUSTRUM(MS4-2-2-2-2)
7087	4" CEDAR ELM	7254	6" LIVE OAK	7579	6" ASHE JUNIPER	7770	7.5" CEDAR ELM(MS4-4-3)	20087	6" ASHE JUNIPER (MS-4-4)
7088									

# Geologic Assessment

## Texas Commission on Environmental Quality

For Regulated Activities on The Edwards Aquifer Recharge/transition Zones and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999.

**To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.**

**Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.**

### Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: Richard V. Klar, P.G.

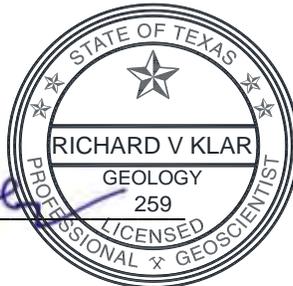
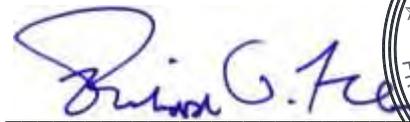
Telephone: 210-699-9090

Date: July 20, 2023

Fax: 210-699-6426

Representing: Raba Kistner, Inc., TBPG Firm #50220 on behalf of K Friese + Associates, TBPE Firm #6535 (Name of Company and TBPG or TBPE registration number)

Signature of Geologist:



7/20/23

**Regulated Entity Name:** Eanes Creek Low Water Crossings

### Project Information

1. Date(s) of Geologic Assessment was performed: October 27, 2022

2. Type of Project:

WPAP

AST

SCS

UST

3. Location of Project:

- Recharge Zone
- Transition Zone
- Contributing Zone within the Transition Zone

4.  **Attachment A – Geologic Assessment Table.** Completed Geologic Assessment Table (Form TCEQ-0585-Table) is attached.

5.  Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups\* (Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the Site Geologic Map or a separate soils map.

Table 1 - Soil Units, Infiltration Characteristics and Thickness

Soil Name	Group*	Thickness
Brackett-Rock outcrop complex, 1-12% slopes (BID)	C	0.5-2 feet
Urban land and Brackett soils, 1-12% slopes (UuE)	C	0.5-2 feet
Volente silty clay loam, 1-8% slopes (VoD)	C	3.5-5 feet

*\*Soil Group Definitions (Abbreviated)*

- A. Soils having a high infiltration rate when thoroughly wetted.*
- B. Soils having a moderate infiltration rate when thoroughly wetted.*
- C. Soils having a slow infiltration rate when thoroughly wetted.*
- D. Soils having a very slow infiltration rate when thoroughly wetted.*

6.  **Attachment B – Stratigraphic Column.** A stratigraphic column showing formations, members, and thickness is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column.

7.  **Attachment C – Site Geology.** A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached.

8.  **Attachment D – Site Geologic Map(s).** The Site Geologic Map must be the same scale as the applicant’s Site Plan. The minimum scale is 1”:400’.

Applicant’s Site Plan Scale: 1” = 60’

Site Geologic Map Scale: 1” = 60’

Site Soils Map Scale (if more than 1 soil type): 1” = 100’

9. Method of collecting positional data:

Global Positioning System (GPS) technology.

Other method(s). Please describe method of data collection: \_\_\_\_

10.  The project site boundaries are clearly shown and labeled on the Site Geologic Map.

11.  Surface geologic units are shown and labeled on the Site Geologic Map.

12.  Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.

Geologic or manmade features were not discovered on the project site during the field investigation.

13.  The Recharge Zone boundary is shown and labeled, if appropriate.

14. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.): If applicable, the information must agree with Item No. 20 of the WPAP Application Section.

There are four (4) test holes present on the project site and the locations are shown and labeled. (Check all of the following that apply.)

The test holes are not in use and have been properly abandoned.

The wells are not in use and will be properly abandoned.

The well is in use and complies with 16 TAC Chapter 76.

There are no wells or test holes of any kind known to exist on the project site.

### *Administrative Information*

Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

# ATTACHMENTS

**ATTACHMENT A**

**GEOLOGIC ASSESSMENT TABLE  
(TCEQ-0585-TABLE)**

**COMMENTS TO GEOLOGIC ASSESSMENT TABLE**

**SOIL PROFILE**

**SOILS MAP**

GEOLOGIC ASSESSMENT TABLE			PROJECT NAME: <b>Eanes Creek Low Water Crossings - West Lake Hills Bond Projects</b> Travis County, Texas (RKI Project No. ASF22-017-01)																
LOCATION			FEATURE CHARACTERISTICS											EVALUATION		PHYSICAL SETTING			
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)	TOPOGRAPHY
						X	Y	Z								<40	≥40		
S-1	N30 16 46.88	W97 48 43.95	MB (W)	30	Kek	1,180	2	~4-6					X	6	36	✓		✓	Floodplain
S-2	N30 16 52.51	W97 48 45.19	MB (W)	30	Kgr	287	2	~4-6					X	6	36	✓		✓	Floodplain
S-3	N30 16 49.40	W97 48 42.31	MB (SD)	30	Kek	208	4	~4-6					X	6	36	✓		✓	Floodplain
S-4	N30 16 52.61	W97 48 44.71	MB (SD)	30	Kgr	179	4	~4-6					X	6	36	✓		✓	Drainage
S-5	N30 16 49.85	W97 48 41.61	MB (G)	30	Kek	677	2	~4-6					X	6	36	✓		✓	Floodplain
S-6	N30 16 52.06	W97 48 45.43	MB (G)	30	Kgr	247	2	~4-6					X	6	36	✓		✓	Floodplain
S-7	N30 16 48.05	W97 48 42.95	MB (D)	30	Kek	30	3	~2-4					X	6	36	✓		✓	Streambed
S-8	N30 16 46.69	W97 48 44.85	MB (D)	30	Kek	35	4	~2					X	6	36	✓		✓	Streambed
S-9	N30 16 52.55	W97 48 46.32	MB (D)	30	Kgr	40	10	~6					X	6	36	✓		✓	Streambed
S-10	N30 16 52.28	W97 48 45.11	MB (GEO, C-1)	30	Kgr	0.2	0.2	15					X	5	35	✓		✓	Hillside
S-11	N30 16 48.68	W97 48 42.48	MB (GEO, C-2)	30	Kek	0.2	0.2	15					X	5	35	✓		✓	Floodplain
S-12	N30 16 48.00	W97 48 43.20	MB (GEO, C-3)	30	Kek	0.2	0.2	15					X	5	35	✓		✓	Floodplain
S-13	N30 16 46.45	W97 48 44.82	MB (GEO, C-4)	30	Kek	0.2	0.2	15					X	5	35	✓		✓	Floodplain
S-14	N30 16 49.98	W97 48 42.18	F	20	Ked, Kgr	105	10		NE-SW	10			F	8	38	✓		✓	Floodplain
S-15	N30 16 45.47	W97 48 45.86	F	20	Ked	56	10		NE-SW				F	8	28	✓		✓	Hillside

\* DATUM: **NAD83**

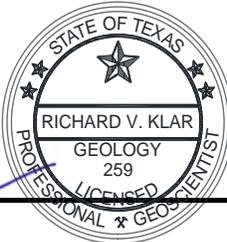
Manmade Features in Bedrock (MB): W = water, SD = storm drain, G = gas, D = drainage culvert, GEO = geotechnical boring and identifier

Formations: Ked = Edwards limestone, Kep = Person Formation, Kek = Kainer Formation, Kgr = Glen Rose Formation

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials: Backfill consisting of native soils and granular bedding materials; concrete for storm drains and drainages Test holes were plugged to ground surface with site-derived auger cuttings and bentonite.
12 TOPOGRAPHY	
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed	

I have read, I understood, and I have followed the Texas Natural Resource Conservation Commission's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field. My signature certifies that I am qualified as a geologist as defined by 30 TAC 213.

Date 7/20/2023

Sheet 1 of 1

**COMMENTS TO GEOLOGIC ASSESSMENT TABLE**  
**Eanes Creek Low Water Crossings**  
**West Lake Hills Bond Projects**  
**Travis County, Texas**

The locations of the following features are indicated on the *Site Geologic Map* provided as **Attachment D** of this report. The project area consists of two discrete areas corresponding to low-water crossings on Eanes School Road and Camp Craft Road.

**Manmade Features in Bedrock**

Features S-1 and S-2

**Features S-1 and S-2** consist of trenches for existing potable water utilities owned by Austin Water Works. **S-1** is located along Camp Craft Road, and **S-2** is located along a portion of Eanes School Road. The locations of these trenches are based on plans provided by the project civil engineer (Dannenbaum Engineering Company, 2019) as well as field observations including a manhole, valves, and hydrants along the north and south sides of Camp Craft Road and along the north side of Eanes School Road. Based on the provided plans, the water utilities consist of 6-inch lines assumed to be installed to depths of approximately 4 to 6 feet terminating in bedrock. The lengths of the trenches within the SITE are estimated to be 1,180 feet along Camp Craft Road (**S-1**) and 287 feet along Eanes School Road (**S-2**).



Features S-3 and S-4

**Features S-3 and S-4** consist of trenches for existing storm water drainage utilities. **S-3** is located along Camp Craft Road and **S-4** is located along a portion of Eanes School Road. Field observations included a 56-inch diameter manhole on the east side of Eanes School Road adjacent to the intersection with Camp Craft Road, plus three 2-foot square grated inlets spaced approximately 120 feet apart on the north side of Eanes School Road. Based on field observations, the storm water drainage utilities are estimated to be between 2 and 4 feet wide. It is assumed that the trench is installed to depths of 2 to 8 feet terminating in bedrock. The lengths of the trenches within the SITE area are estimated to be 208 feet along Camp Craft Road (**S-3**) and 179 feet along Eanes School Road (**S-4**).



Features S-5 and S-6

**Features S-5 and S-6** consist of trenches for existing natural gas utilities. **S-5** is along Camp Craft Road and **S-6** is along a portion of Eanes School Road. The locations of these trenches were identified based on plans prepared by the project civil engineer (Dannenbaum Engineering Company, 2019) and a yellow gas pipe observed attached to a power pole on Eanes School Road, adjacent to the bridge crossing Eanes Creek and the driveway into the Eanes School parking lot. It is inferred that the trench hosting these utility lines are installed to depths of 4 to 6 feet terminating in bedrock. The lengths of the trenches within the SITE area are estimated to be 677 feet long along Camp Craft Road (**S-5**) and 247 feet along Eanes School Road (**S-6**).



along Camp Craft Road (**S-5**) and 247 feet along Eanes School Road (**S-6**).

Features S-7 through S-9

**Feature S-7** consists of a drainage culvert at the Eanes Creek crossing of Camp Craft Road. It consists of a corrugated metal culvert approximately 2-feet in diameter in the direction of Eanes Creek to the northwest-southeast. A metal grate exists at the road edge on south side of the pavement, with two benches of rock and a flood control gauge on the north edge. It appears that the culvert extends into the bedrock of the creek channel. The culvert extends approximately 30 feet within the SITE.



**Feature S-8** consists of a drainage culvert at the Eanes Creek tributary crossing of Camp Craft Road. It consists of a culvert approximately 4 feet wide that passes beneath the road surface, with grates on either side. The culvert is encased in concrete, and appears to extend into the bedrock of the creek channel. The culvert extends approximately 35 feet within the SITE.



**Feature S-9** consists of a drainage culvert where Eanes Creek crosses beneath Eanes School Road. It consists of a rectangular concrete culvert with angular rock pieces enclosed in metal wire. The culvert is approximately 10 feet wide and 6 feet high and was installed beneath the bridge that crosses Eanes Creek on Eanes School Road. The culvert appears to extend into the bedrock of the creek channel and extends approximately 40 feet within the SITE.



#### Features S-10 through S-13

**Feature S-10** consists of geotechnical boring C-1 installed by **RKI** for a geotechnical engineering study (**RKI**, 2022). The boring is located at the southeast side of the crossing of Eanes School Road and Eanes Creek adjacent to the driveway into the Eanes School parking lot. The existing pavement sections measured in the field during drilling operations found there to be 4 inches of asphalt underlain by 5.5 inches of flexible road base. Very stiff sandy clay containing gravel and calcareous deposits exists to a depth of 2 feet, with decomposed limestone beneath to a depth of 12 feet, and hard limestone of the Glen Rose Formation beneath to a total depth of 15 feet.

**Feature S-11** consists of geotechnical boring C-2 (**RKI**, 2022). The boring is located on Camp Craft Road between the intersection with Eanes School Road and the Eanes Creek crossing. The existing pavement sections measured in the field during drilling operations found there to be 4 inches of asphalt underlain by 11 inches of flexible road base. Hard, tan sandy clay with gravel exists to the depth of 2 feet, with weathered and fractured limestone beneath to a depth of 12.5 feet, and hard slightly weathered and fractured limestone of the Kainer Formation beneath to a total depth of 15 feet.

**Feature S-12** consists of geotechnical boring C-3 (**RKI**, 2022). The boring is located on Camp Craft Road at the Eanes Creek crossing. The existing pavement sections measured in the field during drilling operations found there to be 2.5 inches of asphalt. Poorly graded sand with gravel exists to a depth of 6 feet, with limestone of the Kainer Formation beneath to a total depth of 15 feet.

**Feature S-13** consists of geotechnical boring C-4 (**RKI**, 2022). The boring is located on Camp Craft Road at the Eanes Creek tributary crossing, adjacent to the Enclave Business Park. The existing pavement sections measured in the field during drilling operations found there to be 3.5 inches of asphalt underlain by 4 inches of concrete. Very stiff, brown, sandy clay with gravel and calcareous deposits exists to a depth of 4 feet, with limestone of the Kainer Formation beneath to a total depth of 15 feet.

## **Faults**

### **Features S-14 and S-15**

**Feature S-14** consists of a normal fault, referred to as the Mount Bonnell fault on published geologic maps (Fisher, 1974, Garner et al., 1986, and Blome et al., 2005), which trends northeast-southwest and is oriented in approximately the same direction as Camp Craft Road (measured azimuth of 39 degrees within the SITE). The fault location was inferred from changes in rock outcrops across the SITE, and review of published maps. This fault juxtaposes the Glen Rose Formation to the northwest and the Edwards Limestone downthrown to the southeast. The fault is approximately 750 feet long within the SITE. Based on formations outcropping at the surface and thicknesses of geologic formations, the fault throw is estimated to range from approximately 200 feet at the northeast end of the SITE to 350 feet at the southwest end.

**Feature S-15** consists of a conjugate fault associated with the Mount Bonnell fault. It crosses the southwest end of the SITE and trends approximately northwest-southeast (measured azimuth of 345 degrees within the SITE). This fault reportedly juxtaposes the Kainer Formation to the northeast with the overlying Person Formation of the Edwards Limestone to the southwest (Blome et al., 2005). No field indicators of this fault were observed. The fault is approximately 140 feet long across the southwest end of the SITE. Based on the formations outcropping at the surface and thicknesses of geologic formations, the fault throw is estimated to be approximately 150 feet.

**SOIL PROFILE**  
**Eanes Creek Low Water Crossings**  
**West Lake Hills Bond Projects**  
**Travis County, Texas**

SOIL SERIES	THICKNESS ON SITE	DESCRIPTION
<b>Brackett soils</b>	<b>0.5-2 feet</b>	<b><i>Brackett-Rock outcrop complex, 1 to 12 percent slopes (BID)</i></b> . Consists of up to 6 inches of gravelly clay loam with 6 to 18 inches of clay loam underlain by bedrock. These soils occupy gently undulating to rolling topography, generally on benches 100 to 500 feet wide that are separated by rock outcrops (about 20 percent) of limestone and marl. The slope ranges from 1 to 12 percent, but is dominantly 5 to 12 percent, generally on benches, that are separated by outcrops of the underlying limestone and marl. Broken limestone fragments cover up about 75 percent of the surface with a surface texture of gravelly clay loam, gravelly loam, loam, or clay loam. A large portion of rainfall is lost through runoff and seepage from limestone outcrops. Permeability is moderately slow, and the available water capacity is low. Soils are well drained with high runoff.
<b>Urban land and Brackett soils</b>	<b>0.5-2 feet</b>	<b><i>Urban land and Brackett soils, 1 to 12 percent slopes (UuE)</i></b> . Consists of 40 percent urban land and 35 percent Brackett and similar soils. Urban land consists of up to 10 inches of cemented material, with soils consisting of up to 6 inches of gravelly clay loam underlain by 6 to 18 inches of clay loam with bedrock below.
<b>Volente soils</b>	<b>3.5-5 feet</b>	<b><i>Volente silty clay loam, 1 to 8 percent slopes (VoD)</i></b> . Consists of up to about 22 inches of dark grayish-brown silty clay over about 14 inches of dark brown silty clay, followed by brown silty clay to a depth of about 46 inches, and reddish-yellow clay loam to a depth of 54 inches. The parent material is calcareous clayey colluvium and/or alluvium derived from limestone. These soils have moderately slow permeability with high available water capacity. They are well drained with high runoff potential and have a severe erosion hazard.

The preceding table was prepared based on information provided in the *Soils Survey of Travis County, Texas (January 1974)* and the *NRCS Web Soil Survey (2019)* in addition to field observations. As presented on the attached **Site Soils Map**, native soils mapped at the SITE consist of the following units: Brackett-Rock outcrop complex, 1 to 12 percent slopes (BID), Volente silty clay loam, 1 to 8 percent slopes (VoD), and Urban land and Brackett soils, 1 to 12 percent slopes (UuE). The north project segment on Eanes School Road is primarily underlain by VoD soils, with some BID underlying the west edge and UuE on the east edge. Camp Craft Road is primarily underlain by VoD, with some BID along the north edge and at the southwest end.

Soils mapped for the SITE are classified as Group C, which have a low to moderate capacity to transmit infiltrating precipitation. Soils generally consist of 6 to 60 inches of gravelly clay loam, clay loam, and silty clay loam with published permeability values of 0.06 to 1.98 inches per hour. Channel deposits occupy the area in proximity to Eanes Creek and its tributary, and are generally thicker and more reddish in color, while thinner and rockier upland soils exist on ridges and hillsides. Native soils and potential contacts between soil types were observed in conjunction with field reconnaissance efforts except in areas with existing residential and roadway improvements.



**ATTACHMENT B**

**STRATIGRAPHIC COLUMN**

**STRATIGRAPHIC COLUMN**  
**Eanes Creek Low Water Crossings**  
**West Lake Hills Bond Projects**  
**Travis County, Texas**

STRATIGRAPHIC FORMATION	THICKNESS	DESCRIPTION
<b>Person Formation (Kep)</b>	180-224 feet	(See descriptions below)
<i>Cyclic and Marine Members, undivided (Kpcm)</i>	80-100 feet	Unit consists of massive mudstone to packstone, <i>miliolid</i> grainstone, and chert. Identified in the field by cycles of light tan, massive to relatively thin limestone bedding units with some occurrence of crossbedding that is laterally extensive and highly permeable. <b>Not present at the SITE.</b>
<i>Leached and Collapsed Members, undivided (Kplc)</i>	80-100 feet	Unit consists of crystalline limestone, mudstone to grainstone and chert with collapsed breccia. Identified in the field by bioturbated iron-stained beds separated by massive limestone beds with extensive vertical karst development. This unit is highly permeable. <b>Mapped on the south edge of Camp Craft Road within the SITE.</b>
<i>Regional Dense Member (Kprd)</i>	20-24 feet	Unit consists of dense, argillaceous mudstone. Identified in the field by wispy iron-oxide stains. This unit has low permeability. <b>Not exposed within the SITE</b>
<b>Kainer Formation (Kek)</b>	260-310 feet	(See descriptions below)
<i>Grainstone Member (Kkg)</i>	50-60 feet	Unit consists of <i>miliolid</i> grainstone, mudstone to wackestone and chert. Identified in the field by white crossbedded grainstone. <b>Not exposed within the SITE</b>
<i>Kirschberg Evaporite Member (Kkke)</i>	50-60 feet	Unit includes highly altered crystalline limestone, chalky mudstone, and chert. Leaching of evaporite layers resulted in a boxwork porosity with neospar and travertine frames. <b>Patchy outcrops along the majority of Camp Craft Road within the SITE.</b>
<i>Dolomite Member (Kkd)</i>	110-130 feet	Unit consists of mudstone to grainstone, crystalline limestone, and chert. Identified in the field by massively bedded, light gray outcrops, with abundant <i>Toucasia</i> . <b>Not exposed within the SITE</b>
<i>Basal Nodular Member (Kkbn)</i>	50-60 feet	Unit consists of shaly, nodular limestone, mudstone and <i>miliolid</i> grainstone. Identified in the field by massively bedded, nodular, and mottled outcrops, with abundant <i>Exogyra texana</i> . <b>Not exposed within the SITE.</b>

STRATIGRAPHIC FORMATION	THICKNESS	DESCRIPTION
Glen Rose Formation (Kgr)*	± 380 feet	(See descriptions below)
Upper Glen Rose	± 220 feet	<p>Conformably underlies the Kainer Formation of the Edwards and serves as the lower confining unit of the Edwards Aquifer. Consists of alternating beds of yellowish-tan, medium-bedded limestone and argillaceous limestone with minor evaporate layers. Surface cavern development associated with faults and fractures and some water production at evaporate beds is considered a rare occurrence. Field identification is commonly associated with stair-step topography that forms through differential erosion of the alternating limestone and marl beds, and the presence of fossilized ripple marks and sparse casts of <i>Tylostoma</i> sp., <i>Turitella</i> sp., <i>Protocardio texana</i>, and the foraminiferan <i>Orbitolina minuta</i>. Classified hydrologically as having mostly non-fabric selective porosity and generally low permeability. Conformably overlies the bivalve-rich <i>Corbula</i> bed at the top of the Lower Glen Rose.</p> <p><b>Patchy outcrops and float rock were observed along the north edge of Camp Craft Road and Eanes School Road within the SITE.</b></p>

Note: Stratigraphic Column adapted from Fisher (1974)\* and Blome et al., (2005).

**ATTACHMENT C**

**NARRATIVE OF SITE SPECIFIC GEOLOGY**

**SITE GEOLOGY NARRATIVE**  
**Eanes Creek Low Water Crossings**  
**West Lake Hills Bond Projects**  
**Travis County, Texas**

**Introduction**

The following is a site-specific discussion of existing geological conditions and potential recharge features for the Edwards Aquifer identified within the project site, which is part of the West Lake Hills Drainage Master Plan Phase II bond package. As discussed herein, the project site consists of improvements to existing low water crossings within two discrete areas located along Eanes School Road and Camp Craft Road, respectively, in Travis County, Texas (hereinafter referred to as the SITE). This assessment was performed by **Raba Kistner, Inc. (RKI)** for K Friese + Associates, pursuant to applicable Edwards Aquifer Protection Program (EAPP) Rules as specified in *Title 30 of the Texas Administrative Code, Section 213 (30 TAC §213, effective April 24, 2008)*. This assessment report is in the format required by the Texas Commission on Environmental Quality (TCEQ) for the Geologic Assessment and was prepared in accordance with the revised *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones (TCEQ-0585)*, which are applicable to submittals received by the TCEQ after October 1, 2004.

This geologic assessment report documents conditions observed by **RKI** within the SITE boundaries on October 27, 2022.

**Site Description**

**Site Location.** The project area (SITE) consists of two discrete areas located along low-water crossings on Eanes School Road and Camp Craft Road. The SITE currently includes paved right-of-way (ROW) with adjacent roadside ditches. Eanes Creek and its tributary flow across Camp Craft Road in the south portion of the SITE. It is a primarily residential area located within the City of West Lake Hills, which is part of the Austin Metropolitan Area. As presented on the attached **Site Geologic Map**, adjacent properties include schools, commercial properties, and residential properties. To the north of Camp Craft Road is the school zone for Trinity Episcopal School of Austin and Eanes Elementary School, with forested land and multi-family housing to the east, residential properties with forested land to the west, some commercial properties, and the continuation of Camp Craft Road to the southwest. Forested land and the continuation of the ROW surround the Eanes School Road portion of the SITE.

Based on review of official maps published by the Texas Commission on Environmental Quality (TCEQ), the Camp Craft Road portion of the SITE is located primarily within the Edwards Aquifer Recharge Zone (EARZ), oriented in approximately the same direction as the boundary between the Contributing and Recharge zones. The north portion of the SITE on Eanes School Road is fully located within the Contributing Zone. Although a portion of the SITE is located within the Contributing Zone, a geologic assessment was performed on its full extent as required to facilitate planned construction activities pursuant to applicable Edwards Aquifer Protection Program (EAPP) rules as specified in *Title 30 of the Texas Administrative Code, Section 213 (30 TAC 213, effective April 24, 2008)*.

**Topography and Drainage.** Topographic contours on the U.S. Geological Survey (USGS, 2019) 7.5-Minute Series Topographic map (*Austin West Quadrangle*) were reviewed to evaluate the general surface conditions and drainage patterns, along with more detailed 2-foot topographic contours obtained from the City of Austin's Geographic Information Systems (GIS) interactive web map (City of Austin, 2017). The SITE is within an area of moderately sloping hillside topography, and consists of a low-lying area just above or within the floodplain associated with Eanes Creek and its tributary. The maximum elevation within the SITE is approximately 746 feet above mean seal level (amsl) near the south edge of Camp Craft Road, and slopes to a minimum of approximately 708 feet amsl where Camp Craft Road crosses Eanes Creek. As indicated by topographic contours presented on the **Site Geologic Map**, the local surface drainage patterns are generally to the south-southwest toward Eanes Creek, which flows to the southeast. Ultimate flow from the creek is into the Colorado River, which is located approximately 1.8 miles to the east.

Based on review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) Panels 48453C0440J and 48453C445K (effective January 1, 2020) the SITE is almost entirely located in the 100-year floodplain. The Eanes Creek floodplain is designated as a special flood hazard area. Eanes Creek is in Zone AE, a regulatory floodway, while its tributary is in Zone A, a flood hazard area without Base Flood Elevation (BFE).

**Historical Property Use.** Although research pertaining to past SITE operations and historical land use activities was beyond the scope of this assessment, historical aerial imagery was reviewed to evaluate historical land use and the presence of lineations that could indicate the presence of normal faulting. The following aerial photographs were reviewed using Google Earth™: 1995, 2002, 2003, 2005-2009, and 2011-2022 and are summarized as follows:

- The 1995 aerial photograph indicates the SITE area to include residential structures west of Eanes School Road and buildings associated with the Eanes Elementary School campus between Eanes School Road and Camp Craft Road. Commercial properties also exist on the south side of Camp Craft Road at the west end of the SITE, with areas to the south of Camp Craft Road primarily consisting of a wooded area.
- The 2002 aerial photograph indicates the construction of the Trinity Episcopal School of Austin southeast of Camp Craft Road, with the remainder of the SITE unchanged.
- The 2003 aerial photographs indicate additional development of parking lots associated with Trinity Episcopal School of Austin, and the 2005 through 2011 aerial photographs indicate continued development of single-family residential and commercial properties adjacent to the SITE.
- The 2014 through 2022 aerial photographs show the SITE essentially as it appears today, with wooded terrain adjacent to Eanes Creek, and adjoining land use including commercial properties, schools, parking lots, and residential properties.

**Classification of Recharge Features:** As further described herein, features identified and discussed below include thirteen manmade features (i.e., water, storm water, and natural gas utility lines, drainage culverts, and geotechnical borings) and two normal faults. The significance of these features was assessed using definitions and guidance provided in *Instructions to Geologists (TCEQ-0585-Instructions, revised October 1, 2004)*. All features within the SITE that met the criteria presented in this reference were mapped. The

characteristics of all mapped features and the assessments of these features, as defined by the TCEQ, are presented in the attached ***Geologic Assessment Table (TCEQ-0585)***.

### **Stratigraphy**

As presented in the attached ***Stratigraphic Column***, information pertaining to the lithologies and thickness of geologic units underlying the SITE was primarily taken from *Bureau of Economic Geology, Geologic Map of the Austin Area, Texas* (Garner et al., 1986) and the *Geologic Map of the Edwards Aquifer Recharge Zone, South-Central Texas* (Blome et al., 2005). The SITE is underlain by the Upper Glen Rose Formation and Members of the Edwards Limestone. General descriptions of the Person Formation and Kainer Formation, which constitute the upper and lower parts of the Edwards Limestone, as well as a description of the Glen Rose Formation, are provided below:

- **The Person Formation (Kep)** is commonly subdivided into three members as follows: (i) Cyclic and Marine Member, undivided – mudstone to packstone, grainstone, and chert; (ii) Leached and Collapsed Member, undivided – crystalline limestone, mudstone to grainstone, and chert; and (iii) Regional Dense Member – dense, carbonate mudstone.
- **The Kainer Formation (Kek)** is subdivided into four members as follows: (i) Grainstone Member – grainstone, mudstone to wackestone, and chert; (ii) Kirschberg Evaporite Member – highly altered crystalline limestone with chalky mudstone and chert; (iii) Dolomite Member – crystalline limestone consisting of mudstone to grainstone; and (iv) Basal Nodular Member – shaly nodular limestone, mudstone, and grainstone.
- **The Glen Rose Formation (Kgr)** is commonly divided into the upper and lower members as follows: (i) Upper Glen Rose – thinly bedded fine-grained limestone, dolomite, and marl; and (ii) Lower Glen Rose – fossiliferous limestone, dolomite, marl, and evaporites with *Corbula* bed C at the top.

Based on field mapping observations and review of published references, the SITE is underlain by the Kainer Formation and Person Formation of the Edwards Limestone, in addition to the Upper Glen Rose Formation as presented on the ***Site Geologic Map***. The Mount Bonnell fault transects the SITE in approximately the same orientation as Westlake Drive, with the Kainer Formation to the southeast, and the Glen Rose Formation to the northwest. The Kirschberg Evaporite Member of the Kainer Formation underlies the majority of Camp Craft Road, with the Leached and Collapsed Member of the Person Formation at the southwest end owing to the mapped presence of the conjugate fault. Outcrops of the Kirschberg Evaporite Member were observed on the hillside to the south of Camp Craft Road adjacent to the Enclave Business Park. The Upper Glen Rose Formation underlies the north edge of Camp Craft Road and the north portion of the SITE on Eanes School Road. Patchy outcrops of the Glen Rose Formation as well as float rock was observed in Eanes Creek north of Camp Craft Road and west of Eanes School Road. Exposed bedrock was observed where not covered by concrete, roadways, or landscaping associated with development of the Assessment Area. Field observations are consistent with published geologic maps.

In conjunction with field reconnaissance, a solution-enlarged fracture outcrop of the Kainer Formation was identified on the hillside on the south side of Camp Craft Road, adjacent to the Enclave Business Park driveway just outside of SITE boundary, as shown on the **Site Geologic Map**. It consists of a superficial “V” shaped solution-enlarged fracture in a bedrock outcrop that measures approximately 4-feet by 2-feet in plan view. It has a prominent fracture opening within the outcrop that measures approximately 10 inches in aperture and extends 1.5-feet in depth. It appears that this fracture is erosional in nature, with no evidence of connection to the subsurface. The long axis is oriented approximately north, consistent with conjugate fracture directions. Due to its location on a hillside and the small aperture dimensions, it is unlikely that this feature serves as an infiltration pathway to the aquifer. No connection to the underlying bedrock, channeling or preferential flow was observed for this feature.



### **Structure**

This SITE is located along the north edge of the Balcones Fault Zone and as such, exhibits a similar structural trend. The Balcones Fault Zone generally consists of a northeast-southwest trending, *en echelon* normal fault system, which juxtaposes Upper Cretaceous lithologies in the southeast with Lower Cretaceous lithologies in the northwest. As a result of this larger-scale, regional faulting, minor internal fault sequences and fractures exist within this zone which generally follow the same structural trend and accommodate localized displacement.

Based on review of historical aerial photographs, published maps (Garner et al., 1986 and Blome et al., 2005), and as previously discussed herein, the Mount Bonnell fault crosses the SITE, juxtaposing the Upper Glen Rose to the northwest and the Edwards Limestone to the southeast. The fault trends approximately northeast-southwest in approximately the same orientation as Camp Craft Road. As indicated on the **Site Geologic Map**, a conjugate fault trending approximately northwest-southeast is mapped at the southwest end of the SITE (Blome et al., 2005). Field indications of the Mount Bonnell fault included a few minor fractures observed in the Kirschberg Evaporite outcrops within the south portion of the SITE, and the change between the Edwards and Glen Rose Formations between the south and north side of Camp Craft Road is consistent with the mapped fault. No field evidence of the conjugate fault was observed.

As presented on the **Site Geologic Map**, two faults were identified that may potentially serve to enhance the transmission of surface runoff to the subsurface, as described below:

- **Feature S-14:** consists of the Mount Bonnell Fault shown on published geologic maps (Garner et al., 1986 and Blome et al., 2005), trending northeast-southwest and oriented in approximately the same direction as Camp Craft Road (measured azimuth of 39 degrees). This normal fault juxtaposes the Glen Rose Formation to the northwest and the Edwards Limestone downthrown to the southeast. It is also in proximity to and crosses the boundary between the Contributing and

Recharge Zones of the Edwards Aquifer. The fault was not directly observed, but was inferred from changes in rock outcrops across the SITE and review of published maps. Fault throw is estimated to range from approximately 200 to 350 feet based on the thickness of the Kainer Formation members.

- **Feature S-15:** consists of a conjugate fault associated with the Balcones Fault Zone mapped by Blome et al. (2005). The fault trends approximately northwest-southeast (measured azimuth of 345 degrees) and juxtaposes the Kainer Formation to the northeast with the overlying Person Formation to the southwest. Fault throw is estimated to be approximately 150 feet based on thickness of the offset members of the Edwards Limestone.

### **Manmade Features**

As presented on the **Site Geologic Map**, thirteen manmade features were identified that may potentially serve to enhance the transmission of surface runoff to the subsurface. The features consist of a potable water line, storm water drainage, natural gas line, drainage culverts, and geotechnical borings, which meet the criteria for assessment as manmade features in bedrock. These utilities appear to service the commercial, residential, and school properties along Camp Craft Road and Eanes School Road.

- **Features S-1 and S-2** consist of trenches for existing potable water utilities owned by Austin Water Works along Eanes School Road and Camp Craft Road.
- **Features S-3 and S-4** consist of trenches for an existing storm water drainage channel that appears to parallel Eanes School Road from north to south on the east side, and serve as storm water control associated with flooding of Eanes Creek. Just southeast of Camp Craft Road are three storm water manholes and a storm water retention pond assumed to be part of the storm water system.
- **Features S-5 and S-6** consists of trenches for an existing natural gas utility along the south edge of Eanes School Road.

Although not directly observable, it is inferred that the trenches for these subgrade installations are backfilled in accordance with standard construction practices that include the use of structural fill soils (e.g., base course materials, limestone gravel, compacted clay soils, etc.) overlain by native or fill soils, depending upon location and surface improvements. The trenches were not observed in conjunction with any naturally-occurring recharge features. Although the backfilled trenches may exhibit somewhat greater relative infiltration rate than the surrounding soil/rock strata underlying the project boundaries, these manmade features are collectively classified as not sensitive, having a low potential of preferentially transmitting fluids into the Edwards Aquifer. This classification is based upon the point assignment criteria presented in the **Geologic Assessment Table (TCEQ-0585)** and professional judgment.

In addition to the utilities described herein, there are three drainage culverts within the SITE that were identified as manmade features in bedrock:

- **Feature S-7** consists of a drainage culvert at the Eanes Creek crossing of Camp Craft Road that serves as an avenue for water to flow underneath Camp Craft Road.

- **Feature S-8** consists of a drainage culvert at the Eanes Creek tributary crossing of Camp Craft Road. The creek bed to the north of Camp Craft Road was observed to contain standing water, which appeared to flow beneath the roadway past grates at either side. Water south of Camp Craft Road appears to flow along a drainage along the south side of the road and downhill toward the east into Eanes Creek.
- **Feature S-9** consists of a drainage culvert at the Eanes Creek crossing of Eanes School Road. The culvert is underneath the Eanes School Road bridge over Eanes Creek and consists of a concrete culvert and angular rock pieces enclosed in metal wire. This channel serves as an avenue for water to flow through Eanes Creek underneath Eanes School Road, with associated improvements assumed to control flooding.

It appears that limited excavation was performed into the upper portion of the creek and tributary channels in order to install the culverts beneath the road surface; however, these surfaces have been covered in concrete. These features are collectively classified as not sensitive based on a lack of infiltration indicators, fractures, or other avenues for preferentially transmitting fluids into the Edwards Aquifer.

**Features S-10 through S-13** consist of geotechnical borings installed by **RKI** as part of a geotechnical engineering study (**RKI**, 2022). They were reportedly installed with straight-flight augers to a maximum total depth of approximately 15 feet for all borings. Borings encountered native soils consisting of sandy clay and sandy soils at depths of 1 to 6 feet. Boring C-1 is underlain by limestone of the Glen Rose Formation, while Borings C-2, C-3, and C-4 are underlain by the Kainer Formation of the Edwards Limestone. No groundwater was observed during drilling operations. These materials are consistent with mapped soil and rock types. These features are collectively classified as not sensitive as they have been plugged and no longer exist.

#### **Potential for Fluid Migration to the Edwards Aquifer**

Based on a review of the SITE geology, topography and drainage conditions, and the results of our mapping efforts, the overall potential for fluid movement (i.e. surface-derived flow) to the Edwards Aquifer via infiltration is considered to be low to moderate. The following assessment findings support this conclusion:

- The majority of the SITE is composed of existing roadways with impervious pavements and associated drainage improvements.
- The SITE generally exhibits surface soils ranging in thickness from 0.5 to 5 feet. The Brackett and Volente soils, classified as Hydrologic Soil Group C, have a slow published infiltration rate, which inhibits rapid percolation or rainfall or runoff.
- There were no natural karst features observed in the vicinity of any the observed manmade features, reducing the potential for rapid infiltration. Manmade features present at the SITE (**Features S-1** through **S-13**) are collectively classified as not sensitive based on consideration of construction details and application of point assignment criteria and professional judgment.
- Infiltration along the faults (**Features S-14** and **S-15**) likely occurs, however these are classified as not sensitive within SITE boundaries based upon the lack of discrete recharge openings along the

fault traces, and inferred low relative infiltration rate of overlying soil cover and/or pavement improvements.

Given the presence of karst-bearing formations (i.e. particularly the Person and Kainer Formations), it is possible that karst features are present in the shallow subsurface. If features are discovered in conjunction with future phases of land development (i.e., earthwork, excavation), it is recommended that a qualified geoscientist be consulted to assess, determine the level of sensitivity, and provide recommendations for protective measures, if warranted.

## **References**

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Google Earth™, January 1995, April 2002, December 2002, March 2003, November 2003, October 2005, April 2006, February 2007, February 2008, July 2008, February 2009, November 2009, March 2011, August 2012, July 2013, October 2013, November 2013, October 2014, December 2014, May 2015, July 2015, February 2016, January 2017, February 2017, October 2017, January 2018, November 2019, March 2020, April 2020, March 2021, June 2021, January 2022, March 2022, and July 2022.

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United States Department of Agriculture (USDA), 1986, Urban Hydrology for Small Watersheds; USDA / Natural Resource Conservation Service, Technical Release (TR-) 55, June 1986.

**ATTACHMENT D**

**FEATURE POSITION TABLE  
(GPS COORDINATES)**

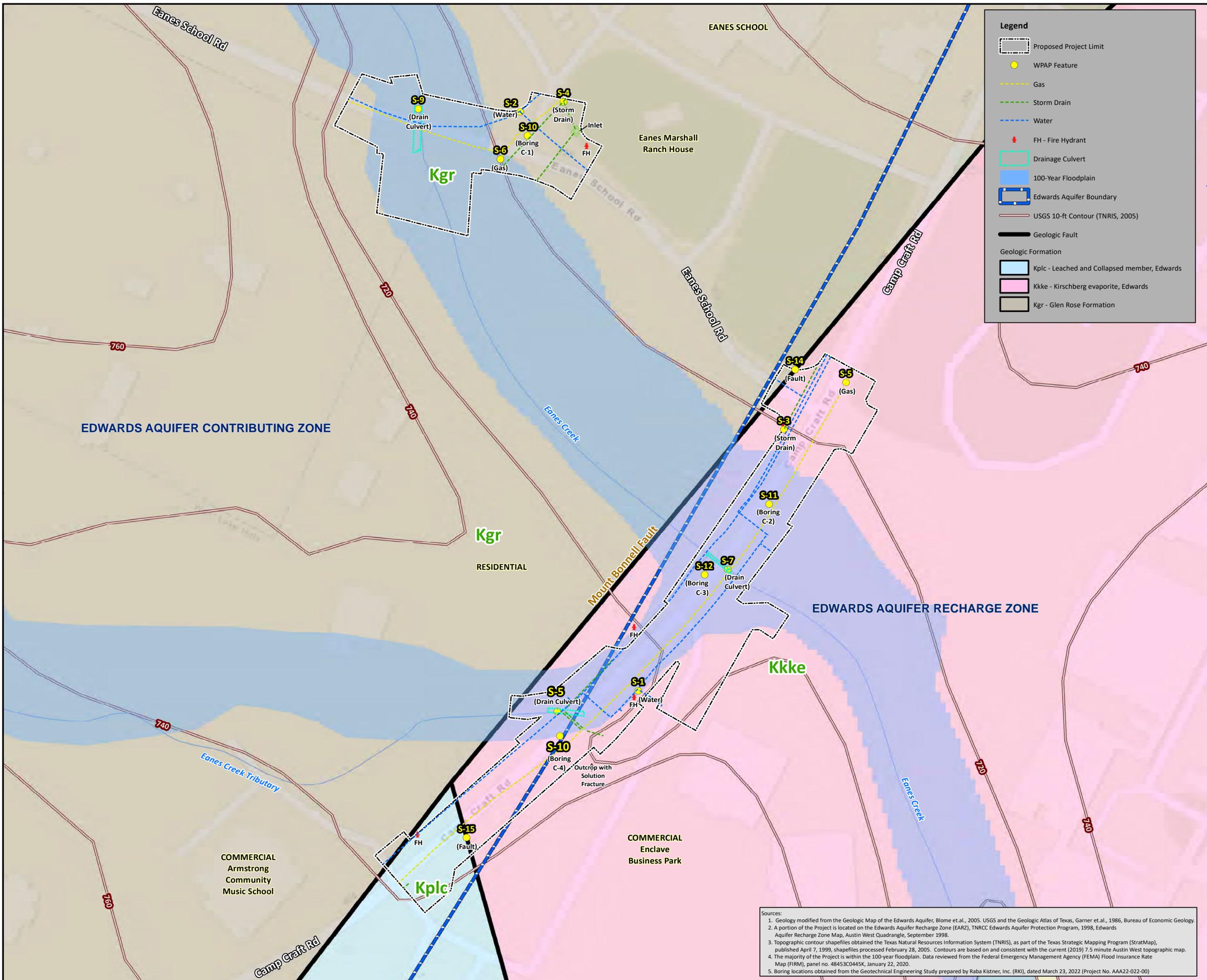
**SITE GEOLOGIC MAP**

**FEATURE POSITION TABLE**  
**Eanes Creek Low Water Crossings**  
**West Lake Hills Bond Projects**  
**Travis County, Texas**  
 RKI Project No. ASF22-017-01

Feature Designation	Feature Type	Date Collected	North Latitude	West Longitude	UTM Northing (meters)	UTM Easting (meters)
S-1	Potable water line (Camp Craft Road)	10/27/2022	N30 16 46.88	W97 48 43.95	3350375	614241
S-2	Potable water line (Eanes School Road)	10/27/2022	N30 16 52.51	W97 48 45.19	3350548	614206
S-3	Storm water drainage (Camp Craft Road)	10/27/2022	N30 16 49.40	W97 48 42.31	3350453	614284
S-4	Storm water drainage (Eanes School Road)	10/27/2022	N30 16 52.61	W97 48 44.71	3350551	614219
S-5	Natural gas line (Camp Craft Road)	10/27/2022	N30 16 49.85	W97 48 41.61	3350467	614303
S-6	Natural gas line (Eanes School Road)	10/27/2022	N30 16 52.06	W97 48 45.43	3350534	614200
S-7	Drainage culvert	10/27/2022	N30 16 48.05	W97 48 42.95	3350411	614268
S-8	Drainage culvert	10/27/2022	N30 16 46.69	W97 48 44.85	3350369	614217
S-9	Drainage culvert	10/27/2022	N30 16 52.55	W97 48 46.32	3350549	614176
S-10	Geotechnical boring C-1	2/28/2022	N30 16 52.28	W97 48 45.11	3350541	614209
S-11	Geotechnical boring C-2	2/28/2022	N30 16 48.68	W97 48 42.48	3350431	614280
S-12	Geotechnical boring C-3	2/28/2022	N30 16 48.00	W97 48 43.20	3350410	614261
S-13	Geotechnical boring C-4	2/28/2022	N30 16 46.45	W97 48 44.82	3350362	614218
S-14	Fault	10/27/2022	N30 16 49.98	W97 48 42.18	3350471	614288
S-15	Fault	10/27/2022	N30 16 45.47	W97 48 45.86	3350331	614191

**Notes:**

1. Geographic coordinates are presented Degrees, Minutes, Decimal Seconds
2. Reference Datum is NAD 83
3. Data were collected utilizing a Garmin GPS 60cx Global Positioning System.
4. Horizontal Accuracy: RMS Value < 3 meter ground resolution
5. GPS data was collected by Heidi Harwick (RKI Project Professional).
6. GPS coordinates correlate to the points on the map for each feature.



**Legend**

- Proposed Project Limit
- WPAP Feature
- Gas
- Storm Drain
- Water
- ↑ FH - Fire Hydrant
- Drainage Culvert
- 100-Year Floodplain
- Edwards Aquifer Boundary
- USGS 10-ft Contour (TNRS, 2005)
- Geologic Fault

**Geologic Formation**

- Kplc - Leached and Collapsed member, Edwards
- Kkke - Kirschberg evaporite, Edwards
- Kgr - Glen Rose Formation

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7/20/2023  
 STATE OF TEXAS  
 RICHARD V. KLAR  
 GEOLOGY  
 259  
 LICENSED PROFESSIONAL GEOSCIENTIST  
*Richard V. Klar*

**SITE GEOLOGIC MAP**  
 EANES CREEK LOW WATER CROSSING  
 WEST LAKE HILLS BOND PROJECT  
 TRAVIS COUNTY, TEXAS

REVISIONS:

No.	DATE	DESCRIPTION

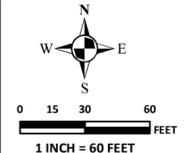
PROJECT No.: ASP22-017-01

ISSUE DATE: 07/20/2023

DRAWN BY: LAW

CHECKED BY: HEH

REVIEWED BY: RVK



- Sources:
- Geology modified from the Geologic Map of the Edwards Aquifer, Blome et al., 2005. USGS and the Geologic Atlas of Texas, Garner et al., 1986, Bureau of Economic Geology.
  - A portion of the Project is located on the Edwards Aquifer Recharge Zone (EARZ), TNRC Edwards Aquifer Protection Program, 1998, Edwards Aquifer Recharge Zone Map, Austin West Quadrangle, September 1998.
  - Topographic contour shapefiles obtained from the Texas Natural Resources Information System (TNRS), as part of the Texas Strategic Mapping Program (StratMap), published April 7, 1999, shapefiles processed February 28, 2005. Contours are based on and consistent with the current (2019) 7.5 minute Austin West topographic map.
  - The majority of the Project is within the 100-year floodplain. Data reviewed from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), panel no. 48453C0445K, January 22, 2020.
  - Boring locations obtained from the Geotechnical Engineering Study prepared by Raba Kistner, Inc. (RKI), dated March 23, 2022 (Project No. AAA22-022-00)

NOTE: This Drawing is Provided for Illustration Only, May Not be to Scale and is Not Suitable for Design or Construction Purposes

# Geologic Assessment

## Texas Commission on Environmental Quality

For Regulated Activities on The Edwards Aquifer Recharge/transition Zones and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999.

**To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.**

**Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.**

### Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: Richard V. Klar, P.G.

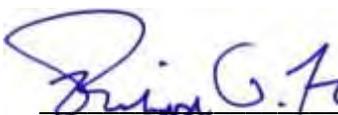
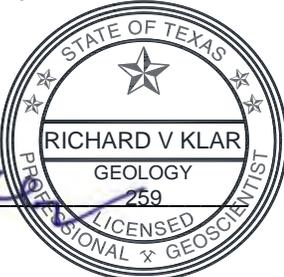
Telephone: 210-699-9090

Date: July 20, 2023

Fax: 210-699-6426

Representing: Raba Kistner, Inc., TBPG Firm #50220 on behalf of K Friese + Associates, TBPE Firm #6535 (Name of Company and TBPG or TBPE registration number)

Signature of Geologist:

  
 7/20/23

**Regulated Entity Name:** Westlake Dr Drainage and Pavement Improvements

### Project Information

1. Date(s) of Geologic Assessment was performed: October 27, 2022

2. Type of Project:

WPAP

AST

SCS

UST

3. Location of Project:

- Recharge Zone
- Transition Zone
- Contributing Zone within the Transition Zone

4.  **Attachment A – Geologic Assessment Table.** Completed Geologic Assessment Table (Form TCEQ-0585-Table) is attached.

5.  Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups\* (Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the Site Geologic Map or a separate soils map.

Table 1 - Soil Units, Infiltration Characteristics and Thickness

Soil Name	Group *	Thickness
Brackett soils and Urban land, 12-30% slopes (BrF)	C	10 to 18 inches
Eckrant soils and Urban land, 0-2% slopes (TeA)	D	5 to 13 inches
Eckrant soils and Urban land, 5-18% slopes (TeE)	D	5 to 13 inches
Urban land and Brackett soils, 1-12% slopes (UuE)	C	6 to 24 inches

*\*Soil Group Definitions (Abbreviated)*

- A. Soils having a high infiltration rate when thoroughly wetted.*
- B. Soils having a moderate infiltration rate when thoroughly wetted.*
- C. Soils having a slow infiltration rate when thoroughly wetted.*
- D. Soils having a very slow infiltration rate when thoroughly wetted.*

6.  **Attachment B – Stratigraphic Column.** A stratigraphic column showing formations, members, and thickness is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column.

7.  **Attachment C – Site Geology.** A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached.

8.  **Attachment D – Site Geologic Map(s).** The Site Geologic Map must be the same scale as the applicant’s Site Plan. The minimum scale is 1”:400’.

Applicant’s Site Plan Scale: 1” = 100’

Site Geologic Map Scale: 1” = 100’

Site Soils Map Scale (if more than 1 soil type): 1” = 150’

9. Method of collecting positional data:

Global Positioning System (GPS) technology.

Other method(s). Please describe method of data collection: \_\_\_\_

10.  The project site boundaries are clearly shown and labeled on the Site Geologic Map.

11.  Surface geologic units are shown and labeled on the Site Geologic Map.

12.  Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.

Geologic or manmade features were not discovered on the project site during the field investigation.

13.  The Recharge Zone boundary is shown and labeled, if appropriate.

14. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.): If applicable, the information must agree with Item No. 20 of the WPAP Application Section.

There are \_\_(#) wells present on the project site and the location is shown and labeled. (Check all of the following that apply.)

The wells are not in use and have been properly abandoned.

The wells are not in use and will be properly abandoned.

The well is in use and complies with 16 TAC Chapter 76.

There are no wells or test holes of any kind known to exist on the project site.

### *Administrative Information*

- Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

# ATTACHMENTS

**ATTACHMENT A**

**GEOLOGIC ASSESSMENT TABLE  
(TCEQ-0585-TABLE)**

**COMMENTS TO GEOLOGIC ASSESSMENT TABLE**

**SOIL PROFILE**

**SOILS MAP**

GEOLOGIC ASSESSMENT TABLE			PROJECT NAME: <b>Westlake Dr. Drainage and Pavement Improvements - West Lake Hills Bond Project</b> Travis County, Texas (RKI Project No. ASF22-017-01)																	
LOCATION			FEATURE CHARACTERISTICS											EVALUATION		PHYSICAL SETTING				
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z								<40	≥40	<1.6	≥1.6	
S-1	N30 17 30.25	W97 47 57.62	MB (W)	30	Kek, Kgr	2,146	3	~6-8					X	6	36	✓			✓	Floodplain
S-2	N30 17 32.76	W97 47 53.93	MB (SS)	30	Kek	1,116	3	~8-10					X	8	38	✓			✓	Floodplain
S-3	N30 17 31.72	W97 47 55.09	MB (COMM)	30	Kek	290	2	~2-4					X	6	36	✓			✓	Floodplain
S-4	N30 17 30.16	W97 47 58.08	MB (G)	30	Kek	1,841	2	~2-4					X	6	36	✓			✓	Floodplain
S-5	N30 17 30.19	W97 47 58.67	MB (D)	30	Kgr, Kek	40	50	~1-2					X	6	36	✓			✓	Streambed
S-6	N30 17 34.11	W97 47 52.35	F	20	Kgr, Kek	465	10		NE-SW	10			F	8	38	✓			✓	Floodplain

\* DATUM: **NAD83**

Manmade Features in Bedrock (MB): W = water, SS = sanitary sewer, COMM = communications, G = gas, D = drainage culvert

Formation: Kgr = Glen Rose Formation, Kek = Kainer Formation (Edwards Limestone)

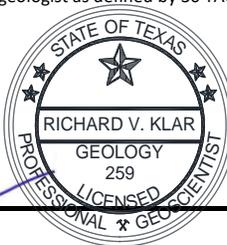
2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials: Backfill consisting of native soils and granular bedding materials ( Features S-1 through S-4 ); concrete for storm drains and drainages ( Feature S-5 )

12 TOPOGRAPHY	
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed	

I have read, I understood, and I have followed the Texas Natural Resource Conservation Commission's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field. My signature certifies that I am qualified as a geologist as defined by 30 TAC 213.

Date 7/20/2023

Sheet 1 of 1

**COMMENTS TO GEOLOGIC ASSESSMENT TABLE**  
**Westlake Drive Drainage and Pavement Improvements**  
**West Lake Hills Bond Projects**  
**Travis County, Texas**

The locations of the following features are indicated on the *Site Geologic Map* provided as *Attachment D* of this report.

**Manmade Features in Bedrock**

**Feature S-1**

**Feature S-1** consists of trenches for the existing potable water utility owned by the Austin Water Works along Westlake Drive. The locations of these trenches are based on plans provided by the project civil engineer (PBS&J, 2005) as well as field observations including a manhole, valves, and hydrants located along both sides of Westlake Drive. Based on the provided plans, the water utility consists of 6-, 12-, and 14-inch lines installed at depths of approximately 6.5 feet. It is assumed that trenches hosting this utility are installed to depths ranging from approximately 6 to 8 feet terminating in bedrock. The combined length of the trenches within the SITE is estimated to be 2,146 feet.



**Feature S-2**

**Feature S-2** consists of a trench for a sanitary sewer utility owned by the West Lake Hills Wastewater Collection System along the west and central portion of Westlake Drive and the south portion of Redbud Trail. The location of this trench is based on plans provided by the project civil engineer (PBS&J, 2005) as well as field observations including two sewer manways along the south side of Westlake Drive east of Redbud Trail. It is assumed that the trench is installed to depths of approximately 8 to 10 feet terminating in bedrock. The length of the trench within the SITE is estimated to be approximately 1,116 feet.



Feature S-3

**Feature S-3** consists of a trench for an existing communications utility owned by AT&T. The location of this trench is based on a manhole and underground cable box along the south side of Westlake Drive to the west of Redbud Trail. It is inferred that the trench hosting the utility line is installed to depths of approximately 2 to 4 feet terminating in bedrock. The length of the trench observed within the SITE is estimated to be 290 feet, but as utility plans were not available, it is possible that the length of this utility is more extensive than estimated.



Feature S-4

**Feature S-4** consists of a trench for an existing natural gas utility along the south edge of Westlake Drive. It is assumed that this utility is owned by Texas Gas, as they are the provider for the City of West Lake Hills. The location of this trench was identified based on review of plans provided by the project civil engineer (PBS&J, 2022). It is inferred that the trench is installed to depths of approximately 2 to 4 feet terminating in bedrock. The length of the trench within the SITE is estimated to be approximately 1,841 feet.

Feature S-5

**Feature S-5** consists of a drainage culvert at the Little Bee Creek crossing of Westlake Drive. It consists of three corrugated metal culverts, each approximately 3-feet in diameter that cross the paved road in the direction of Little Bee Creek to the northwest-southeast. The culverts are encased in concrete, and appear to extend into the bedrock of the creek channel. The culverts extend approximately 40 feet within the SITE.



## **Faults**

### **Feature S-6**

**Feature S-6** consists of a normal fault, referred to as the Mount Bonnell fault on published geologic maps (Fisher, 1974; Garner et al., 1986, and Blome et al., 2005), which trends northeast-southwest and is oriented in approximately the same direction as Westlake Drive (measured in the northeast-southwest direction at approximately 43 degrees within the SITE). The fault location was inferred from fractures observed along the north edge of Westlake Drive just east of Redbud Trail, from changes in rock outcrops across the SITE, and review of published maps. This fault juxtaposes the Glen Rose Formation to the northwest and the Edwards Limestone to the southeast. The fault is approximately 465 feet long within the SITE. Based on formations outcropping at the surface and published sources, the fault throw is estimated to be approximately 200 feet within the SITE vicinity.

**SOIL PROFILE**  
**Westlake Drive Drainage and Pavement Improvements**  
**West Lake Hills Bond Projects**  
**Travis County, Texas**

SOIL SERIES	THICKNESS ON SITE	DESCRIPTION
<b>Brackett soils and Urban land</b>	<b>10-18 inches</b>	<b><i>Brackett soils and Urban land, 12 to 30 percent slopes (BrF).</i></b> The surface layer is a light brownish-gray gravelly clay loam or gravelly loam about up to 6 inches thick. The next layer is 10 to 12 inches of pale-brown clay loam, underlain by interbedded limestone and marl. Brackett soils make up about 48 percent, urban land about 20 percent, and rock outcrop and other soils about 32 percent. Permeability is moderately slow, and the available water capacity is low. Soils are well drained with very high runoff.
<b>Eckrant soils and Urban land</b>	<b>5-13 inches</b>	<b><i>Eckrant soils and Urban land, 0 to 2 percent slopes (TeA).</i></b> Consist of 75 percent Eckrant and similar soils and 20 percent urban land that occupies long, broad ridges. The surface layer has up to about 5 inches of very stony clay with 5 to 8 inches of extremely flaggy clay below, and is underlain by bedrock. Undisturbed areas of Eckrant soils have an 8-inch thick surface layer of dark grayish-brown clay or clay loam. The underlying material is limestone. Soils are well drained with medium runoff.
<b>Eckrant soils and Urban land</b>	<b>5-13 inches</b>	<b><i>Eckrant soils and Urban land, 5 to 18 percent slopes (TeE).</i></b> Consist of 70 percent Eckrant and similar soils and 25 percent urban land that occupies ridges. The surface layer has up to about 5 inches of very stony clay with 5 to 8 inches of extremely flaggy clay below, and is underlain by bedrock. Eckrant soils have a surface layer of grayish-brown clay or clay loam, about 8 inches thick, that overlies limestone. Stones are on the surface and in the soil. The basic soil characteristics are not appreciably reshaped in urbanization. Soils are well drained with high runoff.
<b>Urban land and Brackett soils</b>	<b>6-24 inches</b>	<b><i>Urban land and Brackett soils, 1 to 12 percent slopes (UuE).</i></b> Consists of 40 percent urban land and 35 percent Brackett and similar soils. Urban land consists of up to 10 inches of cemented material, with soils consisting of up to 6 inches of gravelly clay loam underlain by 6 to 18 inches of clay loam with bedrock below.

The preceding table was prepared based on information provided in the *Soils Survey of Travis County, Texas (January 1974)* and the *NRCS Web Soil Survey (2019)* in addition to field observations. As presented on the attached ***Site Soils Map***, native soils mapped at the SITE consist of the following units: Brackett soils and Urban land, 12 to 30 percent slopes (BrF); Eckrant soils and Urban land, 0 to 2 percent slopes (TeA); Eckrant soils and Urban land, 5 to 18 percent slopes (TeE); and Urban Land and Brackett soils, 1 to 12 percent slopes (UuE). The southwest end of the Westlake Drive is underlain by UuE, with some TeE on its south edge. The middle of Westlake Drive, including Redbud Trail, is underlain by BrF, with TeA underlying Skyline Drive and the northeast end of Westlake Drive.

Soils mapped for the SITE are classified as Group C and D soils, which have a low to moderate capacity to transmit infiltrating precipitation. Soils reportedly consist of 5 to 24 inches of gravelly loam, gravelly clay loam, clay loam, and stony clay with published permeability values of 0.06 to 1.98 inches per hour. Urban land consists of up to 10 inches of impervious manmade materials in the vicinity of paved roadways, sidewalks, and parking lots. Brackett soils are associated with the upland areas along Westlake Drive, with Eckrant soils adjacent to Little Bee Creek. Native soils and potential contacts between soil types were observed in conjunction with field reconnaissance efforts except in areas with existing residential and roadway development.



**ATTACHMENT B**

**STRATIGRAPHIC COLUMN**

**STRATIGRAPHIC COLUMN**  
**Westlake Drive Drainage and Pavement Improvements**  
**West Lake Hills Bond Projects**  
**Travis County, Texas**

STRATIGRAPHIC FORMATION		THICKNESS	DESCRIPTION
<b>Edwards Limestone – Kainer Formation (Kek)</b>		260-310 feet	(See descriptions below)
<i>Edwards Limestone (Ked)*</i>	<i>Grainstone member (Kkg)**</i>	50-60 feet	Unit consists of <i>miliolid</i> grainstone, mudstone to wackestone and chert. Identified in the field by white crossbedded grainstone. <b>Not exposed within the SITE.</b>
	<i>Kirschberg Evaporite member (Kkke)**</i>	50-60 feet	Unit includes highly altered crystalline limestone, chalky mudstone, and chert. Leaching of evaporite layers resulted in a boxwork porosity with neospar and travertine frames. <b>Patchy outcrops along the south side of Westlake Drive within the SITE.</b>
	<i>Dolomite member (Kkd)**</i>	110-130 feet	Unit consists of mudstone to grainstone, crystalline limestone, and chert. Identified in the field by massively bedded, light gray outcrops, with abundant <i>Toucasia</i> . <b>Not exposed within the SITE.</b>
<i>Walnut Formation (Kwa)*</i>	<i>Basal Nodular Member (Kkbn)**</i>	50-60 feet	Unit consists of shaly, nodular limestone, mudstone and <i>miliolid</i> grainstone. Identified in the field by massively bedded, nodular, and mottled outcrops, with abundant <i>Exogyra texana</i> . <b>Not exposed within the SITE.</b>
<b>Glen Rose Formation (Kgr)*</b>		± 380 feet	(See descriptions below)
<i>Upper Glen Rose</i>		± 220 feet	Conformably underlies the Kainer Formation of the Edwards and serves as the lower confining unit of the Edwards Aquifer. Consists of alternating beds of yellowish-tan, medium-bedded limestone and argillaceous limestone with minor evaporate layers. Surface cavern development associated with faults and fractures and some water production at evaporate beds is considered a rare occurrence. Field identification is commonly associated with stair-step topography that forms through differential erosion of the alternating limestone and marl beds, and the presence of fossilized ripple marks and sparse casts of <i>Tylostoma</i> sp., <i>Turitella</i> sp., <i>Protocardio texana</i> , and the foraminiferan <i>Orbitolina minuta</i> . Classified hydrologically as having mostly non-fabric selective porosity and generally low permeability. Conformably overlies the bivalve-rich <i>Corbula</i> bed at the top of the Lower Glen Rose. <b>Patchy outcrops and float rock along the north edge of Westlake Drive and Redbud Trail within the SITE.</b>

Note: Stratigraphic Column adapted from Fisher (1974)\* and Blome et al., (2005)\*\*.

**ATTACHMENT C**

**NARRATIVE OF SITE SPECIFIC GEOLOGY**

**SITE GEOLOGY NARRATIVE**  
**West Lake Hills Bond Projects**  
**Westlake Drive Drainage and Pavement Improvements**  
**Travis County, Texas**

**Introduction**

The following is a site-specific discussion of existing geological conditions and potential recharge features for the Edwards Aquifer identified within the project site, which is part of the West Lake Hills Drainage Master Plan Phase II bond package and includes improvements along portions of Westlake Drive, Redbud Trail, Laurel Valley Road, and Skyline Drive in the City of West Lake Hills, Travis County, Texas (hereinafter referred to as the SITE). This assessment was performed by **Raba Kistner, Inc. (RKI)** for K Friese + Associates, pursuant to applicable Edwards Aquifer Protection Program (EAPP) Rules as specified in *Title 30 of the Texas Administrative Code, Section 213 (30 TAC §213, effective April 24, 2008)*. This assessment report is in the format required by the Texas Commission on Environmental Quality (TCEQ) for the Geologic Assessment and was prepared in accordance with the revised *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones (TCEQ-0585)*, which are applicable to submittals received by the TCEQ after October 1, 2004.

This geologic assessment report documents conditions observed by **RKI** within the SITE boundaries on October 27, 2022.

**Site Description**

**Site Location.** The SITE consists of portions of Westlake Drive, Redbud Trail, Laurel Valley Road, and Skyline Drive in the City of West Lake Hills. The SITE currently includes paved right-of-way (ROW) with adjacent roadside ditches and culverts at the crossing of Little Bee Creek, which flows across Westlake Drive in the southwest portion of the SITE. It is primarily a residential area located within the City of West Lake Hills, which is part of the Austin Metropolitan Area. Based on review of official maps published by the Texas Commission on Environmental Quality (TCEQ), the SITE is located entirely within the Edwards Aquifer Recharge Zone (EARZ). Given its location within the EARZ, performance of a geologic assessment is required to facilitate planned construction activities pursuant to applicable Edwards Aquifer Protection Program (EAPP) rules as specified in *Title 30 of the Texas Administrative Code, Section 213 (30 TAC 213, effective April 24, 2008)*.

As presented on the attached **Site Geologic Map**, adjacent properties include commercial, municipal, and residential properties. The Westlake Fire Department and City Hall are located along the Westlake Drive as well as commercial properties including a gas station. The Albert H. Ulrich Water Treatment Plant is also in proximity to the SITE, located approximately 500 feet to the south. One domestic water supply well completed in the Trinity Aquifer was plotted along Westlake Drive, but it was not identified during field reconnaissance. According to the Texas Water Development Board (TWDB), the wellhead is located on private property approximately 60 feet northwest of Westlake Drive, approximately 0.1 mile from Redbud Trail. The well was reportedly drilled in 1955 to a depth of 987 feet.

**Topography and Drainage.** Topographic contours on the U.S. Geological Survey (USGS, 2019) 7.5-Minute Series Topographic map (*Austin West Quadrangle*) were reviewed to evaluate the general surface conditions and drainage patterns, along with more detailed 2-foot topographic contours obtained from the City of Austin's Geographic Information Systems (GIS) interactive web map (City of Austin, 2017). The SITE is within an area of moderately sloping topography, and consists of a low-lying area just above or within the floodplain associated with Little Bee Creek. The maximum elevation within the SITE is approximately 698 feet above mean seal level (amsl) in the northeast end of the SITE on Skyline Drive, and slopes to a minimum of approximately 632 feet amsl at the southwest end where Laurel Valley intersects Westlake Drive. As indicated by topographic contours presented on the **Site Geologic Map**, the local surface drainage patterns are generally to the south towards Little Bee Creek, which transects Westlake Road and Redbud Trail. Ultimate flow is to the Colorado River located approximately 0.7 mile to the east.

Based on review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) Panel 48453C445K (effective January 1, 2020) a portion of SITE along Westlake Drive in proximity to Little Bee Creek is located in the 100-year floodplain. The Little Bee Creek floodplain is designated as a special flood hazard area in Zone AE, a regulatory floodway.

**Historical Property Use.** Although research pertaining to past SITE operations and historical land use activities was beyond the scope of this assessment, historical aerial imagery was reviewed to evaluate historical land use and the presence of lineations that could indicate the presence of normal faulting. The following aerial photographs were reviewed using Google Earth™: 1995, 2002, 2003, 2005-2009, and 2011-2022. The 1995 aerial photograph indicates the SITE area to include residential structures along Laurel Valley Drive, Redbud Trail, and Skyline Drive, with commercial and municipal structures along the south side of Westlake Drive, as well as the water treatment plant to the south, and wooded areas surrounding the SITE. The 2002 through 2003 aerial photographs show development of additional residential properties at the east end of Westlake Drive, and the 2003 through 2022 aerial photographs depict the SITE essentially the same as it appears today.

**Classification of Recharge Features:** As further described herein, there were no recharge features attributed to karstification of limestone terrain and/or surface erosional processes identified within SITE boundaries. Features identified and discussed below also include five manmade features (i.e., water, sanitary sewer, communications, and natural gas utility lines, and drainage culverts), in addition to one normal fault. The significance of these features was assessed using definitions and guidance provided in *Instructions to Geologists (TCEQ-0585-Instructions, revised October 1, 2004)*. All features within the SITE that met the criteria presented in this reference were mapped. The characteristics of all mapped features and the assessments of these features, as defined by the TCEQ, are presented in the attached **Geologic Assessment Table (TCEQ-0585)**.

## **Stratigraphy**

As presented in the attached ***Stratigraphic Column***, information pertaining to the lithologies and thickness of geologic units underlying the SITE was primarily taken from the *Bureau of Economic Geology, Geologic Map of the Austin Area, Texas* (Garner et al., 1986) and the *Geologic Map of the Edwards Aquifer Recharge Zone, South-Central Texas* (Blome et al., 2005).

The SITE is underlain by the Upper Glen Rose Formation and members of the Edwards Limestone. General descriptions of the Kainer Formation, which constitutes the lower part of the Edwards Limestone, as well as a description of the Glen Rose Formation, are provided below:

- **The Kainer Formation (Kek)** is subdivided into four members as follows: (i) Grainstone member – grainstone, mudstone to wackestone, and chert; (ii) Kirschberg Evaporite member – highly altered crystalline limestone with chalky mudstone and chert; (iii) Dolomite member – crystalline limestone consisting of mudstone to grainstone; and (iv) Basal Nodular member – shaly nodular limestone, mudstone, and grainstone.
- **The Glen Rose Formation (Kgr)** is commonly divided into the upper and lower members as follows: (i) Upper Glen Rose – thinly bedded fine-grained limestone, dolomite, and marl; and (ii) Lower Glen Rose – fossiliferous limestone, dolomite, marl, and evaporites with *Corbula* bed at the top.

Based on field mapping observations and review of published references, the SITE is underlain by the Kainer Formation of the Edwards Limestone and the Glen Rose Formation, as presented on the ***Site Geologic Map***. A normal fault transects the SITE in approximately the same orientation as Westlake Drive, with the Kainer Formation to the southeast, and the Glen Rose Formation to the northwest. The Kirschberg Evaporite Member of the Kainer Formation underlies the majority of Westlake Drive, with the Dolomite Member of the Kainer Formation at the southwest portion, in the vicinity of Little Bee Creek. Patchy outcrops of the Kainer Formation were observed in Little Bee Creek south of Westlake Drive, as well as vuggy float rock of the Edwards Limestone along the south edge of Westlake Drive. The Glen Rose Formation underlies the north edge of Westlake Drive, as well as portions of Laurel Valley Road, Redbud Trail, and the north terminus of Skyline Drive within the SITE. Patchy outcrops of the Glen Rose Formation as well as float rock was observed in Little Bee Creek north of Westlake Drive, as well as along Redbud Trail. Exposed bedrock was observed where not covered by concrete, roadways, or landscaping associated with development of the SITE. Field observations were consistent with published geologic maps.

## **Structure**

This SITE is located along the north edge of the Balcones Fault Zone and is expected to exhibit a similar structural trend. The Balcones Fault Zone generally consists of a northeast-southwest trending, *en echelon* normal fault system, which juxtaposes Upper Cretaceous lithologies in the southeast with Lower Cretaceous lithologies in the northwest. As a result of this large-scale regional faulting, minor internal fault sequences and fractures exist within this zone which generally follow the same structural trend and accommodate localized displacement.

Based on review of historical aerial photographs, published maps, and as previously discussed herein, one fault, named the Mount Bonnell Fault is located within the boundaries of the SITE. As presented on the **Site Geologic Map**, the Mount Bonnell Fault trends approximately northeast-southwest in approximately the same orientation as Westlake Drive within the SITE (Garner et al., 1986 and Blome et al., 2005). Field indicators of this fault included a few minor fractures observed on the north edge of Westlake Drive just east of Redbud Trail, and the change between the Kainer Formation and Glen Rose Formation between the south and north side of Westlake Drive, which are consistent with the mapped fault.

As this fault may potentially serve to enhance the transmission of surface runoff to the subsurface, it was designated herein as **Feature S-6**.

This normal fault juxtaposes the Glen Rose Formation to the northwest and the Edwards Limestone downthrown to the southeast. It also serves as the boundary between the contributing and recharge zones of the Edwards Aquifer. Fault throw is estimated to be approximately 200 feet based on the thickness of the Kainer Formation members. The fault was not directly observed but was inferred from fractures along Westlake Drive, changes in rock outcrops across the SITE, and review of published maps and well reports (Garner et al., 1986, Blome et al., 2005, and TWDB, 2022).

### **Manmade Features**

As presented on the **Site Geologic Map**, five manmade features were identified that may potentially serve to enhance the transmission of surface runoff to the subsurface. The features consist of utility trenches associated with a potable water line, sanitary sewer line, communications line, and natural gas line, as well as a drainage culvert, which meet the criteria for assessment as manmade features in bedrock.

With the exception of the communications utility, information regarding the locations of the existing utility trenches were taken from drawings prepared by the civil engineer, PBS&J (2005) provided to **RKI** by K Friesse + Associates on November 17, 2022 in addition to field observations of manway access points or valves. The location of the communications utility is inferred from field observations including a manhole and underground cable boxes. These utilities appear to service the commercial, municipal, and residential properties along Westlake Drive.

- **Feature S-1** consists of trenches for existing potable water utilities owned by the Austin Water Works along Westlake Drive.
- **Feature S-2** consists of a trench for a sanitary sewer utility owned by the West Lake Hills Waste Water Collection system along the west and central portion of Westlake Drive and the south portion of Redbud Trail.
- **Feature S-3** consists of a trench for an existing communications utility owned by AT&T along a portion of Westlake Drive.
- **Feature S-4** consists of a trench for an existing natural gas utility owned by Texas Gas along the south edge of Westlake Drive.

Although not directly observable, it is inferred that the trenches for these subgrade installations are backfilled in accordance with standard construction practices that include the use of structural fill soils (e.g., base course materials, limestone gravel, compacted clay soils, etc.) overlain by native or fill soils, depending upon location and surface improvements. The trenches were not observed in conjunction with any naturally-occurring recharge features. Although the backfilled trenches may exhibit somewhat greater relative infiltration rate than the surrounding soil/rock strata underlying the SITE boundaries, these manmade features are collectively classified as not sensitive, having a low potential of preferentially transmitting fluids into the Edwards Aquifer. This classification is based upon the point assignment criteria presented in the **Geologic Assessment Table (TCEQ-0585)** and professional judgment.

**Feature S-5** is a drainage culvert that serves as a means for water in Little Bee Creek to flow underneath Westlake Drive at the intersection with Laurel Valley Road. The presence of float rock, mud, and moss deposits in Little Bee Creek south of Westlake Drive, as well as the weathered texture of the rocks in the creek bed, plus mud and sand deposits, provide indicators of past flooding events. A few vugs were identified in the Kainer Formation on the south side of Westlake Drive, however, no fractures or indicators of infiltration were identified. It appears that some excavation may have been performed into the upper portion of the creek channel in order to install the culverts beneath the road surface, however these surfaces have been covered in concrete. This feature is classified as not sensitive based on a lack of infiltration indicators, fractures, or other avenues for preferentially transmitting fluids into the Edwards Aquifer.

#### **Potential for Fluid Migration to the Edwards Aquifer**

Based on a review of the SITE geology, topography and drainage conditions, and the results of our mapping efforts, the overall potential for fluid movement (i.e. surface-derived flow) to the Edwards Aquifer via infiltration is considered to be low to moderate. The following assessment findings support this conclusion:

- The majority of the SITE is comprised of paved right-of-way developed with impervious pavements and associated improvements.
- The majority of the SITE is overlain by surface soils ranging in thickness from approximately 5 to 24 inches. The Brackett and Eckrant soils, classified as Hydrologic Soil Groups C and D, have a slow to moderate infiltration rate with high runoff potential when thoroughly wet, and have a slow rate of water transmission.
- There were no natural karst features observed in the vicinity of any the observed manmade features, reducing the potential for rapid infiltration. Manmade features present at the SITE are collectively classified as not sensitive based on consideration of construction details and application of point assignment criteria and professional judgment.
- Infiltration along the fault (**Feature S-6**) is expected, however it is classified as not sensitive within SITE boundaries, based upon the lack of discrete recharge openings along the fault trace, and inferred low relative infiltration rate of overlying soil cover and/or drainage and pavement improvements.

Given the presence of karst-bearing formations (i.e. the Kainer and Glen Rose Formations), it is possible that karst features are present in the shallow surface. If features are discovered in conjunction with future phases of land development (i.e., earthwork, excavation), it is recommended that a qualified geoscientist be consulted to assess, determine the level of sensitivity, and provide recommendations for protective measures, if warranted.

## **References**

- Blome, C. D., Faith, J. R., Pedraza, D. E., Ozuna, G. B., Cole, J. C., Clark, A. K., Small, T. A., and Morris, R. R., 2005, Geologic Map of the Edwards Aquifer Recharge Zone, South-Central, Texas; United States Geological Survey (USGS).
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**ATTACHMENT D**

**FEATURE POSITION TABLE  
(GPS COORDINATES)**

**SITE GEOLOGIC MAP**

GEOLOGIC ASSESSMENT TABLE			PROJECT NAME: <b>Westlake Dr. Drainage and Pavement Improvements - West Lake Hills Bond Project</b> Travis County, Texas (RKI Project No. ASF22-017-01)																	
LOCATION			FEATURE CHARACTERISTICS											EVALUATION		PHYSICAL SETTING				
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z								<40	≥40	<1.6	≥1.6	
S-1	N30 17 30.25	W97 47 57.62	MB (W)	30	Kek, Kgr	2,146	3	~6-8					X	6	36	✓			✓	Floodplain
S-2	N30 17 32.76	W97 47 53.93	MB (SS)	30	Kek	1,116	3	~8-10					X	8	38	✓			✓	Floodplain
S-3	N30 17 31.72	W97 47 55.09	MB (COMM)	30	Kek	290	2	~2-4					X	6	36	✓			✓	Floodplain
S-4	N30 17 30.16	W97 47 58.08	MB (G)	30	Kek	1,841	2	~2-4					X	6	36	✓			✓	Floodplain
S-5	N30 17 30.19	W97 47 58.67	MB (D)	30	Kgr, Kek	40	50	~1-2					X	6	36	✓			✓	Streambed
S-6	N30 17 34.11	W97 47 52.35	F	20	Kgr, Kek	465	10		NE-SW	10			F	8	38	✓			✓	Floodplain

\* DATUM: **NAD83**

Manmade Features in Bedrock (MB): W = water, SS = sanitary sewer, COMM = communications, G = gas, D = drainage culvert

Formation: Kgr = Glen Rose Formation, Kek = Kainer Formation (Edwards Limestone)

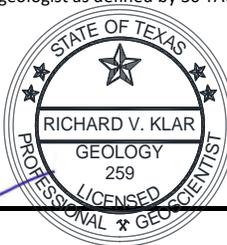
2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials: Backfill consisting of native soils and granular bedding materials ( Features S-1 through S-4 ); concrete for storm drains and drainages ( Feature S-5 )

12 TOPOGRAPHY	
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed	

I have read, I understood, and I have followed the Texas Natural Resource Conservation Commission's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field. My signature certifies that I am qualified as a geologist as defined by 30 TAC 213.

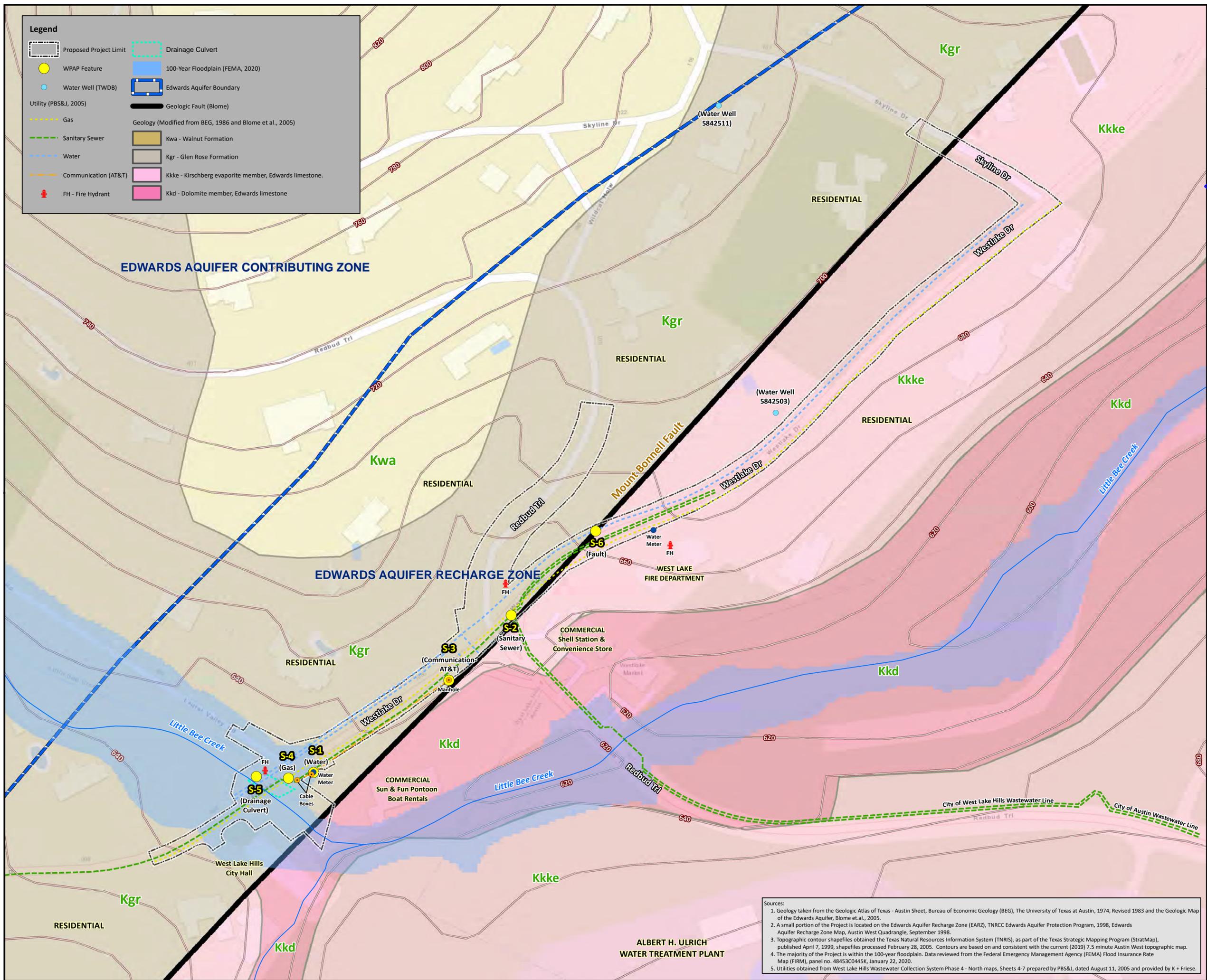
  


Date 7/20/2023

Sheet 1 of 1

**Legend**

	Proposed Project Limit		Drainage Culvert
	WPAP Feature		100-Year Floodplain (FEMA, 2020)
	Water Well (TWDB)		Edwards Aquifer Boundary
Utility (PBS&J, 2005)			Geologic Fault (Blome)
	Gas	Geology (Modified from BEG, 1986 and Blome et al., 2005)	
	Sanitary Sewer		Kwa - Walnut Formation
	Water		Kgr - Glen Rose Formation
	Communication (AT&T)		Kkke - Kirschberg evaporite member, Edwards limestone
	FH - Fire Hydrant		Kkd - Dolomite member, Edwards limestone



**SITE GEOLOGIC MAP**  
 WESTLAKE DRIVE DRAINAGE AND PAVEMENT IMPROVEMENTS  
 WEST LAKE HILLS BOND PROJECT  
 WEST LAKE HILLS, TRAVIS COUNTY, TEXAS

REVISIONS:

No.	DATE	DESCRIPTION

PROJECT No.: ASF22-017-01

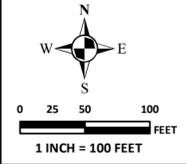
ISSUE DATE: 07/20/2023

DRAWN BY: LAW

CHECKED BY: HEH

REVIEWED BY: RVK

- Sources:
- Geology taken from the Geologic Atlas of Texas - Austin Sheet, Bureau of Economic Geology (BEG), The University of Texas at Austin, 1974, Revised 1983 and the Geologic Map of the Edwards Aquifer, Blome et al., 2005.
  - A small portion of the Project is located on the Edwards Aquifer Recharge Zone (EARZ), TNRC Edwards Aquifer Protection Program, 1998, Edwards Aquifer Recharge Zone Map, Austin West Quadrangle, September 1998.
  - Topographic contour shapefiles obtained the Texas Natural Resources Information System (TNRIS), as part of the Texas Strategic Mapping Program (StratMap), published April 7, 1999, shapefiles processed February 28, 2005. Contours are based on and consistent with the current (2019) 7.5 minute Austin West topographic map (FIRM), panel no. 48453C0445K, January 22, 2020.
  - The majority of the Project is within the 100-year floodplain. Data reviewed from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), panel no. 48453C0445K, January 22, 2020.
  - Utilities obtained from West Lake Hills Wastewater Collection System Phase 4 - North maps, Sheets 4-7 prepared by PBS&J, dated August 11, 2005 and provided by K + Friese.



NOTE: This Drawing is Provided for Illustration Only, May Not be to Scale and is Not Suitable for Design or Construction Purposes

# Recharge and Transition Zone Exception Request Form

Texas Commission on Environmental Quality

30 TAC §213.9 Effective June 1, 1999

*To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.*

*Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.*

## Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Recharge and Transition Zone Exception Request Form** is hereby submitted for TCEQ review and executive director approval. The request was prepared by:

Print Name of Customer/Agent: Victoria Ortega, PE

Date: 7/21/2023

Signature of Customer/Agent:



Regulated Entity Name: West Lake Hills Bond Program

## Exception Request

- Attachment A - Nature of Exception.** A narrative description of the nature of each exception requested is attached. All provisions of 30 TAC §213 Subchapter A for which an exception is being requested have been identified in the description.
- Attachment B - Documentation of Equivalent Water Quality Protection.** Documentation demonstrating equivalent water quality protection for the Edwards Aquifer is attached.

## Administrative Information

- Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.
- The applicant understands that no exception will be granted for a prohibited activity in Chapter 213.
- The applicant understands that prior approval under this section must be obtained from the executive director for the exception to be authorized.

## **ATTACHMENT A NATURE OF EXCEPTION**

The Project is an exception for the requirement for a Water Pollution Abatement Plan for the following reasons:

1. The project will remove 0.04 acres of impervious cover from the site.
2. Proposed work consists of maintenance of existing facilities including roadways and drainage conveyance systems. Minor soil disturbance and stabilization is required for the regrading of existing roadside ditch and culvert/channel conveyance.
3. The proposed work is within existing roadbeds, drainage channels, and culvert locations, which have been previously disturbed.
4. Two faults were identified within the limits of Eanes Creek Low Water Crossings and one fault was identified within the limits of Westlake Dr. The fault crossings are located within the project limits but outside the limits of significant excavation.
  - a. Eanes S-14: located at the intersection of Camp Craft Rd and Eanes School Rd, near the end of the project. The improvements consist of roadway grading and tie ins. Excavation is contained within the existing pavement limits and the depth is limited to the pavement section (13.5-in).
  - b. Eanes S-15: located near the driveway of 401 Camp Craft Rd, near the end of the project. The improvements consist of sidewalk construction. Excavation is contained within the existing asphalt walkway and the depth is limited to the sidewalk section (8-in).
  - c. Westlake S-6: located near the intersection of Westlake Dr and Redbud Trl, the improvements consist of minor roadside ditch grading and maintenance and crack sealing and coat. Excavation depths are less than 1-ft.

## **ATTACHMENT B EQUIVALENT WATER QUALITY PROTECTION**

Development of the Project will enhance water quality protection to the Edwards Aquifer over the existing condition for the following reasons: After completion of the project, vegetation will be reestablished in areas disturbed by construction, the project will reduce the total impervious cover, and improved drainage conveyance will help prevent downstream erosion and associated sedimentation in the stream channel over existing conditions.

# Temporary Stormwater Section

## Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b)(4)(A), (B), (D)(I) and (G); Effective June 1, 1999

**To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.**

**Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.**

## Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Temporary Stormwater Section** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Print Name of Customer/Agent: Victoria Ortega, PE

Date: 7/21/2023

Signature of Customer/Agent:

Victoria M Ortega

Regulated Entity Name: West Lake Hills Bond Program

## Project Information

### Potential Sources of Contamination

*Examples: Fuel storage and use, chemical storage and use, use of asphaltic products, construction vehicles tracking onto public roads, and existing solid waste.*

1. Fuels for construction equipment and hazardous substances which will be used during construction:

The following fuels and/or hazardous substances will be stored on the site: asphalt products, chemical additives, gasoline

These fuels and/or hazardous substances will be stored in:

- Aboveground storage tanks with a cumulative storage capacity of less than 250 gallons will be stored on the site for less than one (1) year.

- Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
  - Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An Aboveground Storage Tank Facility Plan application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.
  - Fuels and hazardous substances will not be stored on the site.
2.  **Attachment A - Spill Response Actions.** A site specific description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is attached.
  3.  Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
  4.  **Attachment B - Potential Sources of Contamination.** A description of any activities or processes which may be a potential source of contamination affecting surface water quality is attached.

### ***Sequence of Construction***

5.  **Attachment C - Sequence of Major Activities.** A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is attached.
  - For each activity described, an estimate (in acres) of the total area of the site to be disturbed by each activity is given.
  - For each activity described, include a description of appropriate temporary control measures and the general timing (or sequence) during the construction process that the measures will be implemented.
6.  Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: Eanes Creek and Little Bee Creek, Lady Bird Lake (Segment NO.1403)

### ***Temporary Best Management Practices (TBMPs)***

*Erosion control examples: tree protection, interceptor swales, level spreaders, outlet stabilization, blankets or matting, mulch, and sod. Sediment control examples: stabilized construction exit, silt fence, filter dikes, rock berms, buffer strips, sediment traps, and sediment basins. Please refer to the Technical Guidance Manual for guidelines and specifications. All structural BMPs must be shown on the site plan.*

7.  **Attachment D – Temporary Best Management Practices and Measures.** TBMPs and measures will prevent pollution of surface water, groundwater, and stormwater. The construction-phase BMPs for erosion and sediment controls have been designed to retain sediment on site to the extent practicable. The following information is attached:

- A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.
  - A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.
  - A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.
  - A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.
8.  The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.
- Attachment E - Request to Temporarily Seal a Feature.** A request to temporarily seal a feature is attached. The request includes justification as to why no reasonable and practicable alternative exists for each feature.
  - There will be no temporary sealing of naturally-occurring sensitive features on the site.
9.  **Attachment F - Structural Practices.** A description of the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site is attached. Placement of structural practices in floodplains has been avoided.
10.  **Attachment G - Drainage Area Map.** A drainage area map supporting the following requirements is attached:
- For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.
  - For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.
  - For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.
  - There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

- There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. Erosion and sediment controls other than sediment basins or sediment traps within each disturbed drainage area will be used.
11.  **Attachment H - Temporary Sediment Pond(s) Plans and Calculations.** Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are attached.
- N/A
12.  **Attachment I - Inspection and Maintenance for BMPs.** A plan for the inspection of each temporary BMP(s) and measure(s) and for their timely maintenance, repairs, and, if necessary, retrofit is attached. A description of the documentation procedures, recordkeeping practices, and inspection frequency are included in the plan and are specific to the site and/or BMP.
13.  All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.
14.  If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).
15.  Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.
16.  Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

### ***Soil Stabilization Practices***

*Examples: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, or preservation of mature vegetation.*

17.  **Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices.** A schedule of the interim and permanent soil stabilization practices for the site is attached.

18.  Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.
19.  Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

### ***Administrative Information***

20.  All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.
21.  If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.
22.  Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

## **ATTACHMENT A SPILL RESPONSE ACTIONS**

Spill prevention, control, clean-up, and reporting shall comply with TCEQ regulations 30 TAC, Chapter 327 – Spill Prevention and Control, which is attached, as well as any local regulations. The contractor will implement proper spill prevention measures and maintain appropriate spill response equipment on site. In the event of a hazardous materials spill, the safety of on-site personnel is the most important consideration. Once the safety of personnel is secured, the second priority becomes stopping the source of the spill. If it is safe to do so, the source of the spill will be stopped and the spill will be contained using items such as sandbags, berms or absorbent rolls.

If during the construction of the project (Temporary Stormwater Management) a hazardous substance or hydrocarbon spill of greater than 250 gallons occurs within the project limits, the contractor is to try to stop the spill from continuing, contact the local fire department, and the Engineer. If the spill is caused by the roadway contractor, the roadway contractor will be responsible for the proper clean-up of the spill as well as notifying the TCEQ Spill Reporting Hotline (1-800-832-8224). If a spill occurs within the project limits but is caused by a third party (someone from the traveling public driving through the project), the contractor and/or the Engineer shall immediately contact local law enforcement, the fire department, and the TCEQ Spill Reporting Hotline. The local fire department will immediately respond to the spill and secure the scene (stop the spill and prevent it from spreading). The City of West Lake Hills will work with the responsible party to facilitate the clean-up of the spill on the City of West Lake Hills property.

## **ATTACHMENT B POTENTIAL SOURCES OF CONTAMINATION**

The potential sources of storm water pollution from the proposed project are displaced soil from the construction site from activities such as clearing/grubbing, grading, excavation, filling, and placement of asphalt and roadway base. Other potential sources of contamination include wastewater from portable bathrooms, litter generated during the construction process, de-watering from excavations, construction vehicles tracking onto roads, and construction products and waste. There are also hazardous construction materials including fuel and use of asphaltic products and petroleum products from the operation of construction equipment on site, all of which are potential sources of contamination.

The primary storm water contaminant expected to be generated during the construction project is the entrained solids (soil particles) which will affect the turbidity of the runoff. During this project, disturbed soils will result from:

1. Site preparation
2. Roadway excavation and fill grading
3. Trenching for wastewater force main, storm sewer or culvert construction
4. Excavation for water quality batch detention ponds
5. Placement of roadway base and pavement
6. Imported soil for fill and top-soil

Increased sediment loading in the storm water can be attributed to: a) direct impingement of rain onto disturbed soil areas, sand, gravel and rock areas where rains dislodge or entrain particles; b) erosion of disturbed soil areas; c) the transfer of soils and particulate matter via equipment or vehicle tires onto non-disturbed areas where they are wasted into drainage ditches.

There is a potential for hydrocarbon contamination in the form of oil and grease from equipment, construction vehicles, and fuel spillage on the site. Oil and grease are typically released into the environment because of equipment failure or maintenance operations. Release of fuel can result from on-site fueling operations or from leakage of temporary fuel storage tanks. Most construction equipment operates hydraulically; there is a potential that the release of hydraulic fluids may occur due to equipment malfunction or damage. The clean-up and containment of any fuels, hydraulic fluids, hydrocarbons, or other hazardous substances released on site will be the responsibility of the contractor.

Entrained solids in runoff during the construction phase will be largely contained by temporary BMPs such as erosion control logs, rock filter dams, sediment control fence, and stabilized construction exits, as shown in the Erosion Control Layouts included in *0587-Attachment C.1 Construction Plans (Sht 47-48 & 94-96)*.

## ATTACHMENT C SEQUENCE OF MAJOR ACTIVITIES

The general order of construction activities is included on the SW3P. The detailed construction sequence is included in the Traffic Control Narrative. Both can be found in *0587-Attachment C.1 Construction Plans (Sht 18 & 56)*. Temporary control measures include sediment control fence, erosion control logs, rock filter dams and stabilized construction exits. Temporary control measures will be installed first in the sequence of construction and removed after all site work is complete and vegetation has been established.

For construction activity, an estimate of the total area to be disturbed is shown below:

1. Installation of temporary erosion and sedimentation controls: 10.92 ac
2. Clearing, grubbing and excavation: 5.39 ac
3. Reconstruction of roadway base and driveways: 1.61 ac
4. Construction of force main, storm sewers, and channel regrading and maintenance: 1.61 ac
5. Site restoration: 5.39 ac
6. Seeding, re-vegetation: 1.69 ac
7. Removal of temporary erosion and sedimentation controls: 10.92 ac

## **ATTACHMENT D TEMPORARY BEST MANAGEMENT PRACTICES AND MEASURES**

Temporary BMPs will be installed before any construction activities begin and shall be removed after all construction work and re-vegetation is complete. Refer to *0602-Attachment C: Sequence of Construction* for more information on construction activities and sequence. Refer to *0587-Attachment C.1 Construction Plans (Sht 47-48 & 94-96)* for the proposed erosion and sedimentation control construction plan sheets showing the location and types of temporary BMPs proposed for the project.

BMPs for onsite flows will prevent pollution of surface streams by filtering pollutant ridden water. These BMPs include silt fence, rock berms, mulch logs, and stabilized construction exits. Immediately following the placement of topsoil, seeding will be implemented to stabilize areas disturbed during construction.

## **ATTACHMENT F STRUCTURAL PRACTICES**

Temporary structural practices used to limit runoff discharge pollutants include silt fence, mulch logs, rock berms, and stabilized construction exits.

The TCEQ general guidelines included in Section 1.2 to Section 1.4 of RG-348 must be followed for installation and maintenance of temporary structural erosion and sediment control BMPs. Additional guidelines can also be found on the Erosion Control Layouts included in *0587-Attachment C.1 Construction Plans (Sht 47-48 & 94-96)*.

## **ATTACHMENT G DRAINAGE AREA MAP**

The Offsite and Onsite drainage area maps are included in *0587-Attachment C.1 Construction Plans (Sht 31-32 & 80-81)*.

## **ATTACHMENT I INSPECTION AND MAINTENANCE FOR BMPS**

All erosion and sediment control measures will be maintained in effective operating condition by following the Project maintenance procedures. The general maintenance and inspection requirements are included on the Erosion Control Layouts included in *0587-Attachment C.1 Construction Plans (Sht 47-48 & 94-96)*. The maintenance plan for temporary BMPS meets the maintenance guidance provided in RG-348.

The Contractor shall install and maintain the integrity of temporary erosion and sedimentation control devices to accumulate silt and debris until soil disturbing activities are completed and permanent erosion control features are in place or the disturbed area has been adequately stabilized as approved in accordance with contract documents including City of West Lake Hills Drainage and Erosion Control Manual and Part II, Section F.6 of TPDES General Permit No. TXR150000.

Maintenance, repairs or retrofits will adhere to the project standards and details for the BMP. Damaged portions of BMPS shall be removed and replaced as needed to adhere to the contract documents. BMPS that cannot be adequately repaired or retrofitted to meet project requirements shall be removed and replaced in entirety in accordance with the contract documents.

The maintenance documentation procedures and recordkeeping practices are summarized in the SW3P included in *0587-Attachment C.1 Construction Plans (Sht 46 & 93)*.

## ATTACHMENT J

### SCHEDULE OF INTERIM AND PERMANENT SOIL STABILIZATION PRACTICES

The general order of construction activities is shown below. The project phasing of construction activities, including time frame information and interim and permanent stabilization measures are included in the Traffic Control Plan - Sequence of Construction and SW3P provided in *0587-Attachment C.1 Construction Plans (Sht 18, 56, 46-48, & 93-96)*. Temporary control measures include silt fence, mulch logs, rock berms, and construction exits and will be installed first in the sequence of construction and removed after all site work is complete and vegetation has been established.

Installation of temporary erosion controls

1. Notice of Intent/SWPPP Controls
  - a. Install erosion and sediment control measures in accordance with the SW3P
2. Construct stabilized construction exits

Site Clearing and Grading

3. Clearing, grubbing, and grading in the locations of proposed improvements.

Construction of proposed roadway, utilities, culvert, and sidewalk.

4. Construction of wastewater force main
5. Construction of proposed culverts, storm sewers, and channel maintenance
6. Reconstruction of roadway base, sidewalk, and driveways
7. Roadway asphalt repaving including mill and overlay.

Site Restoration, Seeding and Re-vegetation

8. Installation of stone and concrete riprap.
9. Seeding of disturbed soils, soil retention blankets, and other soil stabilization measures, as necessary.

Removal of SWPPP Controls

10. Remove erosion and sediment control measures and stabilized construction exits.
11. Notice of Termination.

Records will be kept at the project site to document dates when:

- major grading activities occur;
- construction activities temporarily cease;
- construction activities permanently cease; and
- soil stabilization measures are initiated.

**Agent Authorization Form**  
For Required Signature  
Edwards Aquifer Protection Program  
Relating to 30 TAC Chapter 213  
Effective June 1, 1999

I CHRIS SEEBACH,  
Print Name

DIRECTOR OF FACILITIES  
Title - Owner/President/Other

of TRINITY EPISCOPAL SCHOOL,  
Corporation/Partnership/Entity Name

have authorized Trey Fletcher  
Print Name of Agent/Engineer

of City of West Lake Hills  
Print Name of Firm

to represent and act on the behalf of the above named Corporation, Partnership, or Entity for the purpose of preparing and submitting this plan application to the Texas Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to \$10,000 per day per violation.
2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.
3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.
4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.
5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

[Handwritten Signature]  
Applicant's Signature

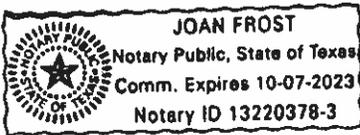
3.20.2023  
Date

THE STATE OF TX §

County of TARRANT §

BEFORE ME, the undersigned authority, on this day personally appeared \_\_\_\_\_ known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that (s)he executed same for the purpose and consideration therein expressed.

GIVEN under my hand and seal of office on this 20 day of March, 2023.



Joan Frost  
NOTARY PUBLIC

Joan Frost  
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 10-7-2023

**Agent Authorization Form**  
For Required Signature  
Edwards Aquifer Protection Program  
Relating to 30 TAC Chapter 213  
Effective June 1, 1999

I Trey Fletcher  
Print Name

City Administrator  
Title - Owner/President/Other

of City of West Lake Hills  
Corporation/Partnership/Entity Name

have authorized Victoria Ortega, PE  
Print Name of Agent/Engineer

of K Friese + Associates, Inc  
Print Name of Firm

to represent and act on the behalf of the above named Corporation, Partnership, or Entity for the purpose of preparing and submitting this plan application to the Texas Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to \$10,000 per day per violation.
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SIGNATURE PAGE:

M. Trey Fletcher  
Applicant's Signature

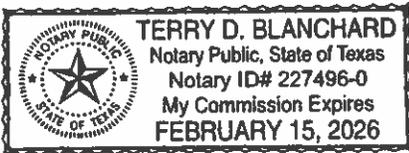
6-14-2023  
Date

THE STATE OF Texas §

County of Travis §

BEFORE ME, the undersigned authority, on this day personally appeared M. Trey Fletcher known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that (s)he executed same for the purpose and consideration therein expressed.

GIVEN under my hand and seal of office on this 19<sup>th</sup> day of June, 2023.



Terry D. Blanchard  
NOTARY PUBLIC

Terry D. Blanchard  
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 2-15-26

# Application Fee Form

## Texas Commission on Environmental Quality

Name of Proposed Regulated Entity: West Lake Hills Bond Program

Regulated Entity Location: City of West Lake Hills

Name of Customer: City of West Lake Hills

Contact Person: Trey Fletcher

Phone: 512.327.3628

Customer Reference Number (if issued): CN 600685515

Regulated Entity Reference Number (if issued): RN \_\_\_\_\_

### Austin Regional Office (3373)

Hays

Travis

Williamson

### San Antonio Regional Office (3362)

Bexar

Medina

Uvalde

Comal

Kinney

Application fees must be paid by check, certified check, or money order, payable to the **Texas Commission on Environmental Quality**. Your canceled check will serve as your receipt. **This form must be submitted with your fee payment.** This payment is being submitted to:

Austin Regional Office

San Antonio Regional Office

Mailed to: TCEQ - Cashier

Overnight Delivery to: TCEQ - Cashier

Revenues Section

Mail Code 214

P.O. Box 13088

Austin, TX 78711-3088

12100 Park 35 Circle

Building A, 3rd Floor

Austin, TX 78753

(512)239-0357

### Site Location (Check All That Apply):

Recharge Zone

Contributing Zone

Transition Zone

<i>Type of Plan</i>	<i>Size</i>	<i>Fee Due</i>
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	\$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	\$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	\$
Sewage Collection System	L.F.	\$
Lift Stations without sewer lines	Acres	\$
Underground or Aboveground Storage Tank Facility	Tanks	\$
Piping System(s)(only)	Each	\$
Exception	1 Each	\$ 500
Extension of Time	Each	\$

Signature: Victoria M Ortega

Date: 7/21/2023

# Application Fee Schedule

Texas Commission on Environmental Quality

Edwards Aquifer Protection Program 30 TAC Chapter 213 (effective 05/01/2008)

## ***Water Pollution Abatement Plans and Modifications***

### ***Contributing Zone Plans and Modifications***

<b><i>Project</i></b>	<b><i>Project Area in Acres</i></b>	<b><i>Fee</i></b>
One Single Family Residential Dwelling	< 5	\$650
Multiple Single Family Residential and Parks	< 5	\$1,500
	5 < 10	\$3,000
	10 < 40	\$4,000
	40 < 100	\$6,500
	100 < 500	\$8,000
	≥ 500	\$10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1	\$3,000
	1 < 5	\$4,000
	5 < 10	\$5,000
	10 < 40	\$6,500
	40 < 100	\$8,000
	≥ 100	\$10,000

### ***Organized Sewage Collection Systems and Modifications***

<b><i>Project</i></b>	<b><i>Cost per Linear Foot</i></b>	<b><i>Minimum Fee- Maximum Fee</i></b>
Sewage Collection Systems	\$0.50	\$650 - \$6,500

### ***Underground and Aboveground Storage Tank System Facility Plans and Modifications***

<b><i>Project</i></b>	<b><i>Cost per Tank or Piping System</i></b>	<b><i>Minimum Fee- Maximum Fee</i></b>
Underground and Aboveground Storage Tank Facility	\$650	\$650 - \$6,500

### ***Exception Requests***

<b><i>Project</i></b>	<b><i>Fee</i></b>
Exception Request	\$500

### ***Extension of Time Requests***

<b><i>Project</i></b>	<b><i>Fee</i></b>
Extension of Time Request	\$150



TCEQ Use Only

# TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

## SECTION I: General Information

<b>1. Reason for Submission</b> (If other is checked please describe in space provided.)		
<input checked="" type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input type="checkbox"/> Other	
<b>2. Customer Reference Number</b> (if issued)	<a href="#">Follow this link to search for CN or RN numbers in Central Registry**</a>	<b>3. Regulated Entity Reference Number</b> (if issued)
CN 600685515		RN

## SECTION II: Customer Information

<b>4. General Customer Information</b>		<b>5. Effective Date for Customer Information Updates</b> (mm/dd/yyyy)	
<input type="checkbox"/> New Customer		<input checked="" type="checkbox"/> Update to Customer Information	
<input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)		<input type="checkbox"/> Change in Regulated Entity Ownership	
<b>The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).</b>			
<b>6. Customer Legal Name</b> (If an individual, print last name first: eg: Doe, John)		<i>If new Customer, enter previous Customer below:</i>	
City of West Lake Hills			
<b>7. TX SOS/CPA Filing Number</b>	<b>8. TX State Tax ID</b> (11 digits)	<b>9. Federal Tax ID</b> (9 digits)	<b>10. DUNS Number</b> (if applicable)
<b>11. Type of Customer:</b>	<input type="checkbox"/> Corporation	<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited
Government: <input checked="" type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Other	<input type="checkbox"/> Sole Proprietorship	<input type="checkbox"/> Other:	
<b>12. Number of Employees</b>		<b>13. Independently Owned and Operated?</b>	
<input checked="" type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 and higher		<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>14. Customer Role</b> (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following			
<input type="checkbox"/> Owner		<input type="checkbox"/> Operator	
<input type="checkbox"/> Occupational Licensee		<input checked="" type="checkbox"/> Owner & Operator	
<input type="checkbox"/> Responsible Party		<input type="checkbox"/> Voluntary Cleanup Applicant	
<input type="checkbox"/> Other:			
<b>15. Mailing Address:</b>	City of West Lake Hills		
	911 Westlake Drive		
	City	West Lake Hills	State TX ZIP 78746 ZIP + 4
<b>16. Country Mailing Information</b> (if outside USA)		<b>17. E-Mail Address</b> (if applicable)	
		tfletcher@westlakehills.gov	
<b>18. Telephone Number</b>	<b>19. Extension or Code</b>	<b>20. Fax Number</b> (if applicable)	
( 512 ) 327-3628		( ) -	

## SECTION III: Regulated Entity Information

<b>21. General Regulated Entity Information</b> (If 'New Regulated Entity' is selected below this form should be accompanied by a permit application)	
<input checked="" type="checkbox"/> New Regulated Entity <input type="checkbox"/> Update to Regulated Entity Name <input type="checkbox"/> Update to Regulated Entity Information	
<b>The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC).</b>	
<b>22. Regulated Entity Name</b> (Enter name of the site where the regulated action is taking place.)	
West Lake Hills Bond Program	

23. Street Address of the Regulated Entity: <i>(No PO Boxes)</i>							
	City		State		ZIP		ZIP + 4
24. County							

**Enter Physical Location Description if no street address is provided.**

25. Description to Physical Location:	Camp Craft Rd from 404 Camp Craft Rd to Eanes School Rd; Eanes School Rd from 223 Eanes School Rd to 304 Camp Craft Rd; Westlake Dr from Bee Cave Rd to Skyline Dr							
26. Nearest City	West Lake Hills				State	TX	Nearest ZIP Code	78746
27. Latitude (N) In Decimal:	30.2910			28. Longitude (W) In Decimal:	97.7997			
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds			
30	17	27.60	97	47	58.87			
29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)		31. Primary NAICS Code (5 or 6 digits)	32. Secondary NAICS Code (5 or 6 digits)				
1611			237310					
33. What is the Primary Business of this entity? <i>(Do not repeat the SIC or NAICS description.)</i>								
City Roadway								
34. Mailing Address:	City of West Lake Hills							
	911 Westlake Drive							
	City	West Lake Hill	State	TX	ZIP		ZIP + 4	
35. E-Mail Address:	tfletcher@westlakehills.gov							
36. Telephone Number	37. Extension or Code			38. Fax Number <i>(if applicable)</i>				
( 512 ) 327-3628				( ) -				

**39. TCEQ Programs and ID Numbers** Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input checked="" type="checkbox"/> Edwards Aquifer	<input type="checkbox"/> Emissions Inventory Air	<input type="checkbox"/> Industrial Hazardous Waste
<input type="checkbox"/> Municipal Solid Waste	<input type="checkbox"/> New Source Review Air	<input type="checkbox"/> OSSF	<input type="checkbox"/> Petroleum Storage Tank	<input type="checkbox"/> PWS
<input type="checkbox"/> Sludge	<input checked="" type="checkbox"/> Storm Water	<input type="checkbox"/> Title V Air	<input type="checkbox"/> Tires	<input type="checkbox"/> Used Oil
<input type="checkbox"/> Voluntary Cleanup	<input type="checkbox"/> Waste Water	<input type="checkbox"/> Wastewater Agriculture	<input type="checkbox"/> Water Rights	<input type="checkbox"/> Other:

**SECTION IV: Preparer Information**

40. Name:	Victoria Ortega, PE	41. Title:	Associate
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
( 512 ) 338-1704		( ) -	vortega@kfriese.com

**SECTION V: Authorized Signature**

**46.** By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	K Friese + Associates	Job Title:	Associate
Name <i>(In Print)</i> :	Victoria Ortega	Phone:	( 512 ) 338- 1704
Signature:	<i>Victoria M Ortega</i>	Date:	7/21/2023